

**NEBOSH IGC COURSE  
SPECIMEN QUESTION &  
ANSWERS**

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## ELEMENT 1 - FOUNDATIONS IN HEALTH AND SAFETY

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the scope and nature of occupational health and safety
- Explain the moral, social and economic reasons for maintaining and promoting good standards of health and safety in the workplace
- Explain the role of national governments and international bodies in formulating a framework for the regulation of health and safety.

### 1.1 - THE SCOPE AND NATURE OF OCCUPATIONAL HEALTH AND SAFETY

#### MEANING OF THE TERMS HEALTH, SAFETY, WELFARE AND ENVIRONMENTAL PROTECTION

**Outline** the meaning of the following terms:

(a) Health;

(b) Safety;

(c) Welfare;

(d) Environmental protection.

Part (a) The term „health“ can be defined as a state of well-being in both a physiological and psychological sense. In occupational terms, it would include not suffering for example from fatigue, stress or noise induced deafness.

Part (b) „Safety“ can be defined as the absence of danger or physical harm to persons, extending in the workplace to things such as equipment, materials and structures.

Part (c) The term „welfare“ relates to the provision of workplace facilities that maintain the basic wellbeing and comfort of the worker such as eating, washing and toilet facilities which enable them to fulfill their bodily functions.

Part (d) „Environmental protection“ may be defined as a measure used to prevent harm to the environment of the world. It prevents harm to air, water, land and natural resources providing protection to flora, fauna and human beings and their inter-relationships

### 1.2 - THE MORAL, SOCIAL AND ECONOMIC REASONS FOR MAINTAINING AND PROMOTING GOOD STANDARDS OF HEALTH AND SAFETY IN THE WORKPLACE

#### REASONS FOR MANAGING HEALTH AND SAFETY

**Outline** the three main reasons why manage health and safety and explain which is the most important of those reasons.

- The Moral, Legal and Financial are three main reasons for promoting good standards of health and safety within an organization.
- The most important reason is MORAL because, we all have moral obligation not to cause harm to others. Employers have a moral obligation toward, their employees and others.
- Moral is increasingly important at a time when employers go to great lengths to encourage their workforce to give commitment.

---

## CONSEQUENCES (COSTS) OF NOT ACHIEVING A GOOD STANDARD OF HEALTH AND SAFETY

**Outline** possible consequences of not achieving good standards of health and safety.

Recognition of the financial and legal implications of poor health and safety performance should be outlined, and include the following considerations:

- Costs of accidents and ill-health in terms of lost production
- Loss of key personnel due to accidents and or ill health or even leaving the company for safer environments (next point)
- Replacement staff costs to cater for those off work due to ill health or injury or those leaving the business to go elsewhere for fear of their health and safety
- Investigation costs relating to accidents and incidents are a lot higher than management and others realise
- Higher insurance premiums will result if the claims history or risk rating of the company is adverse
- Equipment/plant damage and replacement costs
- Legal defence costs that need to be paid in order for a defence to be made by the organisation
- Fines for breaches of health and safety compliance
- Possible imprisonment of persons at various levels for not adhering to the required level of legislative compliance i.e. duty of care.
- Product quality could be affected, as persons who feel that they are not being suitably protected will not have the same degree of care as those that feel their health and safety is being considered
- Resource allocation – if adequate resources are not allocated to health and safety then there is every likelihood deficiencies will arise which may include non compliance with recognised legislative and best practice standards
- Public and employee relations

---

## COST OF ACCIDENTS

Replacement or repair of damaged equipment is a cost that an organisation may incur following an accident at work. **List EIGHT** other possible costs to the organisation following a workplace accident.

Direct costs

These are costs which are directly related to the accident and may be insured or uninsured.

Insured direct costs normally include:

- Claims on employers and public liability insurance
- Damage to buildings, equipment or vehicles
- Any attributable production and/or general business loss.

Uninsured direct costs include:

- Fines resulting from prosecution by the enforcement authority
- Sick pay
- Some damage to product, equipment, vehicles or process not directly attributable to the accident (e.g. Caused by replacement staff)
- Increases in insurance premiums resulting from the accident
- Any compensation not covered by the insurance policy due to an excess agreed between the employer and the insurance company
- Legal representation following any compensation claim.

Indirect costs

These are costs which may not be directly attributable to the accident but may result from a series of accidents. Again these may be insured or uninsured. Insured indirect costs can include:

- A cumulative business loss
- Product or process liability claims
- Recruitment of certain replacement staff.

Uninsured indirect costs include:

- Loss of goodwill and a poor corporate image
- Accident investigation time and any subsequent remedial action required
- Production delays
- Extra overtime payments
- Lost time for other employees, such as a first aider, who attend to the needs of the injured person
- The recruitment and training of most replacement staff
- Additional administration time incurred
- Lower employee morale possibly leading to reduced productivity

---

## ILL-HEALTH ABSENCE COST

**List EIGHT possible costs to an organisation when employees are absent due to work-related ill-health.**

There are a range of costs that have to be considered as having an impact on the organisation, including, but not limited to:

1. Replacement of staff
2. Retraining those who will be replacing those absent
3. Project delays
4. Medical costs
5. Payments while the person is off work
6. Compensation costs (civil)

7. Defence costs of a criminal and/or civil action
8. Adverse publicity
9. Loss of staff motivation which will impact productivity
10. Revision of work processes
11. Investigation costs

---

## ORGANISATIONAL COSTS RELATED TO INADEQUATE STANDARDS OF WORKPLACE HEALTH AND SAFETY

**Identify** the possible costs that an organisation may incur as a result of inadequate standards of workplace health and safety.

The results of providing inadequate standards of workplace health and safety are generally:

An increase in accidents and ill-health of the workers. Consequently an organisation suffers direct costs such as those arising from:

- Lost production and time dealing with the subsequent investigations;
- Those arising from plant damage and replacement and cleanup activities;
- Paying those involved during absences as a result of accident or ill-health;
- Having to recruit and train replacement labour;
- Costs arising from the possibility of action by the enforcement authorities or
- By a civil claim from the injured parties and
- The inevitable rise in insurance premiums.

There are also indirect costs related to:

- Poor staff morale which could lead to industrial unrest and high staff turnover and
- The damage done to the organisation's reputation which could lead to a loss of orders and a subsequent decrease in its profitability.

The better answers structured their responses under the general headings of direct and indirect costs.

---

## BENEFITS TO AN ORGANISATION IN IMPLEMENTING A SUCCESSFUL HEALTH AND SAFETY MANAGEMENT SYSTEM

**Outline** the economic benefits that an organisation may obtain by implementing a successful health and safety management system.

- Reduces risk to an organisation – risk assessments allow the identification and onwards management of risk
- Reduced risk allows/attracts reduced insurance liability coverage
- Ensures legal compliance and as a consequence helps the organisation to avoid costly legal as well as civil actions
- Having less accidents/incidents means that time is more productive and as such would improve overall financial performance (could even have quality improvement connotations).

- There will be cost savings to employers (as stated earlier), individuals – as they will not have earnings affected due to accident/ill-health absence, the economy would benefit by having additional availability of cash and of course society would not be faced with the financial burden of caring for persons who are ill/recovering/disabled due to poor and /or unsafe working practices.
- It would allow target setting and as such economic benefit would be obtained by the company being aware of their performance and effectively managing it accordingly.

---

## MAINTAINING AND PROMOTING HEALTH AND SAFETY STANDARDS

(a) **Explain** reasons for maintaining and promoting good standards of health and safety in the workplace.

(b) **Identify** sources of information that an organisation may use to help maintain and promote good standards of health and safety in the workplace.

(c) **Outline** possible reasons why good standards of health and safety in the workplace may not be achieved.

Part (a),

Answers had structured responses around the moral, legal, social and economic arguments for maintaining good standards of health and safety within an organisation.

The moral argument centres on the need to provide a reasonable standard of care and to reduce the injuries, pain and suffering caused to workers by accidents and ill health

The legal reasons centred on compliance with the law and ILO and other international standards to avoid criminal penalties and to comply with the employer's common law duty to take reasonable care of workers.

Social reasons being concerned with the need to provide a safe place of work, safe plant and equipment, safe systems of work, competent workers and a high standard of training and supervision.

The economic benefits would include:

- A more highly motivated workforce resulting in an improvement in the rate of production and product quality;
- The avoidance of costs associated with accident investigations;
- The avoidance of costs associated with accidents such as the hiring or training of replacement staff and
- The possible repair of plant and equipment;
- Securing more favourable terms for insurance and maintaining the image and reputation of the organisation with its various stakeholders.

Part (b),

Sources of information that an organisation may use to help maintain and promote good standards of health and safety include:

- Legislation including directives and regulations;
- ILO codes of practice, conventions, guidelines and recommendations together with those produced nationally;

- Information produced by the world health organisation (who) and the european agency for safety and health at work;
- International standards such as those from ISO and BSI;
- Guidance produced by the various enforcement agencies;
- Manufacturers' data;
- Information produced by trade associations, trade unions and professional bodies;
- Accident and ill-health data and
- Information emanating from completed risk assessments, inspections and audits.

Part (c)

Reasons why good standards of health and safety may not be achieved in the workplace include:

- A lack of management commitment;
- Poor morale among the workforce and a lack of motivation;
- Frequent changes in the organisation;
- A lack of resources possibly due to a harsh economic climate;
- Conflicting demands with priority being given to production targets and meeting deadlines;
- Poor communication and consultation with the workforce;
- A failure to provide adequate training leading to a lack of awareness amongst workers;
- A failure to complete risk assessments and to produce safe systems of work and method statements;
- Generally poor standards of health and safety in the industry leading to a lack of peer pressure.

---

## COST OF ACCIDENTS

**Identify** possible costs to an organisation following an accident in the workplace.

Possible costs such as those associated with:

- Lost production,
- Staff replacement
- Staff training / retraining
- Staff absence,
- Sick pay,
- Temporary replacement with the need for additional training,
- Repair of damaged plant and equipment,
- Damage to products,
- Investigation and remedial action,
- Additional administration incurred,
- An increase in insurance premiums,
- Fines and compensation awarded,
- Court and other legal representation.
- Costs arising from a loss of business image and
- The detrimental effect on worker morale resulting in reduced productivity.

---

## CONSEQUENCES TO A WORKER INJURED IN A WORKS ACCIDENT



**Identify** possible consequences to workers injured in an accident at work.

Possible consequences to a worker injured in a workplace accident include:

- Pain and suffering and even disability or death with its resultant impact on family life; loss of earnings and future earning capacity following time off work and even loss of current employment;
- Medical expenses and loss of confidence and motivation giving rise to social and psychological problems.

---

## COSTS INCURRED FOLLOWING AN ACCIDENT

Replacement and retraining of staff is a cost that an organisation may face following a workplace accident. **Identify EIGHT** other possible costs to an organisation when a serious accident has occurred at work.

Possible costs include:

- Those associated with lost production;
- Staff absence and sick pay;
- Repair of damaged plant and equipment;
- Damage to products;
- Investigation and remedial action;
- Additional administration incurred;
- An increase in insurance premiums;
- Fines and damages awarded;
- Court and other legal representation.
- A loss of business image and
- The detrimental effect on employee morale resulting in reduced productivity.

You need to read the question – this one looks very similar to a previous one – but here there is clear mention that replacement and retraining of staff have already been considered.

---

## TRAINING – LATER STAGE OF EMPLOYMENT

**Outline** reasons why an employee might require additional health and safety training at a later stage of employment within an organisation.

When a work has been employed by an organisation for some time there may be a need for additional safety training. These needs can vary, and may include:

- A general refresher – as over a period of time a persons focus may shift and thus they may not be as safety focused as they should be – this may be an issue if a person has not had an accident and therefore may become complacent.
- To ensure that there is a consistent approach to safe systems of work which may have changed over time and therefore the worker may be somewhat out-dated in their knowledge.
- The workplace and work practices may have changed without the worker being consciously aware of them.
- The worker may have moved locations within the same premises and is not aware of some of the potential hazards in the present location.

- It may identify further training needs of the individual – this may be an issue with technological advancement.
- Ensuring that the worker remains positive in their health and safety attitude and helps to foster a better and more positive health and safety culture

---

## TRAINING – LEVELS OF SUPERVISION REQUIRED

**Outline** the factors that may determine the level of supervision an employee should receive during their initial period within a company.

The level of supervision required during their initial period with a company will be dependant on a host of factors and may include some, or all of the following:

- Complexity of the work to be undertaken
- Age of the individual
- The attitude of the individual
- Any special needs
- Previous experience
- Previous situation reports (past accident situations)
- The peer group attitude
- Type of PPE that may be required and the need for correct use (i.e. harness – can fall into incorrect use – over a time period)
- Level of supervision available
- Type of work being undertaken
- Substances used and likely effects
- Legal requirements

---

## TRAINING PROGRAMME - FACTORS

**Identify** the factors to be considered while developing a health and safety training programme for an organization

- The objectives of the training - what do you hope to achieve by giving the training and what the participants will obtain from it
- The trainer - whether in-house or external - will have a major impact on the effective presentation of the training and thus the information retention of the participants
- The venue in which the training is held can have a significant effect on the training in general if it is in poor condition or poorly resourced, the training will be less successful than if it is at least in a good condition and comfortable
- The number of people involved in the training will affect the quality of the training - in some cases larger numbers allow for greater group interaction, which can help, whilst in other cases smaller numbers allow for more teacher - participant interaction which can also help
- The means of delivering the teaching will significantly affect most of the other factors here, although it does not necessarily have to be the deciding factor
- The company culture and the support from the management team is also a significant factor in the planning of training delivery

---

## TRAINING – MEASURING ITS EFFECTIVENESS

**Identify** the various measures that might be used to assess the effectiveness of the training

There are a range of measures that may be used to assess the effectiveness of training, including:

- Participation of attendees
- Level of response
- Ability to correctly respond to questions
- Being able to demonstrate understanding
- On the job follow-up for compliance
- Reduction of accidents / incidents in aspects of the training delivered
- Formal feedback from attendees
- Personal feedback
- Others asking for similar training
- Attentiveness throughout

---

## TRAINING RECORDS

**Outline** the reasons why it is important for an employee to keep the training records of his employees

- May be legal requirements
- May assist in developing training plans / identifying gaps
- May be required for evidence following an incident / accident
- May reduce penalties in a court of law
- Insurance premium reviews
- Completing risk assessments
- CPD for the worker
- To save duplication of training
- Management system compliance.

### 1.3 - THE ROLE OF NATIONAL GOVERNMENTS AND INTERNATIONAL BODIES IN FORMULATING A FRAMEWORK FOR THE REGULATION OF HEALTH AND SAFETY

---

## HEALTH AND SAFETY RESPONSIBILITIES OF EMPLOYERS AND ENFORCEMENT ACTIONS

(a) **Outline** the main health and safety responsibilities of employers.

(b) **Identify** actions an enforcement authority might take if it finds that an employer is not meeting its responsibilities.

Part (a)

The main health and safety responsibilities of an employer are:

- To provide and maintain safe plant and equipment,
- To carry out risk assessments

- To introduce safe systems of work;
- To ensure the safe use, storage, handling and transport of articles and substances;
- To provide and maintain a safe workplace, including access and egress;
- To provide a safe working environment with adequate welfare facilities including first aid,
- To provide information, instruction, training and supervision for workers.
- To prepare and revise a health and safety policy;
- To cooperate with and consult with workers;
- To secure competent health and safety advice and to cooperate with other employers at the workplace.

This part of the question was generally well answered though some candidates continue to provide a list instead of the additional detail required by an „outline „question.

Part (b),

Possible actions should be identified, such as:

- Giving advice or warning either verbally or in writing;
- Requiring that an improvement is made within a given period of time;
- Requiring the cessation of work until improvements in health and safety are made; and
- Taking formal legal proceedings such as prosecution.

---

## RESPONSIBILITIES OF EMPLOYERS AND WORKERS

**Outline** the main health and safety responsibilities of:

(a) Employers;

(b) Workers.

Part a)

The main health and safety responsibilities of an employer are:

- To provide and maintain a safe workplace including access and egress together with safe plant and equipment;
- To carry out risk assessments and to introduce safe systems of work;
- To ensure the safe use, storage, handling and transport of articles and substances;
- To provide a safe working environment with adequate welfare facilities including first aid;
- To provide information, instruction, training and supervision for workers.
- To prepare and when necessary to revise a health and safety policy;
- To co-operate with and consult with workers; to secure competent health and safety advice and
- To cooperate with other employers at the workplace.

Part b)

Workers have the responsibility:

- To cooperate with their employer,
- To take reasonable care for their own safety and that of their fellow workers
- To report accidents and any dangerous situations at the workplace.
- Not to misuse any equipment provided for them,

- To follow site rules and
- Should not take alcohol or drugs during their working time.

---

## POWERS OF INSPECTORS AND ENFORCEMENT NOTICES

(a) **Outline** FOUR powers available to an inspector when investigating a workplace accident.

(b) Identify the two types of enforcement notice that may be served by an inspector, stating the conditions that must be satisfied before each type of notice is served.

Part a)

An inspector has the right to:

1. Enter premises at any reasonable time, accompanied by a police officer, if necessary
2. Examine, investigate and require the premises to be left undisturbed
3. Take samples, photographs and, if necessary, dismantle and remove equipment or substances
4. Require the production of books or other relevant documents and information
5. seize, destroy or render harmless any substance or article
6. Issue enforcement notices and initiate prosecutions.
7. An inspector may issue a formal caution when an offence has been committed but it is deemed that the public interest does not require a prosecution. Formal cautions are not normally considered if the offender has already had a formal caution.

Part b)

There are two types of enforcement notices.

1. Improvement notice – This identifies a specific breach of the law and specifies a date by which the situation is to be remedied.
2. Prohibition notice – This is used to halt an activity which the inspector feels could lead to a serious personal injury. The notice will identify which legal requirement is being or is likely to be contravened. The notice takes effect as soon as it is issued.

There are two forms of prohibition notice:

- An immediate prohibition notice – this stops the work activity immediately until the specified risk is reduced
- A deferred prohibition notice – this stops the work activity within a specified time limit.

---

## INFORMATION SOURCES

**Outline** the sources of published information that may be consulted when dealing with a health and safety problem at work.

The sources of this information may be internal to the organization and/or external to it.

Internal sources, which should be available within the organization include:

- Accident and ill-health records and investigation reports
- Absentee records
- Inspection and audit reports undertaken by the organization and by external organizations such as the HSE
- Maintenance, risk assessment (including COSHH) and training records
- Documents which provide information to workers
- Any equipment examination or test reports.

External sources, which are available outside the organization, are numerous and include:

- Health and safety legislation
- HSC/HSE publications, such as approved codes of practice, guidance documents, leaflets, journals, books and their website
- International (e.g. ILO), European and British standards
- Health and safety magazines and journals
- Information published by trade associations, employer organizations and trade unions
- Specialist technical and legal publications
- Information and data from manufacturers and suppliers
- The internet and encyclopedias.

## HEALTH AND SAFETY MANAGEMENT SYSTEMS 1 - POLICY

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the key elements of a health and safety management system
- Explain the purpose and importance of setting policy for health and safety
- Describe the key features and appropriate content of an effective health and safety policy.

### 2.1 - THE KEY ELEMENTS OF A HEALTH AND SAFETY MANAGEMENT SYSTEM

#### MANAGEMENT SYSTEM

Describe the main components of a health and safety management system

The main components of a management system are:

- Policy,
- Organisation
- Planning and Implementation.
- Measuring performance,
- Reviewing Performance,
- Audit and
- Continuous Improvement.

The components are explained as follows:

Policy - should contain:

- Protecting the safety and health of all members of the organization by preventing work related injuries, ill health, diseases and incidents.
- Complying with relevant occupational safety and health national laws and regulations, voluntary programmes, collective agreements on occupational safety and health and other requirements to which the organization subscribes.
- Ensuring the workers and their representatives are consulted and encouraged to participate actively in all elements of the occupational health and safety management system: and
- Continually improving the performance of the occupational safety and health management system.
- Signed / endorsed by senior management and cascaded to all employees.
- Continued.....

Organization Section should ideally contain:

- A chart illustrating the management structure so far as health and safety is concerned.

- The section should also show details of employees from the lowest levels to the highest with key personnel identified by name as well as by job title.
- Also arrangements, procedures, instructions or other internal documents used within the framework of the occupational safety and health management system.

#### Planning and Implementation

- An effective planning system for health and safety requires organisation's to establish and operate a health and safety management system that, controls risk defects to changing demands in a bid that sustains a positive health and safety culture.

#### Measuring Health and Safety

- Performance must be monitored at all levels of the organisation from day to day monitoring by line managers and supervisors to periodic audits of management systems.
- Performance measurement techniques fall into two broad categories:

1. Reactive monitoring which monitor accidents, ill health and incidents

2. Active monitoring which measure the effectiveness of management systems and the extent of compliance with standards and the achievement of plans.

#### Reviewing Performance

- Annual or periodic review of the performance to ensure the system is working on the ground and assess if any of the components need more attention.

#### Audit

- An audit is riot intended to identify all of the hazards, it is intended as an evaluation of health and safety management systems, and is often independent.

#### Continuous Improvement

- When each of the above have been properly progressed the result should be an improvement in the occupational health and safety status of the organisation, which, upon further reviews into the future will enable even more improvements to be achieved.

---

### MANAGEMENT SYSTEM – KEY ELEMENTS – HSG 65

**Outline** the key elements of a health and safety management system.

HSG65 model - outline the six elements in the model,

1. „Policy“ which should be a clear statement of intent, setting out the main health and safety aims and objectives of the company and the commitment of management. Then,
2. „Organising for health and safety“ which should ensure the allocation of responsibility to members of the workforce with the emphasis on achieving competency and control, together with effective systems for communication and consultation with the workforce. Then



3. „Planning and implementing“ that should involve the setting of standards and targets, the completion of hazard identification and risk assessments and the introduction of appropriate control measures. Then
4. „Measuring and evaluating performance“ would need to be put in place using proactive and reactive monitoring systems to provide data on the achievement or non-achievement of the objectives and targets set. Finally
5. „Audit“ should be carried out to check whether what was planned was actually taking place, and
6. „Review“ to consider options for improvement and to set new targets where necessary.

---

## MANAGEMENT SYSTEM – KEY ELEMENTS – OHSAS 18001

### Outline the key elements of a health and safety management system.

1. “Policy”, which would be appropriate to the nature and scale of the organisation’s health and safety risks, include a commitment to the prevention of injury and ill health and to comply at least with applicable legal requirements. Then
2. „Planning“, would include the introduction of procedures for hazard identification and risk assessment and for identifying and accessing the legal and other health and safety requirements that were applicable to the organisation. It would also be necessary to establish health and safety objectives for relevant functions and levels within the organisation. Then,
3. „Implementation and operation“, where senior management would have to demonstrate its commitment, ensure effective lines of communication throughout the organisation and seek effective consultation with and participation by the workforce. Then
4. „Checking“ would be concerned with monitoring the extent to which the organisation’s health and safety objectives are being met and the effectiveness of the risk control measures that have been introduced then
5. „Management review“ would be an examination of the results of internal audits and an evaluation of compliance with applicable legal requirements and other requirements to which the organisation subscribes, assess the extent to which objectives have been met and recommend further improvement that would need to be made.

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## HEALTH AND SAFETY MANAGEMENT SYSTEMS – GENERAL COMPONENTS

### Outline the main components of a health and safety management system

- Policy
- Organisation
- Planning
- Implementing
- Measuring Performance
- Auditing with Checking and Corrective Actions
- Reviewing Performance for Continual Improvement

Can be remembered using POPIMAR

## 2.2 - THE PURPOSE AND IMPORTANCE OF SETTING POLICY FOR HEALTH AND SAFETY

### HEALTH AND SAFETY POLICY

(a) **Outline** the purpose of the three main sections of an organisation's health and safety policy.

(b) **Give** reasons why the health and safety policy should be signed by the most senior person in an organisation, such as a Managing Director or Chief Executive Officer.

Part (a) of this question is intended to test candidates' understanding of health and safety policies and their structure.

Initial referral to the „statement of intent“ which both demonstrates management's commitment to health and safety and sets goals and objectives for the organisation,

Moving on to the „organisation“ section, the purpose of which is to allocate health and safety responsibilities within the company and to ensure effective delegating and reporting and

Finally the “arrangements” section which sets out in detail the systems and procedures that show how the policy is to be implemented.

Those who do not do so well outline the contents of the sections rather than their purpose.

For part (b),

The signature of the most senior person in the organisation would demonstrate management commitment and this would give authority to the policy or that the person concerned ultimately had responsibility for health and safety in the organisation.

### SIGNING OF THE POLICY STATEMENT

**Explain** why a health and safety policy should be signed by the most senior person in an organisation, such as a Managing Director or Chief Executive and include the signing date.

- The statement should be signed and dated by the most senior person in the organisation.
- This will demonstrate management commitment to health and safety and give authority to the policy.
- It will indicate where ultimate responsibility lies and the frequency with which the policy statement is reviewed.

### IMPORTANCE OF DEFINING ROLES AND RESPONSIBILITIES FOR HEALTH AND SAFETY

**Outline** why it is important that all persons in an organisation are aware of their roles and responsibilities for health and safety.

Ensuring that all persons in an organisation are aware of their roles for health and safety will assist in defining their individual responsibilities and will indicate the commitment and leadership of senior management.

A clear delegation of duties will assist in sharing out the health and safety workload and will ensure contributions from different levels and jobs

Defining roles and responsibilities will help to set up clear lines of reporting and communication as well as assisting in defining individual competencies and training needs particularly for specific roles such as first aid and fire.

Finally, making individuals aware of their own roles and responsibilities will indicate to them that health and safety is seen as a core function of the job, will increase their motivation and help to improve the health and safety culture within the organisation as a whole.

## 2.3 - THE KEY FEATURES AND APPROPRIATE CONTENT OF AN EFFECTIVE HEALTH AND SAFETY POLICY

### HEALTH AND SAFETY POLICY COMMUNICATION

**Outline** the various methods for communicating the contents of a health and safety policy to a workforce.

The policy statement of intent should be

- Posted on prominent notice boards throughout the workplace and
- Brought to the attention of all employees at induction and refresher training sessions.

It can also be communicated to the workforce:

- During team briefing sessions,
- At „toolbox“ talks which are conducted at the workplace or
- Directly by email, intranet,
- Newsletters or
- Booklets.
- It should be a permanent item on the agenda for health and safety committee meetings where it should be reviewed at each meeting.

### STATEMENT OF INTENT – CONTENT

(a) **Identify** the typical content of the 'statement of intent' section of an organisation's health and safety policy document.

(b) **Outline** the factors that may indicate that health and safety standards within an organisation do not reflect the objectives within the 'statement of intent'.

Part a)

The following points should be included or considered when a health and safety policy statement is being drafted:

- The aims should cover health and safety, welfare and relevant environmental issues
- The position of the senior person in the organization or company who is responsible for health and safety (normally the chief executive)
- The names of the health and safety adviser and any safety representatives

- A commitment to the basic requirements of the relevant health and safety legislation (access, egress, risk assessments, safe plant and systems of work, use, handling, transport and handling of articles and substances, information, training and supervision)
- A commitment to the additional requirements of the good management of health and safety in the workplace (risk assessment, emergency procedures, health surveillance and employment of competent persons)
- Duties towards the wider general public and others (contractors, customers, students, etc.)
- The principal hazards in the organization
- Specific policies of the organization (e.g. Smoking policy, violence to staff, etc.)
- A commitment to employee consultation possibly using a safety committee or plant council
- Specific performance targets for the immediate and long term future.

Part b)

The factors that may indicate that health and safety standards within an organisation do not reflect the objectives within the 'statement of intent' are numerous and may include:

- Absence and accident rates deteriorating or not achieving their target
- Enforcement actions following non-compliance to legislative standards
- Non-conformances being raised at times such as audits and inspections
- Increase of complaints by workers regarding conditions
- Risk assessments not being reviewed in a timely manner
- Trainings that are health and safety related are not taking place or are not refreshed if and when required.
- Persons not conforming to safe systems of work indicating a slipping / negative safety culture

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## HEALTH AND SAFETY TARGET SETTING

a) **Explain why it is important for an organisation to set targets in terms of its health and safety performance**

Here an alternative question may be – Explain how accident data can be used to improve health and safety performance within an organisation.

b) **Outline SIX types of target that an organisation might typically set in relation to health and safety.**

Part a)

Health and safety performance targets are an important part of the statement of intent because:

- They indicate that there is management commitment to improve health and safety performance
- They motivate the workforce with tangible goals resulting, perhaps, in individual or collective rewards
- They offer evidence during the monitoring, review and audit phases of the management system.

Part b)

The following list, which is not exhaustive, shows common health and safety performance targets:

- A specific reduction in the number of accidents, incidents and cases of work-related ill-health (perhaps to zero)

- A reduction in the level of sickness absence
- A specific increase in the number of employees trained in health and safety
- An increase in the reporting of minor accidents and „near miss“ incidents
- A reduction in the number of civil claims
- No enforcement notices from the local authority
- A specific improvement in health and safety audit scores
- The achievement of a nationally recognised health and safety management standard, such as OHSAS18001.

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## HEALTH AND SAFETY TARGETS – REASONS TO ESTABLISH

**Outline** the reasons why an organisation should establish health and safety targets

There are several reasons for an organisation to set health and safety targets:

- Evidence of management commitment
- To prioritize and focus on important health and safety issues
- To motivate staff by giving them something tangible to aim for and to encourage their ownership
- To enable performance with standards to be measured and to identify improvements that have been made
- To enable trends to be identified
- To meet the standards of the health and safety management systems
- To highlight the important part that targets can play in facilitating the measurement and review of performance

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## SAFETY TARGETS RELATED TO THE „STATEMENT OF INTENT“

**Identify** a range of health and safety targets that may be included in the ‘statement of intent’ section of a health and safety policy.

Targets that might be included in the statement of intent section of a health and safety policy could include such targets as

- Compliance by the organisation with the requirements of relevant legislation;
- A reduction in the number of accidents and cases of ill-health;
- The completion of an assessment of all risks in the workplace and its review within a defined time scale;
- The provision to all workers of the necessary information, instruction and training to ensure their competence;
- The maintenance of exposure levels below defined limits;
- Full consultation with the workforce on health and safety issues;
- The provision of sufficient resources to secure the above targets;
- Increasing the number of trainings delivered related to health and safety.

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## ROLES AND RESPONSIBILITIES FOR HEALTH AND SAFETY RE DIRECTORS, SUPERVISORS, WORKERS AND PERSONS WITH PRIMARY HEALTH AND SAFETY FUNCTIONS

**Outline** the health and safety roles and responsibilities of:

(a) Directors and senior managers;

(b) Supervisors;

(c) Workers;

(d) Person(s) with primary health and safety functions, e.g. Health and safety officer.

Part (a)

The main health and safety responsibilities of directors and senior managers are to

- Prepare and sign a health and safety policy
- Set goals and objectives for the organisation;
- Lead by example and
- Demonstrate commitment;
- Allocate responsibilities for health and safety throughout the organisation and
- Set aside sufficient resources such as for example for training those who have been allocated special roles;
- Secure competent health and safety advice such as by appointing a health and safety advisor; and
- Receive monitoring reports and instigate action to rectify any deficiencies that have been found.

Part (b)

Responsibilities of supervisors - they should:

- Control work in their area of responsibility and set a good example.
- Take part in carrying out risk assessments,
- Take part in the development of safe systems of work and ensure that members of their teams are fully briefed on the systems once they have been introduced.
- Carry out inspections of their working areas and deal with any unsafe conditions or actions, reporting to managers if in any situation they personally do not have the power to take the necessary action.
- They have an important role to play in training, coaching and mentoring members of their team.

Part (c)

The roles and responsibilities of workers include:

- Taking reasonable care of themselves and their fellow workers,
- Refraining from misusing equipment provided for their health and safety,
- Co-operating with their employer by following safe systems of work;
- Reporting accidents and unsafe situations to their supervisor or other nominated member of management.

- They also have an important role to play in taking an active part in any consultation exercise set up by the employer.

Part (d)

A person with primary health and safety functions such as a health and safety officer would be expected to

- Provide expert advice on matters of health and safety;
- Assist in the development of the health and safety policy and procedures and their periodic reviews;
- Intervene when he/she comes across any unsafe conditions or acts;
- Keep health and safety records such as for accidents and any apparent trends; and
- Liaise with representatives of external agencies.

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## ISSUES ON WHICH EMPLOYERS CONSULT WORKERS

**Outline** EIGHT health and safety issues on which employers should consult their workers.

There are a range of issues that employers should consult their workers, these include, but are not limited to:

1. The provision and use of PPE
2. Safe systems of work
3. Health and safety risk assessments
4. Training issues
5. The introduction of processes, etc. that may affect workers health and or safety
6. Changes of materials being used
7. Organisational structure changes
8. The arrangements for appointing and/or nominating competent persons to assist in complying with health and safety obligations/requirements
9. Emergency arrangements and procedures
10. Welfare issues
11. Incentive schemes
12. Introduction of policies e.g. no smoking, drug/substance abuse and use, alcohol use and abuse.

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## COMMUNICATION – BARRIERS

**Give** reasons why a verbal instruction may not be clearly understood by a site operative.

Reasons should include:

- Noise and distractions may mean that persons are unable to clearly hear what is being said

- Use of technical jargon may mean that people mis-understand the information being communicated
- Complexity of information sometimes meets with the information receivers turning their minds off and not listening as they do not understand what is trying to be communicated
- Communication is ambiguous
- Language / dialect barriers is a big problem in some regions, both from the communicator or the receiver, sometimes the same words have different meanings or implications
- Sensory impairment for example a receiver having a hearing deficiency or the communicator having a serious stammer
- Mental difficulty may mean the receiver is not capable of absorbing information to any extent
- Lack of attention by persons clearly not interested in the topic
- Inexperience of persons not used to having to receive information at work i.e. young workers
- Lengthy communication chains may be a problem if translations are required covering several languages – sometimes a problem in the Middle East for example.

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## EFFECTIVENESS OF CONSULTATION

**Explain** how arrangements for consultation with workers may be made more effective.

Arrangements for consultation with workers might be made more effective by:

- The establishment of safety committees;
- Consultation with elected representatives of employee safety;
- Planned direct consultation at departmental meetings,
- Team meetings, tool box talks and staff appraisals;
- Consultation as part of an accident or incident investigation or as part of a risk assessment;
- Day to day informal consultation by supervisors with their team;
- Questionnaires and suggestion schemes.

If formal meetings are to be held, it is important to ensure that:

- There is a correct balance between management and worker representation;
- That an agenda is set and the meeting well managed by the chair;
- That the business of the meeting is not side tracked by discussion of non health and safety issues;
- That minutes of and report back from the meeting are made available to the workforce as a whole and
- That actions agreed receive attention without undue delay.

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## HEALTH AND SAFETY POLICY – POLICY REVISION CIRCUMSTANCES

**Outline** the circumstances that may give rise to a need for a health and safety policy to be revised

A health and safety policy is not a static document and should be reviewed at regular intervals, those intervals can be determined by certain factors and they include:

- Passage of time - at least annually is there have not been organisational changes.
- Technological changes (research development) and advancements have led to a better understanding of work practices and as a consequence has indicated a need for change in working practices



- Introduction of new technology - when new technology has been introduced into the workplace that may pose further hazards,
- Organisational changes where there has been a shift in accountabilities and/or responsibilities
- Legal changes – that may impose fresh requirements on an organisation within the work processes that it undertakes.
- Accident patterns - if a pattern of accidents, accidents in a certain area have been highlighted, a single significant accident – accidents tend to indicate a management system failure.

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## INTERNAL AND EXTERNAL INFLUENCES THAT MAY INFLUENCE A POLICY REVIEW

**Outline** FOUR external AND FOUR internal influences that might initiate a health and safety policy review.

External Influences:

1. Changes in legislation and guidance;
2. Action by the enforcement authority;
3. A civil claim and/or advice from an insurance company;
4. Information from manufacturers;
5. Client considerations or complaints;
6. Suggestions from professional bodies or trade unions
7. As a result of an audit by an external body.

Internal influences:

1. Significant changes in the structure of the organisation;
2. Alterations to working arrangements;
3. After the introduction of new or changed processes or work methods;
4. Following changes in key personnel;
5. Where risk assessments, monitoring exercises or accident investigations show that the policy is no longer effective or relevant;
6. Following consultation with employees and after a sufficient period of time has elapsed since the previous review to suggest that another one is due.

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## HEALTH AND SAFETY POLICY – ARRANGEMENTS

**Outline** the typical issues included in the arrangement section of the Health and safety policy

The arrangements section of the health and safety policy document should state how the organisation, through the responsibilities of the people identified in the organisation section, will carry out the general intentions given in the statement.

This is the most company-specific part of the policy and should have details of procedures for controlling risks identified by the risk assessments.

Arrangements and procedures will control the significant risks identified in the risk assessments, which can involve any combination of:

1. Inspection Regimes
2. Maintenance Arrangements
3. Operating Procedures
4. Training, supervision or monitoring procedures which are needed to control an identified risk.
5. Risk Assessments
6. Safe System Of Work
7. Emergency Arrangements – Fire / First Aid – Accident / Spillages
8. Training – Analysis, Programs, Tool Box Talks
9. Permits To Work
10. Statistic Gathering
11. Accident / Incident Investigation
12. Accident Reporting
13. Safety Committee Protocols – Structure, Constitution
14. Controlling Exposure to Workplace Hazards
15. Health Monitoring

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## TECHNIQUES USED TO IMPROVE HEALTH AND SAFETY STANDARDS – INSPECTIONS, EXTERNAL AUDITS AND ANALYSIS OF ACCIDENT STATISTICS

**Outline** how the following techniques may be used to improve health and safety performance within an organisation.

- (a) Safety inspections.

(b) Externally led health and safety audits.

(c) Analysis of accident statistics.

Part (a)

Safety inspections may be used to improve health and safety performance within an organisation in a number of ways including:

- Identifying hazards and the appropriate remedial action before accidents have occurred;
- Showing management's commitment to health and safety and improving the morale of the workforce;
- Enabling the involvement of employees in the management of health and safety and if carried out on a regular basis, identifying trends and weaknesses in existing procedures.

Part (b),

The findings of a health and safety audit may be used for improving health and safety performance by:

- Providing an objective and expert assessment of actual performance against set standards,
- Identifying the strengths and weaknesses of the existing system
- Enabling targets and objectives to be set and reviewed thus helping to ensure continuous improvement.

Part (c)

An analysis of accident statistics may be used:

- To identify trends and problem areas in order that resources can be allocated, appropriate remedial actions taken and targets set;
- To enable comparisons to be made with other like organisations;
- To provide information to employees in order to focus and stimulate discussion at joint consultation meetings;
- To show the costs to the organisation of the accidents that occurred.

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the health and safety roles and responsibilities of employers, managers, supervisors, workers and other relevant parties
- Explain the concept of health and safety culture and its significance in the management of health and safety in an organisation
- Outline the human factors which influence behaviour at work in a way that can affect health and safety
- Explain how health and safety behaviour at work can be improved
- Outline the need for emergency procedures and the arrangements for contacting emergency services
- Outline the requirements for, and effective provision of, first aid in the workplace.

### 3.1 - ORGANISATIONAL HEALTH AND SAFETY ROLES AND RESPONSIBILITIES OF EMPLOYERS, DIRECTORS, MANAGERS, WORKERS AND OTHER RELEVANT PARTIES

#### ORGANISATION SECTION – RESPONSIBILITY HOLDERS

**Identify SIX categories of persons who may be shown in the 'organization' section of a health and safety policy document AND state their likely general or specific health and safety responsibilities.**

1. Directors and senior managers (responsible for setting policy, objectives and targets)
2. Supervisors (responsible for checking day-to-day compliance with the policy)
3. Safety advisers (responsible for giving advice during accident investigations and on compliance issues)
4. Other specialist, such as an occupational nurse, chemical analyst and an electrician (responsible for giving specialist advice on particular health and safety issues)
5. Safety representatives (responsible for representing employees during consultation meetings on health and safety issues with the employer)
6. Employees (responsible for taking reasonable care of the health and safety of themselves and others who may be affected by their acts or omissions)
7. Fire marshals (responsible for the safe evacuation of the building in an emergency)
8. First aiders (responsible for administering first aid to injured persons)

For smaller organizations, some of the specialists mentioned above may well be employed on a consultancy basis.

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## MANAGEMENT COMMITMENT

Identify EIGHT indicators of management commitment to health and safety in the workplace.

1. An important indicator of management commitment to health and safety in the workplace is the part played by a senior manager in signing the health and safety policy and then
2. In ensuring that the policy is implemented and enforced;
3. Sufficient resources such as finance, equipment;
4. Provision of training are provided to support the implementation;
5. Participation in monitoring procedures such as inspections and audits;
6. Ensuring rapid implementation of any recommendations made from health and safety audits, meetings, investigations and/or initiatives;
7. Personal observance of all safety rules such as wearing personal protective equipment and using pedestrian walkways;
8. Participation in meetings of the safety committee and ensuring that health and safety is a regular agenda item in other meetings at all levels;
9. Engaging in consultation with the workforce and welcoming employee feedback; and in
10. Initiating and being personally involved in the delivery of health and safety training courses.

This question is not usually well answered with many candidates identifying general safety management issues, rather than individual managers' participation and behaviour.

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## CONTRACTOR EVALUATION CRITERIA

Identify the criteria when selecting a contractor

Fortunately, a contractor who works well and meets the client's requirements in terms of the quality and timeliness of the work is likely also to have a better than average health and safety performance.

Cost, of course, will have to be part of the judgement but may not provide any indication of which contractor is likely to give the best performance in health and safety terms.

In deciding which contractor should be chosen for a task, the following should be considered:

- Do they have an adequate health and safety policy?
- Can they demonstrate that the person responsible for the work is competent?
- Can they demonstrate that competent safety advice will be available?
- Do they monitor the level of accidents at their work site?
- Do they have a system to assess the hazards of a job and implement appropriate control measures?
- Will they produce a method statement, which sets out how they will deal with all significant risks?
- Do they have guidance on health and safety arrangements and procedures to be followed?

- Do they have effective monitoring arrangements?
- Do they use trained and skilled staff who are qualified where appropriate? (Judgement will be required, as many construction workers have had little or no training except training on the job.)?
- Can the company demonstrate that the employees or other workers used for the job have had the appropriate training and are properly experienced and, where appropriate, qualified?
- Can they produce good references indicating satisfactory performance?

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## SHARED WORKPLACE – ENSURING HEALTH AND SAFETY

**Outline** how the organisations could work together to help ensure the workplace is safe and healthy.

In order to ensure a safe and healthy workplace, the two organisations could:

- Hold regular meetings of their managers;
- Share information and risk assessments in order to avoid carrying out incompatible processes and activities and using incompatible substances;
- Prepare and agree joint site rules for the workplace for example for assembly points and smoking areas;
- Set up joint procedures for the management of visitors and contractors;
- Agree on procedures for the management of traffic and the movement of vehicles;
- Carry out joint inspections investigations and monitoring of the workplace;
- Draw up joint emergency procedures and introduce fire drills for the work site as a whole; agree a policy for the management of waste and
- Introduce joint safety committees and worker representatives.

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## ACHIEVING EMPLOYEE CO-OPERATION AND CO-ORDINATION IN A SHARED WORKPLACE

**Outline** the issues that should be considered to achieve co-operation and co-ordination where employers share a workplace.

The issues that should be considered to achieve cooperation and coordination in a shared workplace include:

- The need for all employers to share information on the hazards and risk associated with their particular activity;
- The maintenance of access and egress to the workplace and the control of access by visitors and others;
- The maintenance and cleanliness of shared and public areas;
- The control of vehicle movement in the workplace;
- The preparation of procedures for dealing with serious or imminent danger and emergencies;
- The appointment of key personnel with specific responsibility for matters such as fire and first aid;
- The provision of joint first aid facilities;
- The allocation of responsibility for environmental controls such as heating, ventilation and air conditioning;
- The maintenance and cleanliness of welfare facilities; and
- The provision of security arrangements to deal with unwelcome visitors and/or trespassers.

There would also be advantage in mentioning the there may be additional requirements under specific legislation in some countries e.g. the UK Management of Health, Safety and Welfare Regulations

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## DUTIES OF DESIGNERS, MANUFACTURERS AND SUPPLIERS

**Outline** the general duties of designers, manufacturers and suppliers of articles and substances for use at work to ensure that they are safe and without risk to health.

Everyone in the supply chain, from the designer to the final installer, of articles of plant or equipment for use at work to:

- Ensure that the article will be safe and without risk to health at all time when it is being set, used, cleaned or maintained
- Carry out any necessary testing and examination to ensure that it will be safe, and
- Provide adequate information about its safe setting, use, cleaning, maintenance, dismantling and disposal.

There is an obligation on designers or manufacturers to do any research necessary to prove safety in use.

Erectors or installers have special responsibilities to make sure, when handed over, that the plant or equipment is safe to use.

Similar duties are placed on manufacturers and suppliers of substances for use at work to ensure that the substance is safe when properly used, handled, processed, stored or transported, to provide adequate information and do any necessary research, testing or examining.

Where articles or substances are imported, the suppliers' obligations outlined above attach to the importer, whether a separate importing business or the user personally.

Often items are obtained through hire purchase, leasing or other financing arrangements with the ownership of the items being vested with the financing organization.

Where the financing organization's only function is to provide the money to pay for the goods, the supplier's obligations do not attach to them.

## 3.2 - CONCEPT OF HEALTH AND SAFETY CULTURE AND ITS SIGNIFICANCE IN THE MANAGEMENT OF HEALTH AND SAFETY IN AN ORGANISATION

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### SAFETY CULTURE – REASONS FOR ITS DECLINE

**Outline** the factors that might cause the safety culture within an organisation to decline/deteriorate.

There are other indications of a poor health and safety culture or climate. These include:

- A high sickness, ill-health and absentee rate amongst the workforce
- The perception of a blame culture

- High staff turnover leading to a loss of momentum in making health and safety improvements
- No resources (in terms of budget, people or facilities) made available for the effective management of health and safety
- A lack of compliance with relevant health and safety law and the safety rules and procedures of the organization
- Poor selection procedures and management of contractors
- Poor levels of communication, cooperation and control
- A weak health and safety management structure
- Either a lack or poor levels of health and safety competence
- High insurance premiums.

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## SAFETY CULTURE – SPHERES OF INFLUENCE

**Name** the three spheres of influence related to 'Safety Culture' and explain how these three spheres of influence interact to ensure safety at work.

The three spheres of influence related to Safety Culture are:

1. Organisation (the organisational controls from management)
2. People (employees, contractors, sub-contractors, etc.)
3. Job (the tasks undertaken)

The three spheres of influences are known to work together to influence and foster a positive safety culture.

The organisation that ensure a safe place of work, information, training, instruction, and supervision, together with good risk controls sets the scene for employees to work in a secure and well motivated environment.

With this the people within the organisation and those connected to it should be competent and believe in the goals and preventative measures set by management, this forms a team of well-motivated employees.

The third sphere of influence is essential to complete the interrelation of the three spheres of influence. This is the on-going tasks / jobs, which if well organised and controlled by management with good communication, consultation and supervision will go a long way to ensuring and reinforcing a positive safety culture.

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## SAFETY CULTURE – WHAT IS IT?

**Define** the term 'Health and Safety Culture'.

The health and safety culture is related to attitudes and shared perceptions and the product of individual and group values as well as patterns of behaviours based on competence and confidence and on communications founded on mutual trust.



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## PROMOTING A POSITIVE CULTURE – CONTROL, CO-OPERATION, COMPETENCE, COMMUNICATION

Identify ways in which the following can be achieved to help promote a positive health and safety culture in a workplace:

- (a) Control;
- (b) Co-operation;
- (c) Competence;
- (d) Communication.

Part (a)

„Control,, might help to promote a positive health and safety culture in the workplace by for example,;

- Appointing a senior person in the organisation to monitor the implementation of the health and safety policy;
- Ensuring health and safety management procedures are in place;
- Allocating responsibilities to specific personnel with managers taking full responsibility for controlling risk factors and reporting on performance;
- Persuading employees to commit to clear health and safety objectives and setting health and safety standards;
- Encouraging safety representatives to promote both the policy and the standards set;
- Enforcing health and safety measures and taking disciplinary action where this is thought to be necessary.

Part (b)

„Co-operation“ is concerned with:

- Consultation with the employees and their representatives to motivate them and encourage their ownership of the control measures that have been put in place;
- Involving the workforce in health and safety matters such as for example the completion of risk assessments and workplace inspections;
- Sharing information with them regarding loss and other health and safety experiences.

Part (c)

„Competence“ might be achieved by:

- Assessing the skills necessary to ensure tasks are carried out safely by careful selection of the staff to be involved and identifying their training needs;

- The provision of the necessary instruction, information and training to individuals with particular emphasis on that needed for high risk activities;
- Making arrangements for employees to have access to advice and information sources to assist in increasing their knowledge.

Part (d)

„Communication“ can play an important part in promoting a positive health and safety culture by:

- Clear and effective lines of communication established and any barriers removed;
- If information is provided by tool box talks for example and
- Health and safety is discussed regularly not only at official safety committee meetings but also at all team meetings;
- If managers are seen to lead by example and to encourage two way communication

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## SAFETY CULTURE - IMPROVEMENT

### Outline ways in which health and safety culture can be improved

- Clear and active senior management commitment to health and safety
- The needs of production and health and safety properly balanced with pressure for production controlled against that for health and safety
- Sufficient resources devoted to health and safety
- Maximum partnership between management and the workforce based on a participative relationship between staff at all levels
- Humanistic and non-authoritarian style of management
- High senior and line management visibility on the shop floor
- Frequent and informal communication between all levels
- Quality training given to management and the workforce
- Frequent and high-quality training for general safety and safe skills
- High levels of job satisfaction
- Ergonomic plant design and layouts
- Workforce selected for their safety attitudes and behaviours.

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## SAFETY CULTURE – DETERIORATION

**Identify** the factors that could have contributed to the deterioration of the health and safety culture within the organisation.

Factors that could lead to a deterioration in a safety culture could include:

- The lack of visible leadership
- The lack of commitment at senior level
- Changes in the management structure or roles
- Changes in work patterns with the lack of effective communication prior to and during change
- The fact that health and safety was not given the same priority as other objectives such as production or quality

- The lack of consultation with and involvement of the workforce
- The absence of management systems particularly where health and safety were concerned
- A reduction in the workforce leading to work overload
- A high staff turnover
- External influences such as a downturn in the economy leading to job insecurity
- The presence of a blame culture and/or peer pressure
- Deterioration in the standard of welfare facilities.

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## REASONS FOR NOT FOLLOWING PROCEDURES

A health and safety audit of an organisation has identified a general lack of compliance with procedures.

a) **Describe** the possible reasons for procedures not being followed

b) **Outline** the practical measures that could be taken to motivate employees to comply with health and safety procedures.

Part a)

There are a number of reasons why procedures may not be followed, including:

- A negative or poor health and safety culture being in place – a why bother attitude as an example
- Lack of training, awareness, supervision and/or information
- Poor work planning, leading to high work pressure, and this pressure and the want to complete may force individuals not to comply
- Lack of safety systems and barriers in place, if something is not properly in place or not properly maintained then people will not conform
- Inadequate responses to previous incidents – could indicate a lack of management commitment and in turn lead us along this „why bother“ route again
- Management based on one-way communications, people often see rules being meant to be broken – telling is not always the best mode of communication – consultation is far more effective
- Deficient co-ordination and responsibilities – leading to a lack of confusion as to who is responsible for what
- Poor management of health and safety

Part b)

- A clear and evident commitment from the most senior manager downwards,
- Providing a climate for safety in which management's objectives and the need for appropriate standards are communicated
- Constructive exchange of information at all levels is positively encouraged
- Involvement of working in things like risk assessments,
- An active health and safety committee with across the board representation
- Health and safety being on the agenda of all departmental minutes
- An analytical and imaginative approach identifying possible routes to human factor failure.
- Procedures and standards for all aspects of critical work and mechanisms for reviewing them

- Effective monitoring systems to check the implementation of the procedures and standards
- Incident investigation and the effective use of information drawn from such investigations
- Adequate and effective supervision with the power to remedy deficiencies when found.

### 3.3 - HUMAN FACTORS WHICH INFLUENCE BEHAVIOUR AT WORK

#### PERSONAL FACTORS - ATTITUDE, MOTIVATION, SELF-INTEREST, PERCEPTION

1. Attitude is the tendency to behave in a particular way in a certain situation. Attitudes are influenced by the prevailing health and safety culture within the organization, the commitment of the management, the experience of the individual and the influence of the peer group. Peer group pressure is a particularly important factor among young people and health and safety training must be designed with this in mind by using examples or case studies that are relevant to them. Behaviour may be changed by training, the formulation and enforcement of safety rules and meaningful consultation – attitude change often follows.
2. Motivation is the driving force behind the way a person acts or the way in which people are stimulated to act. Involvement in the decision-making process in a meaningful way will improve motivation as will the use of incentive schemes. However, there are other important influences on motivation such as recognition and promotion opportunities, job security and job satisfaction.
3. Self-interest, in all its forms, is a significant motivator and personal factor.
4. Perception is the way in which people interpret the environment or the way in which a person believes or understands a situation. In health and safety, the perception of hazards is an important concern.

Many accidents occur because people do not perceive that there is a risk. There are many common examples of this, including the use of personal protective equipment (such as hard hats) and guards on drilling machines and the washing of hands before meals. It is important to understand that when perception leads to an increased health and safety risk, it is not always caused by a conscious decision of the individual concerned.

The stroboscopic effect caused by the rotation of a drill at certain speeds under fluorescent lighting will make the drill appear stationary.

It is a well-known phenomenon, especially among illusionists, that people will often see what they expect to see rather than reality. Routine or repetitive tasks will reduce attention levels leading to the possibility of accidents.

Other personal factors which can affect health and safety include physical stature, age, experience, health, hearing, intelligence, language, skills, level of competence and qualifications.

Finally, memory is an important personal factor since it is influenced by training and experience.

The efficiency of memory varies considerably between people and during the lifetime of an individual.

The overall health of a person can affect memory as can personal crises.

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## PERCEPTION OF RISK

(a) Give the meaning of the term 'perception'.

(b) Outline ways in which workers' perceptions of hazards in the workplace might be improved.

Part (a),

An acceptable meaning of „perception“ is required, such as the way that people interpret and make sense of presented information, for instance in relation to their surroundings.

Part (b),

Few candidates are able to outline more than one or two ways in which workers' perceptions of hazards in the workplace might be improved.

Most refer in general terms to

- Motivation
- The need to increase awareness in the individual by safety campaigns or posters
- To increase knowledge by means of training.
- That there was a need to identify, perhaps by the use of surveys, the reasons for workers' misperceptions in order to increase awareness and challenge currently held views.
- Other ways might include making hazards more obvious (for example, by the use of signs) and
- Addressing environmental factors, such as lighting and noise, this might cause distraction or otherwise hinder the perceptual processes.

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## MOTIVATION

Identify ways in which managers can motivate employees to work safely.

Managers can motivate people in health and safety by a number of means, including:

- A clear and evident commitment from the most senior manager downwards, which provides a climate for safety in which management's objectives and the need for appropriate standards are communicated and in which constructive exchange of information at all levels is positively encouraged
- An analytical and imaginative approach identifying possible routes to human factor failure. This may well require access to specialist advice
- Procedures and standards for all aspects of critical work and mechanisms for reviewing them
- Effective monitoring systems to check the implementation of the procedures and standards
- Incident investigation and the effective use of information drawn from such investigations
- Adequate and effective supervision with the power to remedy deficiencies when found.
- Effective health and safety management system
- Encouraging a positive health and safety culture
- Ensuring adequate and competency of supervision
- Insisting on effective incident reporting and analysis
- Willing to learn from experience
- Clearly visible health and safety leadership

- A suitable team structures
- Efficient communication systems and practices
- Providing adequate staffing levels
- Ensuring suitable work patterns are implemented
- Recognition and reward

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## HUMAN ERROR – REDUCTION AND MOTIVATION

### Outline ways of reducing the likelihood of human error in the workplace.

Exclusion strategies. Exclusion strategies make it impossible for the identified human error to occur. One such exclusion strategy is “mistake proofing.” For example, as consumers we cannot put a diesel fuel nozzle into an unleaded fuel tank’s opening.

The pump’s design makes it impossible to make that error.

Exclusion should be used in cases in which the potential human error can lead to catastrophic consequences.

Prevention strategies. Prevention strategies are the next tier down from exclusion and are used where the risk of human error is not as critical. In other words, the investment in making the human error impossible is not justified, so we just want to find a more economical approach to make it difficult to commit that identified human error.

Examples include the checklist a pilot completes before each flight and the surgical instrument count a nurse completes before and after a surgery.

Fail-safe strategies. Contrary to the name, fail-safe strategies are invoked when we want to mitigate the consequences of human error instead of trying to prevent it from occurring in the first place.

For example, stringent preventive maintenance efforts should be in place to ensure that equipment is calibrating according to the manufacturer’s specifications.

If the calibration goes beyond set alarm limits, and that condition is not acknowledged and corrected immediately, catastrophic consequences could result.

Competence improvements with more focused training and awareness

ISIT (Information, Supervision, Instruction and Training)

Rest – reduce tiredness and fatigue

Health monitoring to determine levels prior to deteriorating to an unacceptable level

Follow-up after incidents – establish why things went wrong – contributors and causes

Engineering out areas where error may arise e.g. control conflicts

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## CHECKING COMPETENCE

Some jobs require that work is carried out by a competent person.

**Identify** what checks could be made to assess whether a person is competent.

Checks on the possession of competence by an individual may include:

- Their qualifications and the possession of a specific licence such as for driving a heavy goods vehicle;
- Employment history and experience;
- Membership of a professional body;
- Previous training
- Success in any relevant examination and/or test; and
- Any references and recommendations that might be available.

## HEALTH AND SAFETY COMMUNICATION – NOTICE BOARDS

(a) **Identify** FOUR types of health and safety information that might usefully be displayed on a notice board within a workplace.

(b) **Explain** how the effectiveness of notice boards as a means of communicating health and safety information to the workforce can be maximised.

Part a)

1. Health and safety policy
2. Minutes of the health and safety committee meeting
3. Accident / ill-health / absence statistics
4. Good safety initiatives
5. Safety alerts (bad practice identification)
6. Safety awards
7. Details of health and safety training events

Part b)

The most common way in which written communication is used in the workplace is the notice board.

For a notice board to be effective, it needs to be well positioned within the workplace and there needs to be a regular review of the notices to ensure that they are up to date and relevant.

If there is a multi-lingual workforce it is beneficial and effective to have any notice board items written in the main languages to encourage the reading of such information, acceptance and compliance with requirements as necessary

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## COMMUNICATION METHODS - IMPORTANCE

**Give** reasons why it is important to use a variety of methods to communicate health and safety information in the workplace.

- Consideration of the sort of information that needs to be communicated in the workplace and the different methods of presenting such information should be addressed.
- People respond differently to different stimuli, and that variety prevents over-familiarisation with one method and helps to reinforce a message.
- The need to overcome language barriers and the inability of some workers to read;
- The need to motivate, stimulate interest and gain involvement and feedback;
- The acceptance that different types of information require different methods of communication for example emergency signs;
- That the policy of the organisation may require certain information to be in a specified format; and
- That on occasions evidence that the message was given may need to be kept.

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## BARRIERS TO EFFECTIVE COMMUNICATION

**Identify** the barriers to effective verbal communication that may exist

There are numerous barriers to effective communication, these may include:

- Language not understood- the language spoken by the trainer or supervisor not understood by the employees.
- Personal Factors – such as a dislike to the person giving the communication, may be related to a lack of trust or the uncertainty of the real reason for the communication (trust)
- Background noise- due to background noises or other disturbances the verbal instructions is not understood by the employees
- Technical explanations are not clearly understood
- Use of jargon not being understood
- Interference by PPE. Due to the wearing of PPE such as ear defender, hood etc the verbal communication can not be interpreted effectively
- Stress – due to personal stress employees may be unable to concentrate on the communication being conveyed
- Timing – if the timing is inappropriate persons may have their interest elsewhere – e.g. holding a meeting only minutes prior to a meal break
- Distractions – these could involve on-going activities, noise, proximity of the public, etc.

## 3.4 - HOW HEALTH AND SAFETY BEHAVIOUR AT WORK CAN BE IMPROVED

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### INFORMATION AND CONSULTATION

**Explain** the difference between consulting and informing workers on health and safety issues

Informing is considered to be a one way process e.g. providing workers with information on hazards and risk control measures. Consulting is a two-way process in which the employer for example listens and takes account of the views expressed by workers prior to making a final decision.



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## ERRORS AND VIOLATIONS, HUMAN ERROR

(a) **Give** the meaning of the terms 'error' AND 'violation' AND give a practical example of EACH.

(b) **Outline** factors that could contribute to human error in relation to:

(i) The individual;

(j) The tasks being undertaken;

(iv) The organisation.

(c) **Explain** ways in which the likelihood of human error can be reduced.

Part (a)

An "error" is an unintended action, for example where a familiar task is not carried out as planned such as operating the wrong switch or control.

A „violation“ however, is a deliberate deviation from an acceptable standard such as the intentional removal of a guard in order to speed up a process.

Part (b)

(i) The factors relating to the individual:

- Attitude and motivation;
- Maturity
- Mental maturity;
- Aptitude;
- Competence;
- Physical capabilities;
- Any sensory defect they may possess;
- Perception of risks involved in the task being undertaken;
- The possibility that they have language problems;
- The effects of stress, fatigue and alcohol or substance misuse.

(ii) The factors relating to the tasks include:

- The lack of correct tools,
- Poorly maintained equipment
- Equipment that had not been well designed resulting in ergonomic problems,
- The setting of unrealistic target,
- Tasks that were complex or conversely those that were repetitive and monotonous,
- Systems of work that were not clear
- Environmental conditions such as noise levels and unsatisfactory lighting.

(iii) The factors related to the organisation include:

- A poor health and safety culture
- A lack of obvious leadership on the part of management resulting in an unsatisfactory level of supervision and monitoring,
- A lack of resources
- A failure to complete risk assessments and introduce safe systems of work
- A lack of consultation and communication with the workforce
- A failure to provide adequate levels of training for employees.

Part (c)

The ways in which the likelihood of human error might be reduced are related to the potential defects identified in the second part of the answer above and how they might be remedied including:

- The introduction of effective procedures for the selection and recruitment of staff including pre-employment health screening and health surveillance;
- The use of ergonomic principles in the design of tasks;
- The setting of realistic targets
- Introduction of job rotation and frequent breaks following consultation and communication with the involvement of the workforce;
- Ensuring a high level of supervision and mentoring
- Establishing clear lines of responsibility;
- The introduction of procedures for the regular monitoring of health and safety standards with remedial action being taken whenever this was seen to be necessary

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## INDUCTION TRAINING – A MEANS OF REDUCING WORKPLACE ACCIDENTS

**Outline** [how induction training programmes for new workers can help to reduce the likelihood of workplace accidents.](#)

Such induction training for new workers may assist in reducing workplace accidents and incidents in a number of ways, including:

- Making workers aware of the workplace hazards and risks
- By introducing the new starts to related safe systems of work
- By ensuring awareness in emergency preparedness procedures to be followed
- Making them aware of restricted areas
- By training them in the correct and safe use of tools and equipment and ensuring that they are conversant with their proper use
- Ensuring that new starts are aware of the reporting procedures for mal-functioning equipment
- Making them aware of incident and hazard reporting procedures
- Making them aware of the sources of help available should further need arise
- Such training will foster a positive attitude towards safety and safe working and may assist in countering any pressure put on them by peers and others

Please note that this question was not concerning the topic of induction training sessions.

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## HEALTH AND SAFETY COMMITTEE - AGENDA

**Outline** the topics that may typically be included on the agenda of a safety committee meeting.

A safety committee agenda would normally include subjects which are / were of concern to employees on various health and safety issues.

The agenda would be made up of suggestions and issues which may have been brought up by employees, contractors and others.

The agenda items that may be typically included are

- The outcomes of any recent inspection by the enforcing authorities
- The outcomes of any third party audits that relate to health, safety and environmental issues
- Any recent accidents, incidents and near misses – reports and outcomes
- Any problems arising from workplace inspections, e.g. Housekeeping, blocked fire exits etc.
- Also areas such as the identification of unsafe acts, conditions and hazards that have been reported and perhaps not suitably rectified.
- Other topics may include, stress at work, due to long hours, or environmental conditions, manual handling issues, worker dissatisfaction with welfare arrangements, food and catering contractors etc.
- Changes in legislation and their likely impact
- Outcomes of risk assessment and safe working system reviews
- Accident, incident, sickness, absence and ill health statistics, etc.
- Workplace inspection scheduled

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## INEFFECTIVE HEALTH AND SAFETY COMMITTEE

**GIVE SIX** reasons why a health and safety committee may prove to be ineffective in practice

- Lack of management commitment
- No clear terms of reference
- Unbalanced membership i.e. too many managers
- Lack of respect to team members – workers to managers and vice versa
- Poor leadership of the chair person
- No access to relevant health and safety advice
- No direction or no priorities being assigned
- Inclusion of trivial topics or allowing topics to run on to put others out of time

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## WAYS IN HELPING A SAFETY COMMITTEE BE EFFECTIVE

**Outline** ways to help ensure the effectiveness of a safety committee.

- Right number and mix of members
- Authority to consider recommendations
- Knowledge and expertise

- Good communication lines – management to employees and vice versa
- Formality mix – agenda, minutes, chair person
- Part of meeting to be pro-active
- Identified and agreed priorities
- Limiting the input of individuals (not allowing one person to take over or hog a meeting)

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## ORGANISATIONAL BENEFITS OF HAVING A SAFETY COMMITTEE

**Outline** the benefits to an organization of having a health and safety committee.

- It allows a definite point of contact for allowing safety issues to be raised.
- Helps to keep management and workers informed of the company health and safety status.
- If properly managed it will foster better employee / management relationships with regard to health and safety.
- It allows proper focus on the progress of achieving targets.
- Allows points to be raised in the presence of management without undue delay.
- Assists in the accurate communication of information from the committee to the workforce.
- If demonstrates management commitment to health and safety.
- It should improve or at least maintain a positive safety culture.

## 3.5 - EMERGENCY PROCEDURES AND THE ARRANGEMENTS FOR CONTACTING EMERGENCY SERVICES

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### EMERGENCY EVACUATIONS AND EMERGENCY PROCEDURES

(a) **Identify** THREE types of emergency in the workplace that may require the evacuation of workers.

(b) **Explain** why it is important to develop emergency procedures in the workplace.

Part (a)

Three types of emergency in the workplace that could lead to the need to evacuate workers could be:

- Fire or explosion,
- The accidental release of toxic chemicals or gases,
- Transport incidents,
- Bomb alerts or other terrorist activities,
- Weather related emergencies and
- Earthquakes.

Part (b)

The importance of developing procedures for the safe evacuation of workers in the event of an emergency could include:

- The need to comply with legal requirements;
- To be prepared for foreseeable emergencies;
- To ensure the safety and protection of the workers including those dealing with the emergency
- To assist the safe evacuation of persons including those with specific needs such as visitors and the disabled;
- To provide information on the action to be taken, not only by workers but also by neighbours and others who might be affected by the emergencies such as in a shared or joint occupancy premises;
- To allocate specific responsibilities to certain workers in the event of an evacuation being necessary;
- To be able to mitigate the effects of adverse events and to restore the situation to normal; to ensure the procedures are made available to any relevant emergency services and
- To ensure business continuity.

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## EMERGENCIES REQUIRING EMERGENCY PROCEDURES

**Identify** FOUR types of emergency that would require an organisation to have an emergency procedure

1. Fire
2. Accident
3. Chemical spillage
4. Dangerous occurrence
5. Security / Intruder alert
6. Explosive device discovery
7. Terrorist threat / nuisance calls

### 3.6 - REQUIREMENTS FOR, AND EFFECTIVE PROVISION OF, FIRST-AID IN THE WORKPLACE

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#### FIRST AID PROVISION – EMERGENCY PROVISION

(a) **Identify** TWO main functions of first-aid treatment.

(b) **Outline** the factors to consider when making an assessment of first-aid provision in a workplace.

Part (a)

The main purpose of first aid is to control the life-endangering situation and prevent further injury.

For serious accidents, the main responsibility of those in the work area is to get professional help; ignorantly doing the wrong thing can cause further injury.

Part (b)

Typical examples of the equipment and facilities a first-aid room may contain are:

- A sink with hot and cold running water;
- Drinking water and disposable cups;
- Soap and paper towels;
- A store for first-aid materials;
- Foot-operated refuse containers, lined with yellow, disposable clinical waste bags or a container suitable for the safe disposal of clinical waste;
- An examination/medical couch with waterproof protection and clean pillows and blankets;
- A chair;
- A telephone or other communication equipment; and
- A record book for recording incidents attended by a first-aider or appointed person.

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## FIRST AID RISK ASSESSMENT – FACTORS TO BE CONSIDERED

**Outline factors to be considered when carrying out an assessment of first-aid requirements in a workplace.**

The factors to be considered include, but are not limited to:

- The number of trained first-aid personnel and first-aid facilities in relation to, for example, the size of the organisation;
- The distribution and composition of the workforce including the special needs of workers such as trainees, young workers and the disabled;
- The types of hazard and level of risk present;
- The past history of accidents and their type, location and consequences;
- The proximity of the workplace to emergency medical services;
- The special needs of travelling, remote or lone workers such as the provision of personal first aid kits or mobile phones;
- The possibility of shared provision on multi-occupancy sites;
- The need to train the first aid personnel in special procedures; and
- The ability to provide continued cover over different shifts and for sickness, leave and other absence.

## HEALTH AND SAFETY MANAGEMENT SYSTEMS 3 – PLANNING

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the importance of planning in the context of health and safety management systems
- Explain the principles and practice of risk assessment
- Explain the general principles of control and a basic hierarchy of risk reduction measures
- Identify the key sources of health and safety information
- Explain what factors should be considered when developing and implementing a safe system of work for general activities
- Explain the role and function of a permit-to-work system.

### 4.1 - IMPORTANCE OF PLANNING

#### UNDERESTIMATION THE SERIOUSNESS OF A HAZARD

List the reasons why the seriousness of a hazard may be underestimated by someone exposed to it

- The person may not have been exposed to the situation in the past
- Has worked in the same job without ill-effect
- Their attitude – does not care
- The person may be tired
- Not had awareness training (initial or refresher)
- Over-reliance on PPE
- Controls not functioning e.g. LEV
- Alarms not operational (CO H2S)
- Effects of medication / drugs / Alcohol
- Cumulative impacts of failures – one adding to another and having more serious consequences

### 4.2 - PRINCIPLES AND PRACTICE OF RISK ASSESSMENT

#### HAZARD AND RISK

**Explain**, using an example EACH case, the meaning of the following terms:

a) 'Hazard'

b) 'Risk'

Part a)

A hazard is the potential of a substance, activity or process to cause harm.

Hazards take many forms including, for example, chemicals, electricity and working from a ladder. A hazard can be ranked relative to other hazards or to a possible level of danger.

Part b)

A risk is the likelihood of a substance, activity or process to cause harm. A risk can be reduced and the hazard controlled by good management.

Alternatively

An acceptable definition of „risk“ would have been the probability/likelihood of an occurrence and its possible consequences and severity in terms of injury, damage or harm.

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## SO FAR AS IS REASONABLY PRACTICABLE

**Explain** the meaning of phrase "so far as is reasonably practicable".

This means the degree of risk in an activity can be balanced against time, trouble, cost and physical difficulty of taking measures to avoid risk.

The greater the risk then the more likely it is that to be reasonable would be to go to substantial expense and invention to reduce risk.

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## FORMS OF IDENTIFYING WORKPLACE HAZARDS

**Identify** EIGHT means of hazard identification that may be employed in the workplace

The means of identifying hazards in the workplace may include:

- Carrying out workplace inspections
- Safety tours can be undertaken
- Carrying out observations of the workplace and work practices
- Safety audits
- Task or job analysis
- Risk assessments
- The analysis of accident, incident and ill-health data
- Reviewing accident and incident reports
- Referring to legislation, approved codes of practices and guidance notes
- Reviewing procedures in line with manufacturers recommendations e.g. a MSDS
- Consultation with the workforce
- Health surveillance



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## RISK ASSESSMENT – SUITABLE AND SUFFICIENT

**Explain** what is required for the assessment to be 'suitable and sufficient'

Here there are a number of considerations to be made, these will include:

- It should identify and prioritise the measures that need to be taken to comply with relevant statutory (legal) provisions
- It should be appropriate to the nature of the work
- It should remain valid for a reasonable period of time

A suitable and sufficient risk assessment should identify significant risks arising out of work.

Trivial risks can usually be ignored, as can risks arising from the routine activities associated with life in general, unless the work activity compounds those risks or there is evidence of significant relevance to the particular work activity.

The degree of sophistication of the risk assessment will be directly linked to the size and nature of the undertaking and the hazards and risks likely to be encountered.

Employers should ensure that where specialist advisers are used, those advisers have sufficient understanding of the particular work activity they are advising on.

Everyone involved in that process - employer, employees and specialist will often need to be all working together.

Employers in the UK for example are expected to take reasonable steps, such as reading Health and Safety Executive guidance notes, the trade press etc., to familiarise themselves with the hazards and risks at their work.

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## NEAR MISS AND DANGEROUS OCCURRENCE AND ACCIDENT RATIO STUDIES

(a) **Outline**, using a workplace example, the meaning of the terms:

- (i) Near-miss;
- (ii) Dangerous occurrence.

(b) **Outline** how an 'accident ratio study' can contribute to an understanding of accident prevention.

Part (a),

A near-miss is an incident which has potential to cause harm but where there was actually no loss or injury.

A dangerous occurrence is a specified event that has not resulted in injury but which must be reported to the relevant enforcing authority. Examples of specific dangerous occurrences could have been chosen – including:

- The collapse or partial collapse of a scaffold
- The collapse, overturning or failure of a load-bearing part of equipment such as a lift, hoist or crane.

Part (b),

Accident ratio studies have shown that there is a fixed ratio between accidents of different severity and those where no loss occurred (near-misses).

Consequently, organisations that have high numbers of near-misses are likely to have a greater number of serious accidents and therefore if they reduce the number of near-misses they are likely to suffer fewer accidents.

Similarly, if the causes of minor injuries are addressed and either eliminated or controlled, the causes of serious accidents will also be reduced.

Many candidates when answering this type of question tend to discuss frequency and/or incidence rather than ratios.

A few candidates draw a triangle but are then unable to apply its principle to the question.

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## HAZARD

**Explain** the meaning of the term 'hazard'.

A hazard is anything that has the potential to cause harm, with harm in this instance being related to injury, damage or loss

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## HAZARD AND RISK MEANINGS AND ELEMENTS OF A RISK ASSESSMENT

(a) **Give** the meaning of the term 'hazard' AND give an example of a workplace hazard.

(b) **Give** the meaning of the term 'risk' AND give an example of a workplace risk.

(c) **Outline** the key stages of the risk assessment process, identifying the issues that would need to be considered at EACH stage.

(d) **Outline** the criteria which must be met for the assessment to be 'suitable and sufficient'.

For part (a), - A „hazard“ is something with the potential to cause harm or loss

Part (b), - A definition of „risk“ would have to be the probability/likelihood that the potential would be realised and its possible consequence and severity in terms of injury, damage or harm. An example to support the explanation might have been, “the likelihood of someone being killed by coming into contact with electricity”.

Most candidates provided an acceptable meaning of „hazard“ but fewer manage to give an adequate meaning of „risk“, often omitting reference to severity and consequence.

In both cases workplace examples are often not provided thus marks will be lost.

Part (c)

The outlined key stages of a workplace risk assessment would be:

1. Identifying the hazards (many state risk here) associated with the activities and tasks performed at the workplace;
2. Identifying who might be harmed including operators, maintenance staff, cleaners and visitors and groups especially at risk including young workers and the disabled;
3. Evaluating the likelihood and probable severity of the harm that might be caused, assessing the adequacy of existing control measures and deciding whether additional controls should be introduced;
4. Recording the significant findings of the assessment and
5. Carrying out a review at a later date and revising the findings when necessary.

Part (d),

For a risk assessment, to be deemed suitable and sufficient it should

- Indicate the competence of the assessor together with any specialist advice that has been sought;
- Should identify all significant hazards and risks arising from or connected with the activity to be carried out;
- Identify all the persons at risk including workers, other workers and members of the public with reference to those who might be particularly at risk;
- Evaluate the adequacy and effectiveness of existing control measures and
- Identify other protective measures that may be required; enable priorities to be set;
- Record the significant findings of the assessment; and identify the period of time for which it is likely to remain valid.

Answers to this type of question are not to a good standard with many candidates showing little understanding of the terms "suitable and sufficient".

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## RISK ASSESSMENT PROCESS

With respect to undertaking a general risk assessment on activities in a workplace outline the key stages of the risk assessment process identifying the issues that would need to be considered at EACH stage.

The first stage is to consider the activities that are being undertaken at the workplace to identify the significant hazards involved.

The second stage would be to identify those who may be affected or exposed by the said activities and related hazards. These may include:

- Operators,
- Maintenance staff
- Cleaners
- Visitors and
- Vulnerable groups, etc.

Vulnerable groups could include

- Young workers
- Pregnant workers and nursing mothers
- Persons with disabilities or special needs.

The third stage of the process involves the evaluation of the risks from the identified hazards taking into account the likelihood and severity that could be caused when related to the frequency and duration of the exposure of the employees and the measures currently in place to control such risks and the scope for further reduction in the risks by introducing additional controls.

The fourth stage is the recording of significant findings of the assessment in a written form that can be retrieved when the need arises. The additional protective and preventative measures need to control the risk(s) should be included.

The fifth and final stage is concerned with the review and revision of the assessment at regular intervals, or more particularly if there are developments (changes) in things like legislation, working procedures, materials and equipment used, etc. that may invalidate the original assessment.

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## RISK ASSESSMENT STAGES

**Identify** the key stages of a workplace risk assessment.

A workplace risk assessment involves the following five stages:

1. The identification of the hazards associated with the activities and tasks performed at the workplace
2. The classes and numbers of persons who might be harmed;
3. Evaluating the likelihood and probable severity of the harm that might be caused;
4. Assessing the adequacy of existing control measures and deciding whether additional measures were required;
5. Recording the significant findings of the assessment and carrying out a review at a later date and revising the findings when necessary.

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## LONE WORKER – FACTORS TO BE CONSIDERED

**Identify** the factors to be considered to ensure the health and safety of persons who are required to work on their own away from the workplace.

Risk assessment is essential to examine the hazards and potential risks of lone workers who are more vulnerable.

Control measures include

- Procedures need to be put in place to ensure that lone workers remain safe. These may include supervisor's periodically visiting and observing people working alone; regular contact between the lone worker and supervision using either a telephone or radio.
- Automatic warning device which operate if specific signals are not received periodically from the lone worker, e.g. systems for security staff;
- Other devices designed to raise the alarm in the event of an emergency and which are operated manually or automatically by the absence of activity.
- Checks that a lone worker has returned to their base or home on completion of their task.

- Lone workers should be capable of responding correctly to emergencies.
- Lone workers should have access to adequate first – aid facilities and mobile workers should carry a first - aid kit suitable for treating minor injuries.

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## PREGNANT WORKER

(a) **Identify** work activities that may present a particular risk to pregnant women at work AND give an example of EACH type of activity.

(b) **Outline** actions that an employer may take when a risk to a new or expectant mother cannot be avoided.

Part (a)

The following work activities may present particular hazards to a pregnant woman:

- Manual handling of loads such as in packing goods;
- Tasks involving long periods of standing or sitting as experienced by shop assistants;
- Work involving exposure to biological agents or chemical substances that might affect the unborn child or pregnant/nursing mother such as lead glazing;
- Work in hyperbaric atmospheres, for example underwater diving;
- Tasks involving exposure to ionising radiation which would affect radiographers;
- Tasks involving regular exposure to shocks and low frequency vibration or excessive movement such as driving;
- Unusually stressful work such as tasks involving exposure to heat or noise;
- Contact with the public where there might be a risk of violence or verbal abuse;
- Ergonomic issues such as in assembly work; and
- Work at height for example from a ladder.

Part (b)

The actions that an employer may take when a risk to a new or expectant mother cannot be avoided include:

- Modifying the working conditions or hours of work of the workers,
- Offering them suitable alternative work or
- Suspending them from work for as long as necessary on full pay.

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## YOUNG PERSONS – VULNERABILITY

(a) **Explain** the reasons why young persons may be at a greater risk of accidents at work.

(b) **Outline** the measures that could be taken to minimise risks to young employees.

Part (a)

Young persons at work are more prone to risk due to various factors.

They include their age and physical capability, their lack of knowledge and experience of the workplace.

Also the young person's perception of risk has not developed in the workplace setting.

The general move from home / school and a tendency of young persons to take risks to respond to peer-group pressures is also a factor.

Part (b).

It is mandatory in a number of countries to conduct a risk assessment of the areas of work and activities where a young person is required to work. This should ensure that all hazards are controlled to as low as reasonably practicable.

Young people should not be subject to excessive hours of work, exposed to risks (such as dangerous machinery, heavy lifting – manual handling excessive heat or cold etc.).

Other control measure should include comprehensive safety orientation (which should include emergency procedures), PPE where required and competent supervision and monitoring.

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## RISK ASSESSMENT – WHEN TO REVIEW

### Outline **EIGHT** reasons for reviewing a risk assessment

- Risk assessments should be regularly reviewed to ensure their adequacy and appropriateness (passage of time)
- When there have been changes in the work process
- When there has been a change in the rate of production
- When there have been changes in the materials and/or substances used;
- Moving to new premises or the introduction of new or the modification of existing plant;
- If new plant or equipment has been introduced
- As a result of investigation reports on accidents and cases of ill-health or monitoring exercises such as audit or workplace inspection;
- The availability of new information on hazards and risks;
- Following changes in legislation
- Following comments/recommendations made by an enforcement officer and/or auditor
- When new controls or techniques are available
- Change in the personnel employed – use of younger persons, employing persons with disabilities
- Following reports of ill-health
- Following complaints from the workforce
- Following action by the enforcement authority
- The availability of new or improved control measures or techniques; following changes in legislation;

Note that this question calls for an outline and not list – should a list be provided full marks will not be awarded.

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## RISK ASSESSMENT – ASSISTANCE TO COMPLETE

### Outline the factors than an employer should take into account when selecting individuals to assist in the carrying out of a risk assessment

Some of the factors that will have to be taken into consideration are:

- The competency of the person assigned and their attitude to undertaking such a task

- Ability to be able to undertake the work in a responsible manner
- Skill – to be knowledgeable in the work being assessed
- Age – be of sufficient maturity
- Past experience in risk assessment
- Physical and mental capabilities to undertake the role
- Report writing skills would be a distinct advantage
- Training in risk assessment
- Familiarity with the process activity
- Knowledge of Regulations and standards applicable to the risks being assessed
- Communications and interaction with workers
- Trade Union Safety Representative

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## DUTIES TOWARDS VISITORS

**Outline** procedures that could be used to ensure the safety of visitors to an organisations premise.

- The proper identification of visitors
- Visitors being stopped and met at the „gate“ prior to entering site – this will enable the issuing of safety related messages / instructions, etc.
- Getting visitors to sign in, issue badges that identify them as visitors etc. These badges may contain a version of site rules that have to be complied with
- Providing information regarding the risks present and site rules and procedures, especially in emergency situations – tie this in to the point mentioned above.
- Provide visitor supervision i.e. escorts, to ensure that they are not unduly exposed to risks
- Ensure that restricted access areas are suitably identified and visitors are made aware of them

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## VISITOR AWARENESS OF EMERGENCY PROCEDURES

**Explain** why visitors to a workplace should be informed of emergency procedures that may be actions during their visit.

There is a need for visitors to be aware of the emergency procedures that may be enacted during their visit to the premises for a range of reasons, including:

- There is a moral responsibility on the occupier/host to do so,
- There is a legal duty of care owed to visitors
- So that they will know the appropriate procedure to adopt to lesson the risk to themselves, and
- To prevent them being an hindrance to those dealing with the emergency situation

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## RISKS TO VISITORS AND PRECAUTIONS

(a) **Give TWO** reasons why visitors to a workplace might be at greater risk of injury than workers.

(b) **Identify** precautions that could be taken to reduce the risk of injury to visitors to a workplace.

Part (a),

There are a number of reasons why visitors to a workplace might be at greater risk of injury than workers. These include:

- Their unfamiliarity with the processes carried out at the workplace, the hazards they present and their associated risks
- The fact that they may not have been issued with personal protective equipment;
- Their lack of knowledge of the site layout
- The fact that pedestrian routes might be inadequate and unsigned;
- Their unfamiliarity with the emergency procedures
- Their vulnerability particularly if they were disabled, very young or had language problems.

Part (b),

Measures such as the following may reduce the possibility of injury to visitors:

- Visitor identification, for example, by the issue of badges with a routine for signing in and out;
- Prior notification to those members of staff to be involved in the visit;
- The provision of information to the visitors in suitable languages on hazards and emergency procedures;
- An explanation of specific site rules, for example, restricted areas and the wearing of personal protective equipment;
- The clear marking of pedestrian routes and
- The need for visitors to be escorted by a member of management or supervisory staff.

#### 4.3 - GENERAL PRINCIPLES OF CONTROL AND A BASIC HIERARCHY OF RISK REDUCTION MEASURES

##### MANAGEMENT OF RISK – HIERARCHY OF CONTROL

With respect to the management of risk within the workplace:

(a) **Explain** the meaning of the term 'hierarchy of control'

(b) **Outline**, with examples, the standard hierarchy that should be applied with respect to controlling health and safety risks in the workplace

For part (a)

An acceptable meaning of the term „hierarchy of control“ would be either a list of measures designed to control risks which are considered in order of importance, effectiveness or priority or measures designed to control risk that normally begin with an extreme measure of control and end with personal protective equipment as a last resort.

There are few candidates who are able to give an acceptable meaning of the term.

Part (b) on the application of the hierarchy,



- Here you should begin an answer with the possibility of eliminating the risks either by designing them out or changing the process.
- The next step would be the reduction of the risks by, for example, the substitution of hazardous substances with others which were less hazardous.
- If this were not possible, then isolation would have to be considered, using enclosures, barriers or worker segregation.
- The application of engineering controls such as guarding, the provision of local exhaust ventilation systems, the use of reduced voltage systems or residual current devices would follow as would management controls such as safe systems of work, training, job rotation and supervision with the final control measure being
- The provision of personal protective equipment such as ear defenders or respiratory protective equipment.

Some candidates did not succeed in putting the hierarchy in the right order, and only a few add examples of the various control measures, other candidates provide a list rather than the required outline which is not what the question called for.

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## PERSONAL PROTECTIVE EQUIPMENT – LIMITATIONS

Due to its limitations personal protective equipment (PPE) should only be considered after other control measures.

**Outline the limitations of using PPE.**

There are numerous reasons why PPE should be considered only after other possibilities have been exhausted. These include

It is often a legal requirement that other means of control are considered first particularly since PPE does not remove the hazard.

PPE may not provide adequate protection because of such factors as

- Poor selection,
- Poor fit because of facial features such as beards,
- Incompatibility with other types of ppe,
- Contamination, and
- Misuse or non-use by workers.

PPE is likely to be uncomfortable and relies for its effectiveness on a conscious action by the user which raises issues such as training and supervision.

Its use can actually create additional risks, for instance, impaired vision and warning sounds masked by hearing protection.

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## PERSONAL PROTECTIVE EQUIPMENT – LAST RESORT

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**Explain** why personal protective equipment (PPE) should be considered as a last resort in the control of occupational health hazards.

Personal Protective Equipment (PPE) is considered the last resort in the hierarchy of control measures I precautions, as hazards should be assessed by the risk assessment process and all hazards where possible should be eliminated or controlled at their source - e.g. reduce the noise of a compressor by engineering controls by making it quieter with insulation etc, this will help reduce the level of noise at source prior to issuing PPE (ear protection).

If PPE is given without trying to eliminate or reduce the hazard (s) we are not using a systematic method of permanent controls.

PPE is a good method of control for various hazards, however, if we use PPE without first trying to eliminate or reduce the hazard, the hazard may still exist in its full form and PPE may not be sufficient means of safe control, also different types and ranges of PPE protect at varying levels so health may be compromised, more importantly PPE depends on the user to wear it and this is practice is difficult to ensure to enforce with consistent supervision and regular inspections etc.

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## PERSONAL PROTECTIVE EQUIPMENT – EYE PROTECTION

**Outline** what factors should be considered in the selection process of personal eye protection for use in the workplace.

- The type of hazard i.e. particles, molten metal, chemicals, etc. present
- The standard of equipment required as specified in British, European, ANSI or other appropriate and recognised Standard
- The suitability of different types of equipment i.e. goggles, visors and spectacles with regard to the person and the process
- Fit and comfort of the PPE and its ability not to adversely affect the operation, function or use of other items of PPE that may have to be used in unison with other items.
- Storage and maintenance requirements of the PPE with reference to the worker, the work environment and or the storage of it
- Costs of total replacement vv that of repair (why replace the whole item when maybe only the lens needs to be replaced)
- The training needs of individuals expected to use, maintain, etc the items of PPE
- Compatibility with other types of PPE as mentioned previously
- General environment where the equipment will be used and or stored.

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## PERSONAL PROTECTIVE EQUIPMENT – HEARING PROTECTION

**Describe** the factors to be considered when selecting suitable hearing protection to be used as an interim measure to reduce employees exposure to noise

- Select the right style. The two most common types of protection are muffs worn over the ears, and plugs worn in the ears. Muffs are comfortable for longer wearing times but are not effective when obstructed by eyeglasses or hats. Hearing plugs are less noticeable than muffs and their small size makes them convenient to put in a pocket.

- Check the noise reduction rating (NRR). All hearing protection devices are rated according to how much noise (in decibels) they will reduce for the wearer. For general use, look for NRR of 25 or greater. Actual noise reduction will probably be about half of the manufacturer's NRR, because ratings were obtained under perfect lab conditions.
- Consider cost. Disposable ear plugs are available for about \$1; muffs, about \$15. Disposable plugs are popular for short wearing periods but can be expensive if protection is needed on a regular basis. Reusable plugs or muffs may be a better choice for frequent wearers.
- Use clean items. Disposable plugs cannot be washed or used again. Use warm, soapy water to wash reusable devices; thoroughly rinse and dry them, and store in a clean, covered container.
- Look for hearing protection devices from reliable suppliers

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## HEARING PROTECTION – FACTORS THAT AFFECT ITS PERFORMANCE

**Outline** the factors that are likely to affect the performance of personal hearing protection.

A number of factors which could affect the performance of personal hearing protection include:

- Incorrect selection;
- Incompatibility with other personal protective equipment;
- Incorrect or poor fitting by the wearer;
- Incorrect attenuation;
- Damage or
- Lack of maintenance

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## PERSONAL PROTECTIVE EQUIPMENT – FOOTWEAR

**Identify** FOUR different types of hazards that could require the use of special footwear explaining in EACH type how the footwear protects the wearer.

- Falling objects – steel toe-caps would protect the toes from crush and or impact injuries
- Sharp objects – steel in-soles would prevent sharp items piercing through the sole of the shoe / boot into the wearers foot
- Flammable atmospheres – anti-static footwear would prevent the generation of sparks
- Spread of contamination – washable boots (i.e. food industry), here washable footwear would prevent the spread of harmful contaminants
- Molten metal – heat resistant boots and gaiters would prevent the hot material penetrating through clothing onto the wearers skin / body.
- Electricity – rubber soles to act as an effective insulator
- Wet environments – impermeable Wellington boots
- Slippery surfaces – non-slip / slip resistant soles
- Cold environments – thermally insulated footwear to protect the wearer from the effects of cold

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## PERSONAL PROTECTIVE EQUIPMENT – LAST RESORT

Personal Protective Equipment (PPE) should only be considered after other control measures have been found to be ineffective or not practicable.

**Give reasons why PPE should be considered only after other control measures.**

There are numerous reasons why personal protective equipment (PPE) should be considered only after other possibilities have been exhausted.

Importantly, in accordance with legal requirements and those of international and national standards, the hierarchy of controls should be applied before PPE is used as a last resort if only because the latter does not remove the hazard.

Additionally, PPE may not provide adequate protection because of such factors as poor selection, poor fit because of facial features such as beards, incompatibility with other types of PPE, contamination, and misuse or non-use by workers.

Again, PPE is likely to be uncomfortable and relies for its effectiveness on a conscious action by the user which raises issues such as training and supervision and there are cost factors involved in its use such as those arising from its initial supply and its subsequent maintenance, cleaning and eventual replacement.

In certain circumstances, its use can actually create additional risks, for instance, impaired vision with warning sounds masked by the use of hearing protection.

#### 4.4 - SOURCES OF HEALTH AND SAFETY INFORMATION

##### ABSENCE – INVESTIGATING THE PROBLEM

The number of absences due to work related upper limb disorders (WRULD) in an organisation is increasing

**Identify the possible sources of information that could be used when investigating this problem**

- A possible source of information is extensive, and sources of information can include:
- Review of absence/sickness.
- Review of first aid/surgery treatments.
- Speaking with work groups that appear to be affected.
- Physical observations of work practices.
- Review of risk assessments.
- Review of health and safety committee meeting minutes.
- Review of insurance claims.
- Consult with workplace representatives for information
- Undertake a review of reliable web information
- Identify if training sessions have increased the awareness of the importance of reporting such incidents

##### ABSENCES DUE TO WORK RELATED ILL-HEALTH – SOURCES OF INFORMATION

The number of absences due to upper limb disorders in an organisation appears to be increasing.

**Outline the possible sources of information that could be consulted when investigating this problem.**

A possible source of information is extensive, and sources of information can include:

1. Review of absence/sickness.
2. Review of first aid/surgery treatments.
3. Speaking with work groups that appear to be affected.
4. Physical observations of work practices.
5. Review of risk assessments.
6. Review of health and safety committee meeting minutes.
7. Review of insurance claims.
8. Consult with workplace representatives for information
9. Undertake a review of reliable web information
10. Identify if training sessions have increased the awareness of the importance of reporting such incidents

#### 4.5 - FACTORS THAT SHOULD BE CONSIDERED WHEN DEVELOPING AND IMPLEMENTING A SAFE SYSTEM OF WORK FOR GENERAL WORK ACTIVITIES

##### WORKER INVOLVEMENT IN SETTING AND MAINTAINING STANDARDS

**Outline** ways in which an organisation could encourage workers to be involved in setting and maintaining high standards of health and safety.

- Involving workers in risk assessments, accident investigations and the development of safe systems and procedures;
- Setting up suggestion schemes and acting on the ideas and recommendations put forward;
- Organising training courses and information programmes on the benefits of good safety standards; supporting active involvement in safety committee meetings;
- Introducing an effective two-way communication system;
- Introducing a system of award and reward to recognise achievement; and
- Ensuring that management set a good example for the workforce to follow.

Some candidates are only able to come up with no or two brief suggestions such as „management commitment and training“ which was not sufficient to gain the marks available.

##### SAFE SYSTEM OF WORK – DEVELOPMENT

**Outline** the factors that should be considered when developing a safe system of work.

You need to outline factors such as

- Details of the task or activity to be performed, such as might be provided by a job safety analysis;
- The equipment and materials to be involved;
- Any information or guidelines provided by manufacturers;
- The number of employees who will carry out the activity, the level of their competence and training and the possibility that some may be vulnerable;
- The inherent and contingent hazards and risks taking into account the particular environment;
- The history of any accidents associated with the activity;
- The adequacy of the control measures in place;

- Relevant legal requirements;
- The need for consultation with employees;
- Emergency procedures and
- The systems for monitoring and supervision.

An alternative answer to the one given above may take the following form:

When developing a safe system of work you should consider the following.

- Environment - will the environment in which the work is being carried out have sufficient heating, ventilation, lighting etc. will the activity or process have an impact on the environment?
- People - are people 'competent' and suitably trained to conduct the specific work or task expected of them?
- Equipment - is the machinery / equipment to the specification for the work and is it in good condition, with guards where necessary

Within the consideration risk assessments, inspection and accident reports should be consulted to ensure the safe system of work addresses all hazards and risk which are likely to arise.

Also manufacturers instruction and information and equipment, machinery and chemicals etc should also be consulted.

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## SAFE SYSTEMS OF WORK AND WORKER INVOLVEMENT

An organisation is introducing a new work activity that requires a safe system of work.

### Outline:

(a) Why it is important to involve workers in the development of a safe system of work;

(b) Why it is important for safe systems of work to have written procedures.

For part (a)

It is important to involve workers in the development of a safe system of work because of their knowledge of the particular working environment involved and what will work in practice.

Additionally, their involvement will establish their ownership of the system and will encourage them to use and follow it once it has been finalised and introduced.

Finally their involvement will emphasise management's commitment to health and safety and help to raise its profile within the organisation.

For part (b)

Once a safe system of work is developed, it is imperative that a clear method of communicating its procedures to the workforce is used and this would be better achieved in writing rather than orally.

The procedures may contain complex information that will need to be consulted on more than one occasion to ensure the correct sequence of operations is followed.

Additionally, different people will need to be aware of the procedures and it is preferable to have them written down rather than pass them on by word of mouth, a method that may not always guarantee consistency in their presentation.

A written document will also be needed for audit purposes and could be used as evidence in defending an enforcement action or a civil claim.

Finally, the use of written procedures may well be a requirement of the organisation's quality assurance procedures.

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## SAFE SYSTEMS OF WORK – SOURCES OF INFORMATION

Outline the sources of information that could be consulted when developing a safe system of work.

The candidates here need to be quite specific

- Statutory instruments – including legislation and supporting regulations
- Approved Codes of Practice – ACoP's
- HSE or municipality guidance
- Manufacturers' information
- European and other official standards
- Industry and trade literature, trade association guidance, etc
- Results of risk assessments
- Analysis of accident statistics, accident investigations, enquiries
- Investigation and analysis of health surveillance records
- From the employees involved via conversation, consultation
- Enforcement agencies (municipalities, government departments and or their agencies) and other experts

The safe system of work will include how the task is to be done, what equipment is required, what communication needs must be met and who can authorise variations to the procedure and the following may need to be consulted:

- Risk Assessment (potential hazards)
- Job Descriptions
- Permit to work conditions
- Description of the work to be done?
- Existing instructions or procedures that may need to be adopted / adapted
- Who is required to do the work and what skills and abilities will be needed
- Supervisory requirements and competencies based work to be done
- Instructions for any special tools, protective clothing or equipment (e.g. breathing apparatus) that may be needed?
- Availability of special tools, protective equipment
- Training records of the people who are to do the work – are they adequately trained
- Specific isolations and locking-off needs for the work to be done safely?
- What other site activities are occurring - will the work interfere them or other activities create a hazard to the people doing the work
- Determination of the respective permissions

- Available communication facilities - how will the people doing the work communicate with each other
- Emergency procedures and preparedness plans – need to involve emergency procedures – local rules

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## SAFE SYSTEM OF WORK – DEFINITION

**Explain** the meaning of the term 'safe system of work'

- A means of working in a safe manner :
- A safe system of work is the systematic examination of a task in order to identify all hazards.
- The aim is to produce a safe work method that will eliminate or reduce the risks associated with the identified hazards.
- It is important to involve employees that carry out the work or with detailed knowledge of the activity, so that the system of work produced is effective and practical as well as safe.
- Involving employees with the process helps them to understand why this level of control has to be established and maintained.

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## SAFE SYSTEM OF WORK - TRAINING

**Outline** the information that should be given to employees in a training session on a safe system of work.

People doing work or supervising work must be made fully aware of the laid-down safe systems that apply. The preparation of safe systems will often identify a training need that must be met before the system can be implemented effectively.

In addition, people should receive training in how the system is to operate. This applies not only to those directly involved in doing the work but also to supervisors/managers who are to oversee it.

In particular, the training might include:

- Why a safe system is needed
- What is involved in the work
- The hazards which have been identified
- The precautions which have been decided and, in particular
  - The isolations and locking-off required, and how this is to be done
  - Details of the permit to work system, if applicable
  - Any monitoring (e.g. Air testing) which is to be done during the work, or before it starts
  - How to use any necessary personal protective equipment
  - Emergency procedures.

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## CONFINED SPACE WORKING

A leaking underground concrete reservoir has been emptied in order that it can be visually inspected prior to its subsequent repair.

(a) **Outline** the features of a safe system of work for the inspection team in this a 'Confined Spaces'.



(b) **Describe** the health risks faced by those repairing the reservoir when pneumatic tools are to be used to remove defective concrete and epoxy resin material used to effect repairs.

Part a)

If you cannot avoid entry into a confined space make sure you have a safe system for working inside the space.

Use the results of your risk assessment to help identify the necessary precautions to reduce the risk of injury. These will depend on the nature of the confined space, the associated risk and the work involved.

Make sure that the safe system of work, including the precautions identified, is developed and put into practice. Everyone involved will need to be properly trained and instructed to make sure they know what to do and how to do it safely.

The following checklist is not intended to be exhaustive but includes many of the essential elements to help prepare a safe system of work.

- Appointment of a supervisor
- Are persons suitable for the work? - Do they have sufficient experience of the type of work to be carried out, and what training have they received?
- Isolation - Mechanical and electrical isolation of equipment is essential if it could otherwise operate, or be operated, inadvertently. If gas, fume or vapour could enter the confined space, physical isolation of pipework etc needs to be made. In all cases a check should be made to ensure isolation is effective.
- Cleaning before entry - This may be necessary to ensure fumes do not develop from residues etc. while the work is being done.
- Check the size of the entrance - Is it big enough to allow workers wearing all the necessary equipment to climb in and out easily, and provide ready access and egress in an emergency?
- Provision of ventilation - You may be able to increase the number of openings and therefore improve ventilation. Mechanical ventilation may be necessary to ensure an adequate supply of fresh air.
- Testing the air - This may be necessary to check that it is free from both toxic and flammable vapours and that it is fit to breathe. Testing should be carried out by a competent person using a suitable gas detector which is correctly calibrated.
- Provision of special tools and lighting - Non-sparking tools and specially protected lighting are essential where flammable or potentially explosive atmospheres are likely. In certain confined spaces (e.g. inside metal tanks) suitable precautions to prevent electric shock include use of extra low voltage equipment (typically less than 25 V) and, where necessary, residual current devices.
- Provision of breathing apparatus - This is essential if the air inside the space cannot be made fit to breathe because of gas, fume or vapour present, or lack of oxygen.
- Preparation of emergency arrangements - This will need to cover the necessary equipment, training and practice drills.
- Provision of rescue harnesses - Lifelines attached to harnesses should run back to a point outside the confined space.
- Communications - An adequate communications system is needed to enable communication between people inside and outside the confined space and to summon help in an emergency.
- Check how the alarm is raised - Is it necessary to station someone outside to keep watch and to communicate with anyone inside, raise the alarm quickly in an emergency, and take charge of the rescue procedures?

- Is a „permit-to-work“ necessary? - A permit-to-work ensures a formal check is undertaken to ensure all the elements of a safe system of work are in place before people are allowed to enter or work in the confined space. It is also a means of communication between site management, supervisors, and those carrying out the hazardous work.
- Emergency procedures - When things go wrong, people may be exposed to serious and immediate danger. Effective arrangements for raising the alarm and carrying out rescue operations in an emergency are essential. You should consider communications; rescue and resuscitation equipment; capabilities of rescuers; shut down; first-aid procedures and local emergency services

Part b)

Health risks – use of pneumatic tools:

- Noise induced hearing loss – temporary or permanent
- Vibration effects such as vibration white finger
- Being struck by airborne particles
- Dust inhalation
- Musculoskeletal injuries from work process and working posture
- Work related upper limb disorders due to frequency, duration and type of work process
- Injuries as a result of slipping, tripping and falling
- Injection of air stream into body from say a hose leak (high pressure)

Health risk epoxy resin:

- Contact dermatitis
- The primary risk associated with epoxy use is sensitisation to the hardener, which, over time, can induce an allergic reaction.
- It is a main source of occupational asthma among users of plastics, respiratory irritation is fairly common
- Chemical burns as a result of chemical reactions

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## CONFINED SPACE WORKING – MAINTENANCE – UNDERGROUND STORAGE VESSEL

**Outline precautions needed when maintenance work is being carried out in an underground storage vessel.**

The precautions required in such an instance would be dependant upon a whole of factors. These could involve, some, all or more aspects indicated below:

- Permit-to-work – this is a space not used for normal work activity by persons
- Risk assessment to determine the level of risk, the adequacy of controls and any additional controls required
- Isolation of plant and equipment that may endanger persons working or entering this environment
- Pre-cleaning to make the area as safe as possible, not loosing focus on potential gases that may escape if sludge, etc is disturbed
- Purging and testing the vessel’s atmosphere, at all levels for particular gases or the adequacy of the oxygen content of the atmosphere
- Safe means of access and egress
- Appropriate tools i.e. non-spark (intrinsic)
- P.P.E appropriate to the environment and individual

- Appropriate lighting
- Continual monitoring / observation of workers inside by a watchman safely positioned – say outside
- Competent and trained personnel including those who may be engaged in any rescue work of downed workers
- Adequate first aid arrangements
- Suitable and sufficient fire fighting and fire control methods
- Good communication systems between tank and above-ground workers
- Maintenance of detailed emergency procedures, etc.
- An adequate number of trained persons in rescue being available

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## LONE WORKING CONSIDERATIONS

### Identify the considerations to be taken into account for lone working situations

Safe arrangements for lone workers are no different to organising the safety of other employees. It must be identified if the lone worker can adequately control the risks of the job precautions must be in place for both normal work and for emergencies such as fire, equipment failure or sudden illness.

Other considerations:

- Does the lone worker have a safe way in and out of the workplace?
- Can one person handle temporary access equipment, plant, goods or substances?
- Is there a risk of violence?
- Are women especially at risk?
- Do young people work alone?
- Check that lone workers have no medical condition that would make them unsuitable for working alone, seeking medical advice if necessary.
- Training is particularly important where there is limited supervision lone workers need to be sufficiently experienced to fully understand the risks and precautions required employers should set limits of what may and may not be done whilst working alone.
- Lone workers should be competent to deal with unusual or new circumstances beyond their training, and know when to stop and seek advice.

The extent of supervision depends on the risk and the ability of the lone worker to identify and handle health and safety issues.

Employees new to a job may need to be accompanied until competencies are achieved. Supervisors may periodically visit to observe the work being done. There should be regular contact by radio, telephone or mobile phone automatic warnings should be activated if specific signals are not received at base other warnings that raise the alarm in the event of an emergency should be devised check that the lone worker has returned to base, or home, on completion of the work.

Lone workers should be capable of responding correctly to an emergency and emergency procedures should be in place with the worker trained to respond

Lone workers should have access to a First Aid Kit or facilities

Risk assessment may indicate that the lone worker needs first aid training as this may have to be self-administered.

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## STAFF INVOLVEMENT IN HEALTH AND SAFETY

List practical means in which managers can involve their staff in the improvement of health and safety

- Training
- Information
- Instruction
- Communication
- Consultation
- Meetings
- Safety Committees
- Suggestion schemes
- Joint inspections
- Recognition and rewarding good/safe behaviours
- Leading by example
- Workplace inspections

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## WORKER INVOLVEMENT TO IMPROVE HEALTH AND SAFETY STANDARDS

**Identify** ways in which a manager could involve workers in the improvement of health and safety in the workplace.

The ways in which a manager could involve workers in the improvement of workplace health and safety may include but not be limited to:

- Involving workers in risk assessments, accident investigations, the selection of equipment and the development of safe systems and procedures;
- Encouraging hazard spotting and the reporting of defects;
- Setting up suggestion schemes for improvements;
- Organising training courses and information programmes;
- Supporting active involvement in safety committee meetings;
- Being accompanied by workers or their representatives on safety tours and inspections; and
- Giving workers responsibilities for mentoring young and inexperienced workers.

### 4.6 - ROLE AND FUNCTION OF A PERMIT-TO-WORK SYSTEM

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#### PERMITS TO WORK – EFFECTIVENESS

**Identify** the factors which may influence the effectiveness of a permit to work system

The effectiveness of a permit to work system may be influenced by a number of factors, including:

The training needs of those involved in the work to be identified and met, and monitoring procedures to ensure that the system is operating as intended.

The permit document will typically need to specify:

- What work is to be done

- The plant/equipment involved, and how they are identified who is authorized to do the work
- The steps which have already been taken to make the plant safe
- Potential hazards which remain, or which may arise as the work proceeds
- The precautions to be taken against these hazards
- For how long the permit is valid
- That the equipment is released to those who are to carry out the work.

In accepting the permit, the person in charge of doing the authorized work normally undertakes to take/maintain whatever precautions are outlined in the permit.

The permit will also include spaces for:

- Signature certifying that the work is complete
- Signature confirming re-acceptance of the plant/equipment.

An alternative approach to this answer may be:

Permit systems must adhere to the following eight principles:

1. Wherever possible, and especially with routine jobs, hazards should be eliminated so that the work can be done safely without requiring a permit to work
2. Although the site manager may delegate the responsibility for the operation of the permit system, the overall responsibility for ensuring safe operation rests with him/her
3. The permit must be recognized as the master instruction which, until it is cancelled, overrides all other instructions
4. The permit applies to everyone on site, including contractors
5. Information given in a permit must be detailed and accurate. It must state:
  - a) Which plant/equipment has been made safe and the steps by which this has been achieved; What work may be done; The time at which the permit comes into effect
6. The permit remains in force until the work has been completed and the permit is cancelled by the person who issued it, or by the person nominated by management to take over the responsibility (e.g. at the end of a shift or during absence)
7. No work other than that specified is authorized. If it is found that the planned work has to be changed, the existing permit should be cancelled and a new one issued
8. Responsibility for the plant must be clearly defined at all stages.

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## PERMIT TO WORK SYSTEMS

(a) **Define** the term 'permit-to-work system'

(b) **Outline** THREE types of work situation that may require a permit-to-work system, giving reasons in EACH case for the requirement

Part (a)

When work has to be carried out involving hazardous or high risk activities, a permit to work is normally used.

A permit to work is a formal documented control process which takes account of all the foreseeable interactions between the worker, the environment and the associated hazards.

It defines the procedures and precautions to be undertaken and the sequence in which they should be carried out.

The permit to work approach is not in itself a safe system of work, but a very specific type of control.

It is designed to prevent human errors, especially those of conflicting knowledge, incorrect assumptions and mixed messages.

Certain types of activities and certain hazards require permit to work procedures as part of the safe system.

Part (b)

Complex and highly hazardous situations – examples being:

- Dangerous substances – Exposure and ill health
- Entry into explosives or inflammable atmospheres – explosions and fires
- Entry into non- respirable atmospheres – suffocation potential
- Confined spaces – dangerous atmospheres, work conditions
- Electrical work, especially high voltage – Contact with live electricity
- Pressurised systems and pressurised atmospheres – explosions, exposure leading to penetration
- Radioactive or biologically hazardous environments – occupational ill health
- Breaking into pipelines containing hazardous materials, including chemicals, gases and steam – contact or exposure to hazardous situations
- Hot work such as welding, in certain situations – fire and explosions
- Fumigation or other releases of hazardous substances – occupational health issues, contamination
- Maintenance work on plant and machinery – exposure to dangerous parts, entrapment, entanglement, nip points, etc.
- Working at height – fall from height
- Working in excavations – collapse of excavation and burying
- Cold work situations – fire or explosions from unintentional sparks

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## **FUNCTIONS OF A PERMIT TO WORK AND THE ELEMENTS**

(a) **Outline** the functions of a permit-to-work form.

(b) **Outline** the elements that should be included in a typical permit to work.

Part (a)

- The functions of a permit to work system are to control high risk activities by ensuring set procedures are followed;
- To formally record control measures and
- To give signed authority for the activity to be carried out.

#### Part (b)

Elements that should be included in the permit include:

Firstly a description and assessment of the task to be performed including the plant involved, its location and the foreseeable hazards associated with the task. This will determine the need for, and nature of other relevant elements such as, the isolation of sources of energy and inlets, the additional precautions required such as atmospheric monitoring, the provision and use of personal protective equipment, communication arrangements and the duration of the permit.

An essential element of a permit to work system is, of course, the operation of the permit itself. By means of signatures, the permit should be issued by an authorised person, and accepted by the competent person responsible for the work.

On completion of the work, the competent person would need to indicate on the permit that the area had been made safe in order for the permit to be cancelled by the authorised person, after which isolations could be removed.

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### PERMIT TO WORK – DETAILS TO BE INCLUDED

**Outline** the general details that should be included in a permit-to-work.

The general details that should be included in a permit-to-work are:

A description and assessment of the work to be performed including the plant involved, its location and the possible hazards associated with the task.

This will determine the need for, and nature of, other relevant contents of the permit such as:

- The isolation of sources of energy and product inlets,
- Additional precautions required such as atmospheric monitoring,
- The provision and use of personal protective equipment,
- The emergency procedures to be followed and
- The duration of the permit.

An essential element of a permit to work system is, of course, the operation of the permit itself. By means of signatures, the permit should be issued by an authorised person, and accepted by the competent person responsible for the work.

On completion of the work, the competent person would need to indicate on the permit that the area had been made safe in order for the permit to be cancelled by the authorised person, after which isolations could be removed.

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## WELDING OPERATIONS

**Outline** the health and safety risks associated with welding operations.

Welding/hot work is potentially hazardous as:

- A source of ignition in any plant in which flammable materials are handled.
- A cause of fires in all processes, regardless of whether flammable materials are present.
- Possibly fatal electric shock if using electrically powered welding equipment.
- Burns to the people doing the work or in close proximity.
- Occupational health risks from fume and vapour from the welding operation.
- Exposure to intense light may give rise to eye problems e.g. „arc eye“ of the welder or others in the direct vicinity.
- Explosions may arise in circumstances where there are explosive atmospheres, in addition if using gas welding equipment without the proper protective devices (flash back arresters) flames may go back into cylinders and give rise to an explosion.

Hot work includes cutting, welding, brazing, soldering and any process involving the application of a naked flame.

Drilling and grinding should also be included where a flammable atmosphere is potentially present.

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## WELDING OPERATIONS – PRECAUTIONS BEFORE COMMENCING WORK

**Identify** precautions that would need to be considered before welding work can commence.

Before carrying out welding work, the following precautions need to be considered:

The need to issue a permit to work for the operation. This would then point to the further precautions to be taken such as:

- Removing or covering up all combustible materials in the area of operation
- Screening the working area
- Allowing entrance only to persons involved in the work
- Providing fire fighting equipment
- Appointing a fire watcher
- Restricting ventilation in the working area by shutting windows and closing air ducts
- Setting in place procedures for evacuation in the event of an emergency
- Providing personal protective equipment such as a visor, apron and means of respiratory protection;
- Ensuring that workers concerned in the welding operation are made aware of the hazards involved and the precautions to be taken including for example the importance of completing pre-use inspections of the equipment to be used.



### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the principles, purpose and role of active and reactive monitoring
- Explain the purpose of, and procedures, for health and safety auditing
- Explain the purpose of, and procedures for, investigating incidents (accidents, cases of work-related ill-health and other occurrences)
- Describe the legal and organisational requirements for recording and reporting incidents
- Explain the purpose of, and procedures for, regular reviews of health and safety performance.

### 5.1 - ACTIVE AND REACTIVE MONITORING

#### REACTIVE AND PROACTIVE MONITORING

a) **List Six proactive (active) monitoring methods**

b) **List Four reactive monitoring methods**

Part a)

1. Safety Audits
2. Safety Inspections
3. Safety Survey
4. Safety Tour
5. Safety Sampling
6. Benchmarking
7. Hazard and Operability Studies
8. Health Surveillance
9. Performance Reviews
10. Risk Assessments

Part b)

1. Accident Investigation and Reviews

2. Insurance Claims Reviews
3. Defect Reports
4. Enforcement Action Follow-Up
5. Legal and Enforcement Actions
6. Legal mandates (notices)

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## ACTIVE AND REACTIVE MONITORING OF SAFETY PERFORMANCE

**Identify** FOUR active and FOUR reactive means by which an organisation can monitor its health and safety performance.

In answering part this question, candidates could have selected from a number of active monitoring methods including:

1. Safety inspections,
2. Surveys,
3. Audits
4. Sampling,
5. Environmental monitoring,
6. Health surveillance,
7. Behavioural observation such as by carrying out safety observation tours and
8. Benchmarking against the performance of other like organisations.

Reactive monitoring methods which might be used include:

1. Accident and ill-health statistics and reports;
2. Incidents of reported near-misses and dangerous occurrences;
3. Property damage;
4. Actions taken by the enforcement authorities;
5. The number of civil claims;
6. An analysis of absences and lost time;

7. Complaints by workers and

8. The costs involved in all the above.

---

## REACTIVE AND PROACTIVE MONITORING – DIFFERENCES WITH EXAMPLES

**Explain** the difference between Proactive and Re-active monitoring and give an example of each.

Proactive monitoring which monitors the achievement of plans and the degree of compliance with standards before an Accident, Incident or Ill Health.

Reactive monitoring - monitors after accidents, ill health and incidents.

Examples for Proactive Monitoring:

- Performance Reviews,
- Review of training assessments, records and needs,
- Workplace Inspections,
- Management system audits
- Safety Survey.

Examples for Reactive Monitoring:

- Accident or Incidence Rates, ill
- Ill Health incidence records and rate
- Accident investigation reports
- Accident frequency rates
- Accident severity rates
- Sickness and absence records

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## REACTIVE MEASURE TO MONITOR AN ORGANISATIONS HEALTH AND SAFETY PERFORMANCE

**Identify SIX** reactive measures that can be used to monitor an organisation's health and safety performance.

The reactive measures that can be used to monitor an organisation's health and safety performance include:

1. The number of reported accidents and the frequency, incidence and severity rates;
2. Sickness absence rates particularly those relating to occupational ill-health;
3. Incidents of reported near misses and dangerous occurrences;
4. Property damage;
5. The number of actions such as the issue of notices, prosecutions and the serving of verbal or written warnings taken by the enforcement authorities;

6. The number of civil claims;
7. Records of absenteeism and staff turnover;
8. The number of complaints from employees or neighbours and
9. The costs involved in all the above.

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## ACTIVE MONITORING METHODS

**Outline** four active monitoring methods that can be used when assessing health and safety.

Active (Proactive) Monitoring is intended to reveal hazards that are not controlled to a standard. And to reveal visible non-compliance with standards and it relies heavily on visible evidence only

When assessing health and safety in the workplace proactive (active) monitoring can be achieved using various methods.

These methods include:

- Documented workplace inspections which are conducted on a regular basis to spot immediate hazards, unsafe acts and conditions and ensure action is taken for remedial measure as soon as possible.
- Checklists are often used for inspections, but care should be taken not to miss 'other' hazards that are not part of the generic checklist.
- Risk assessments is a major active monitoring tool as this systematic method highlights hazards and risks and eliminates or reduce them to as low as is reasonably practicable (ALARP).
- Auditing is also a valuable monitoring tool as this method examines the health and safety management systems and outlines areas for improvement.
- Reporting near misses / incidents is very important as this can lead to prevention of major accident in the future.

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## CHECKLISTS – STRENGTHS AND WEAKNESSES

(a) **Outline** the role of workplace health and safety inspections.

(b) **Give** Two examples of:

(i) Strengths of using a checklist when carrying out an inspection.

(ii) Weaknesses of using a checklist when carrying out an inspection.

Part (a)

A workplace inspection is a general examination of health and safety performance at a particular point in time.

As well as demonstrating management commitment, its role is to:

- Identify workplace hazards;
- Implement immediate corrective action where this is possible;
- Ensure compliance with the law and with laid down standards;

- Recommend improvements and further controls when these are seen to be necessary;
- Observe employee behaviour, for example, in the use of personal protective equipment;
- Listen to and consult with workers on health and safety issues; t
- Review previous findings and recommendations and
- Provide a summary report to individual managers on standards in their areas of control.

Part (b) (i)

Using a checklist to complete a health and safety inspection of a workplace

1. Enables prior preparation and planning to be made so that the inspection is structured and systematic;
2. Reduces the chance that important areas or issues might be missed;
3. Provides an immediate record of findings; ensures a consistent approach by those carrying out the inspection;
4. Is easily adapted or customised for different areas; and provides an easy method for comparison and audit.

Part (b) (ii)

The weaknesses of using such a system are:

1. That over reliance on a checklist may lead to a blinkered approach by “inspectors” with the possibility that significant risks might be missed;
2. That the checklist may not be reviewed and updated to account for changes to work processes or equipment;
3. That there is a danger that inspections become routine with no follow up questions being asked;
4. That the system is too objective and restrictive with no scope for peripheral issues to be considered;
5. That untrained persons might be tempted to conduct inspections and
6. That the procedure is subject to human error and/or abuse.

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## STRENGTHS AND WEAKNESS OF CHECKLISTS

**Outline** the strengths AND weaknesses of using a checklist to complete a health and safety inspection of a workplace.

Strengths of checklists:

- Enables prior preparation and planning so that an inspection can be more structured and systematic
- Reduces the chances of important areas or issues being overlooked
- Provides an immediate record of findings
- Ensures a consistent approach
- Provides an easy method of comparison and audit.

Weaknesses of checklists:

- May lead to a blinkered approach resulting in maybe significant risks may be overlooked

- May not be reviewed or updated to take account of changes in work processes, etc.
- Become routine with no follow-up questions
- Too objective and restrictive with little or no scope for peripheral issues
- Procedure is subject to human error and/or abuse.

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## INSPECTIONS – SKILLS AND KNOWLEDGE REQUIRED

(a) **Identify** TWO types of health and safety inspection.

(b) **Outline** the skills and knowledge that are required of an employee who conducts health and safety inspections.

Part (a)

1. Pre-use checks for example of portable appliances or ladders;
2. General periodic workplace inspections;
3. Statutory inspections;
4. Those associated with planned preventative maintenance;
5. Safety tours;
6. Safety sampling
7. Inspections carried out by members of the enforcement authority.

Part (b)

There are a range of qualities expected of an employee who carries out health and safety inspections including:

Relevant Knowledge:

- The knowledge he/she should possess such as a general knowledge of health and safety together with the legal requirements and any published guidance;
- Knowledge of the workplace and the work activities carried out with the procedures that have been introduced such as safe systems of work and the use of permits to work;
- Knowledge as to whom he/she should report the results of the inspections.

Relevant skills:

- The ability to identify hazards and risks and to detect deficiencies in the control measures provided;
- Observational skills together with the ability to record and report observations;
- Interpersonal skills including the ability to interview and question fellow employees
- The ability to recognise his/her own limitations.

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## SAFETY INSPECTIONS – CONSIDERATIONS

**Identify** the significant areas that should be considered during a planned health and safety inspection of a workplace

- Any substances or materials used in the area being inspected
- Traffic routes in and around the inspection area
- Means of access to and egress from the area of inspection
- Work equipment and work processes used in the area being inspected
- The work practices such as manual handling, ergonomics, etc that are employed within the work area
- Work environment itself, to include space, lighting, heating, air movement, ventilation, etc
- Electricity and electrical sources as well as other power sources present
- Fire precautions required within the workplace
- First-aid facilities provided with regard to the risks posed by work operations and or situations
- Welfare facilities to include washing, changing resting and toilet facilities as appropriate
- Workstation ergonomics – matched to the worker and the tasks that they perform
- The standards of housekeeping being achieved against what is required
- Any outstanding actions points from previous inspections

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## SAFETY INSPECTIONS – THEIR ROLE

**Outline** the role of workplace health and safety inspections.

Safety inspections, which are a general examination of health and safety performance at a particular point in time, may be used to improve health and safety performance within an organisation in a number of ways including:

- Identifying hazards and assessing controls enabling the appropriate remedial action to be taken before accidents have occurred;
- Showing management's commitment to health and safety and improving the morale of the workforce; enabling the involvement of workers in the management of health and safety and if carried out on a regular basis, identifying trends and weaknesses in existing procedures;
- Ensuring adherence to legal requirements and standards;
- Reviewing previous findings and recommendations and providing a summary report to individual managers of standards in their area of responsibility.

Be sure you read the question – here the word „role“ is important.

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## HEALTH AND SAFETY INSPECTIONS AND AUDITS

**Outline** the main features of:

(a) A health and safety inspection of a workplace

(b) A health and safety audit.

Part a)

A workplace inspection is a general examination of health and safety performance at a particular point in time.

As well as demonstrating management commitment, its role is to:

- Identify workplace hazards;
- Implement immediate corrective action where this is possible;

- Ensure compliance with the law and with laid down standards;
- Recommend improvements and further controls when these are seen to be necessary;
- Observe employee behaviour, for example, in the use of personal protective equipment;
- Listen to and consult with workers on health and safety issues; t
- Review previous findings and recommendations and
- Provide a summary report to individual managers on standards in their areas of control.

Part b)

A „health and safety audit“ is a systematic critical examination of a health and safety management system, involving a structured process for the collection of independent information with the aim of assessing the effectiveness and reliability of the system and suggesting corrective action when this was thought to be necessary.

## 5.2 - HEALTH AND SAFETY AUDITING

### HEALTH AND SAFETY AUDIT – MEANING, COVERAGE AND FINDINGS

(a) **Give** the meaning of the term ‘health and safety audit’.

(b) **Outline** key areas that may be covered within a health and safety audit.

(c) **Explain** how the findings of a health and safety audit can be used to improve health and safety performance.

Part (a)

The meaning of the term „health and safety audit“ is a systematic critical examination of a health and safety management system, involving a structured process for the collection of independent information with the aim of assessing the effectiveness and reliability of the system and suggesting corrective action when this was thought to be necessary.

Some candidates confuse an audit with an inspection – be warned.

Part (b)

Key areas that may be covered by a health and safety audit include:

- The health and safety policy;
- The allocation of roles and responsibilities;
- The completion of risk assessments;
- The control of specific hazards such as those connected with display screen equipment, manual handling and working at heights;
- Fire protection and prevention;
- Arrangements for the control of contractors;
- Records of employee competence and training;
- First aid and emergency procedures;
- Procedures for the reporting and investigation of accidents;
- Arrangements for consultation with employees
- Minutes of safety committee meetings;



- Maintenance records including those required by law;
- Enforcement history; and
- Recommendations for the improvement of the existing health and safety management system.

Part (c),

The findings of a health and safety audit may be used for

- Improving health and safety performance by identifying areas of compliance and non-compliance and the reasons for and nature of the non-compliance;
- Identifying the strengths and weaknesses of the existing system, enabling comparison and benchmarking with other similar organisations and communicating the findings to management and staff;
- Informing and enabling remedial actions to be taken emphasising the need for proactive rather than reactive measures;
- Aiding prioritisation and the allocation of resources; producing evidence of commitment by the organisation in putting health and safety on the agenda; and
- Encouraging continual improvement.

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## HEALTH AND SAFETY AUDITS – ADVANTAGES AND DISADVANTAGES

**Describe** the advantages AND disadvantages of carrying out a health and safety audit of an organisation's activities by:

(a) An internal auditor;

(b) An external auditor.

Part (a)

The possible advantages of using an internal auditor for a safety audit of an organisation would include:

- Familiarity with the workplace, its tasks and processes
- An awareness of what might be practicable for the industry;
- The ability to see improvements or a deterioration from the last audit;
- Familiarity with the workforce and an individual's qualities and attitude;
- An audit which was relatively less costly and easier to arrange.

Possible disadvantages being,

- An internal auditor may not be in possession of recognised auditing skills,
- May not be up to date with legal requirements
- Be less likely to be aware of best practice in other organisations.
- They may be subject to pressure from management and the workforce and
- Have time constraints imposed upon them.

Part (b)

Advantages with an external auditor:

- Is more likely to possess the necessary auditing skills and credibility;
- Will not be inhibited from criticising members of management or the workforce;
- Is more likely to be up to date with legal requirements and best practice in other companies
- Will view the organisation's performance with a fresh pair of eyes.

Disadvantaged are:

- They are unlikely to be familiar with the workplace, tasks and processes;
- Will not be familiar with the workforce and their individual attitudes to health and safety
- Will have difficulty in obtaining the full cooperation of the workforce;
- May be unfamiliar with the industry and seek unrealistic standards and
- May well be more costly than an internal member of staff.

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## HEALTH AND SAFETY AUDITS – PLANNING AND GATHERING INFORMATION

(a) **Outline** the issues that need to be considered at the planning stage of an audit.

(b) **Identify** TWO methods of gathering information during an audit.

Part (a)

The issues that need to be considered at the planning stage of an audit include:

- The selection of a competent audit team independent of the area to be audited;
- Agreeing the objectives and scope of the audit;
- Developing audit questionnaires and checklists and agreeing on relevant guidance and standards that would be applied;
- Allocating resources and facilities;
- Agreeing timescales and
- Deciding on methods of feedback.

Part (b)

Methods of gathering information during an audit include:

- Interviewing;
- Reviewing and assessing written procedures; and
- Workplace observations to assess compliance with relevant health and safety standards and guidance.

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## MANAGEMENT SYSTEM – REVIEW OF DOCUMENTS

**Identify** documents that may be examined when reviewing an organisation's health and safety management system.

The documents that may be examined / reviewed during a management system review / audit include:

- Safety policy

- Risk assessments
- Risk assessment procedures
- Safety monitoring procedures
- Maintenance records
- Accident and incident reports
- Health surveillance records
- Health and safety committee meeting minutes
- Training records
- Statutory inspection records and reports/outcomes
- Previous audit reports

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## TOPICS TO BE INCLUDED IN A HEALTH AND SAFETY AUDIT

**Outline** the topics that should be included in a health and safety audit.

The topics for inclusion in a health and safety audit will include a document review, interviews and actual observations on any or all of the following:

- The organisations health and safety policy
- Awareness of risk assessment procedures and compliance
- Awareness of safety monitoring procedures and compliance
- The adequacy of maintenance arrangements and associated records
- The gathering, analysing and dissemination of accident, incident and ill-health data
- A review of health surveillance records and procedures for gathering the same
- The extent of legal compliance within the organisations operations
- A review of the health and safety committee minutes
- The quality, range and content of training records
- The results of statutory/thorough inspections
- A review of previous audit reports to ensure no recurrences and the addressing of previously identified non-conformances.

## 5.3 - INVESTIGATING INCIDENTS

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### BENEFITS OF ACCIDENT INVESTIGATION

**Outline** the benefits of conducting an accident investigation.

There are a range of benefits that result from investigating accidents, including:

- The prevention of similar situations
- Complying with legal requirements
- Complying with insurance requirements
- Improving workplace safety standards
- Improving employee moral
- Preventing future business losses
- The provision of information to assist in legal proceedings evidence to support a defence in enforcement action or where a civil claim is being sought

- Improving attitudes towards health and safety in the workplace.

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## ACCIDENT INVESTIGATION REPORT

List the information that should be included in an accident investigation report.

- Date
- Time
- Location
- Injured person(s)
- Witnesses
- Injuries / losses sustained
- Equipment / tools involved
- Costs estimated / known
- Who investigated
- Date investigated
- Introduction
- Summary
- Main body – observations, legal breaches, likely enforcement action
- Recommendation
- Conclusions
- Circulation list
- Any immediate actions taken to make safe the area
- Estimated costs
- Identification of the causes – immediate, underlying and root

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## ACCIDENTS – IMMEDIATE AND ROOT CAUSES

A workplace accident has occurred and an investigation is to take place.

(a) **Give** the meaning of the term ‘immediate causes’.

(b) **Give** TWO examples of immediate causes that could have contributed to a workplace accident

(c) **Give** the meaning of the term ‘underlying (root) causes’.

(d) **Give** TWO examples of root causes that could have contributed to a workplace accident.

Part a)

The term immediate cause is the unsafe act or condition that resulted in an accident, incident or loss

Part b)

1. Carelessness
2. Lack of attention
3. Guard missing off a machine

Part c)

Underlying or root cause – is the failure of procedures and/or management systems that resulted in the unsafe act or condition

Part d)

1. Not checking on the proper completion of a maintenance task
2. Not providing training
3. Inappropriate level of supervision for the risk
4. Inappropriate procedure

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### NEAR MISS ACCIDENT – ENGINEER WORKING N A CRANCE – WHY INVESTIGATE, POSSIBLE CAUSES, WHAT SHOULD BE IN THE REPORT

An engineer was involved in a near-miss incident when he dropped a component whilst working on an overhead crane. The component narrowly missed an employee who was passing below.

(a) **Give FOUR reasons why the near-miss incident should be investigated.**

(b) **Identify SIX possible root causes of the near-miss incident.**

(c) **Other than root causes outline what should be included in the near-miss incident report.**

Part (a)

The incident should be investigated in the first instance to prevent a recurrence by identifying its causes and any weaknesses in the existing procedures and systems. It would also help to set priorities for any remedial action found to be necessary if for instance risk assessments and safe systems of work need to be amended.

An investigation would additionally help to demonstrate management commitment to health and safety and assist in maintaining and even improving the health and safety culture of the organisation and the morale of the workforce.

Part (b)

Possible root causes include:

- A failure to carry out an adequate risk assessment of the operation resulting in the absence of recognised procedures for carrying out maintenance work
- No safe system of work for handling components.
- No system in place for advising other employees of the operation which was about to be carried out
- Lack of signs and barriers erected to keep employees away from the area beneath the crane.
- The engineer's competence and training would have to be questioned together
- The possibility that he/she was subjected to excessive work demands so that he/she did not have the time to take the necessary precautions in completing the job with, in co
- Calling into question the standard of supervision exercised by management.

Part (c)

In order to complete a near-miss incident report, information which should be collected includes:

- Details of the activity being carried out at the time with any history of previous similar incidents;
- The immediate causes of the incident with a description of the prevailing environmental conditions such as levels of lighting;
- Drawings or photographs of the site of the incident with details of witnesses and copies of their statements;
- Copies of relevant risk assessments and safe systems of work together with existing maintenance records;
- Records of training received by the employees concerned;
- An indication of possible breaches of legislation;
- An estimation of the cost implications of the incident;
- Recommendations for the action to be taken to prevent a recurrence including a proposed timescale and the allocation of responsibility for completion of the work to a named individual or individuals.

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**ACCIDENT INVESTIGATION – REASONS, INFORMATION TO BE INCLUDED IN THE REPORT, POSSIBLE IMMEDIATE AND ROOT CAUSES**

An employee has been seriously injured after being struck by a reversing vehicle in a loading bay.

(a) **Give FOUR** reasons why the accident should be investigated.

(b) **Outline** the information that should be included in the investigation report.

(c) **Outline FOUR** possible immediate causes and **FOUR** possible underlying (root) causes of the accident.

Part (a)

The reason this accidents should be investigated are numerous and they include:

1. Examining the direct cause of the accidents and trying to establish the root cause of the accident to try to prevent future accidents by identifying and eliminating or reducing the causes.
2. Accidents also give use valuable information in relation to hazards that may exist in the workplace that have not been identified by a pro-active approach.
3. To ensure compliance with legislation and
4. Accident reporting internally
5. To ensure training and information can be targeted in the areas of concern and management controls can be strengthened.

Part (b)

An accident report should be comprehensive to enable the direct and indirect (root causes) to be identified.

The report should ideally contain the events preceding the accident, the date and time of the accident, the precise location information on person(s) involved.

A clear account of what was found at the accident scene with the possible direct causes, together with witness statements

Initial injuries of person(s) if medical personnel are at the scene their initial findings should be included.

Other information can be included as required, e.g. - weather conditions, road and ground conditions etc.

If root cause analysis has been carried out this information should be included.

Part (c)

Four possible causes of immediate causes of the above accidents may be:

- Slips on workplace surface on the level, employee not paying attention, no reversing alarm on the vehicle, fork lift truck operator not be attentive and not looking around for pedestrians.

The route causes for the above accidents could be:

- Slips on the workplace level may have a root cause of oil being split and not cleaned up immediately

The root cause of a Fork Lift truck could be attributed to the driver being not properly trained and inadequate training in reversing techniques.

The root cause of the employee slipping may be that the housekeeping regime is in adequate and not monitored.

The fork lift truck may not be well maintained to check the reversing alarm is working.

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## ACCIDENTS TO A MACHINE OPERATOR – IMMEDIATE AND ROOT CAUSES

A machine operator is involved in an accident by coming into contact with a dangerous part of a machine, **describe:**

(a) The possible immediate causes

(b) The possible underlying (root) causes

Part (a)

The possible immediate causes could be:

- Inadequate or non-existent safety devices that allow access to the dangerous parts of equipment
- Poor housekeeping resulting in slip and trip type incidents into the machinery
- Loose clothing becoming entangled
- Machine malfunction
- Operator error and non conformance with a safe system of work

Part (b)

The possible root (underlying) causes

- Inadequate training of the operator in the safe operation of the equipment

- Inadequate information / instruction / supervision
- Poor maintenance such as the non-replacement of guards following machine service
- Inadequate risk assessment that did not consider all the significant risks
- Personal factors – stress, fatigue and the influence of drugs and alcohol
- Poor management systems not properly allowing effective health and safety management of the workplace / workforce
- Ineffective supervision either in terms of competency or numbers (scope of control)
- Selection of personnel not being appropriate to the work expected
- Selection of correct equipment not being suitable and sufficient for the purpose intended.

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## ACCIDENT INVESTIGATION TEAM – WHO TO INCLUDE

Giving reasons in EACH case identify **FOUR** categories of persons who may be considered a useful member of an internal accident investigation team.

Accident team members must be chosen for their knowledge, skill and experience in certain areas.

Four members who could be useful are:

1. Health and Safety Manager - the individual would bring the skills and knowledge of a health and safety professional and have in – depth knowledge of accident investigation.
2. Supervisor - this individual would have first hand knowledge of the workers task and activities and the 'on the job hazards'.
3. Worker Representative - this individual would bring the experience of the work and have information gained via interaction with colleagues on a range of issues in the workplace.
4. Worker – A person who was involved in the accident may be able to make useful contributions to other members of the investigation team
5. Site Engineer - This person would probably be the most senior to lead the investigation, the professional engineering background would bring a systematic methodology of examining any mechanical failures etc.
6. Technical Expert – If the technical level of knowledge is not readily available there may be a need to include such a person
7. Senior Manager – If a senior manager was involved then there is the availability of authority that may enable quicker decisions to be made to off-set additional problems arising and not having to wait the course of time to obtain permissions to have certain works done, etc.
8. Health and Safety Practitioner – This person would be available to give advice on matters relating to legislative requirements, good investigation techniques, etc.
9. Trade Union Representative (e.g. Safety Representative) – In some countries these have a right in legislation to be involved in such matters to represent their members.

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## ACCIDENT – INFORMATION GATHERING CHECKLIST

**Identify** the items that might be included on a checklist to gather information following accidents involving slips, trips and falls.

Suitable answers here would identify questions designed to elicit information on:

- The personal details of the person involved;



- The time and location of the accident;
- The type and severity of the injury sustained;
- The task being undertaken at the time of the accident;
- The working environment as far as weather, standard of lighting and visibility were concerned;
- The condition of the floor or ground;
- The type and condition of any personal protective equipment that was being worn;
- Whether the injured person had been given first aid, had returned to work or had been sent to hospital; the underlying medical condition of the injured person;
- Whether there were any witnesses or CCTV footage of the accident;
- Details of the training and information received and
- Details of any relevant risk assessments that had been carried out or any previous similar accidents that had occurred.

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## ACTIONS MANAGEMENT CAN TAKE TO PREVENT SIMILAR ACCIDENTS IN THE FUTURE

**Outline** actions management may take to prevent similar accidents.

In order to prevent similar accidents, management could take a range of actions such as:

- Carrying out a comprehensive investigation and communicating its findings to the workforce;
- Reviewing the health and safety policy together with existing risk assessments and control measures;
- Introducing a programme of regular inspections and monitoring, a more effective standard of supervision and disciplinary action for non-conformance with set procedures;
- Consulting on a regular basis with the workers and introducing a programme of refresher training not only on the operation of plant and equipment but also on general health and safety awareness.

Although the question clearly asks for an „outline“, some candidates provide just a list and as such answers of this type would not be awarded maximum marks.

---

## REASONS WHY AN INSPECTION AFTER A SERIOUS ACCIDENT MAY NOT LEAD TO UNSAFE CONDITIONS BEING CORRECTED

A serious accident has occurred.

During the investigation it is found that an inspection of the work site had taken place before the accident.

**Outline** possible reasons why the inspection did not lead to an unsafe situation being corrected.

There are a number of possible reasons why the inspection did not lead to the unsafe situation being corrected.

- It may have been that the unsafe activity was not taking place at the time of the inspection or the hazard was not obvious and consequently the inspector would not have noticed it.
- The unsafe condition might have been observed but was not mentioned in the report of the inspection and even if it had been included, the report might not have been seen by a responsible person or had not been followed up and the corrective action taken.
- There might have been a situation where the responsibility for taking the corrective action was unclear for instance if there had been a number of different employers on site.

- The failure to correct the unsafe action may well have been caused by the inability of the inspector to carry out a proper inspection because of his/her lack of knowledge and competence.

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## NEAR MISS INCIDENT INVESTIGATION

A machine has leaked hot liquid into a work area.

No-one has been injured.

**Outline** reasons why it is important for an organisation to investigate 'near miss' incidents

Answers to this question need to outline:

- That the investigation of „near-miss“ incidents and the identification of their underlying causes might allow preventive action to be taken before something more serious occurs.
- It also gives the right message that all failures are taken seriously by the employer and not just those that lead to injury.
- Additionally, it is generally accepted that „near-misses“ far outnumber incidents resulting in injury and can therefore produce more data from which a greater understanding of the deficiencies in existing management systems such as risk assessments and safe systems of work can be identified and rectified.
- It would be good for delegates to briefly refer to Bird's or Heinrich's triangle.

## 5.4 - RECORDING AND REPORTING INCIDENTS

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### ACCIDENT REPORTING – MAJOR ACCIDENT

**List FOUR** types of major injury which normally requires immediate reporting under national legislation

1. Fractures (other than fingers, thumbs and toes)
2. Amputation
3. Loss of sight (including temporary)
4. Broken bones
5. Electrocutation requiring resuscitation
6. Hospitalisation overnight or for more than 24 hours
7. Injury that required resuscitation

Fatal injuries are a special case and DO NOT come under the definition of "major injury".

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### ACCIDENT REPORTING – UNDER REPORTING / NOT REPORTING

**Outline EIGHT** factors that could prevent accidents from being reported at work by employees.

1. Persons being ignorant of reporting procedures
2. Peer pressure placed on persons not to report
3. The fear of possible retribution by management
4. The preservation of the company's or departments safety record (particularly where incentive schemes are in place)

5. Avoidance of first-aid or medical treatment for fear of an individual being considered a risk
6. A worker wanting to keep on the right side of a supervisor or manager
7. Over-complicated reporting procedures
8. Lack of management response to earlier reported accidents
9. Persons not being encouraged to report injuries
10. Blame culture
11. Prone to disciplinary action
12. Feeling of guilt
13. Loss of incentives
14. Jeopardises advancement / promotion
15. To many formalities
16. Embarrassment
17. May be used as a poor example to others (pride)

---

## ACCIDENT REPORTING – WHY?

**Identify** the factors why accidents need to be reported

- May be a legal Requirement
- Allow investigation
- To establish immediate, underlying and root causes
- To prevent a recurrence following implementation of recommendations
- A requirement of the management system
- Accurate statistics to be maintained
- Allows the identification of trends thus introduction of preventative measures
- To ensure appropriate contingencies into the future

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## ACTIONS TO TAKE FOLLOWING A SERIOUS WORKPLACE ACCIDENT

**Outline** the immediate and long terms actions that should be taken after a serious workplace injury accident

- Make sure the area is safe to enter to assist any injured person
- Obtain assistance for the injured person and secure any damage
- Call for external assistance
- Assist with any external investigations – police, etc
- Inform respective persons – management, HR, relatives, owner of assets, etc
- Gather internal investigation team
- Obtain facts
  - Statements
  - Photos
  - Records – maintenance, training, risk assessments
  - Permits and safe systems of work
- Analyse information
- Determine actions required
- Generate reports with action plans
- Follow-up

- Review risk assessments
- Review management system and related procedures
- Follow-up on actions progress

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## ACTIONS TO TAKE FOLLOWING A SERIOUS WORKPLACE ACCIDENT

**Outline** the immediate AND longer-term actions that should be taken following an accident at work that has caused serious injury to a worker.

The immediate and longer-term actions that should be taken following an accident at work that has caused serious injury to a worker can include:

- Isolating the scene of the accident and making the area safe;
- Administering first aid treatment
- Contacting the emergency services;
- Informing the next of kin
- Offering counselling and support;
- Notifying the regulatory authority if appropriate and also the insurers;
- Collecting initial evidence such as photographs and sketches and the names of witnesses;
- Setting up the accident investigation team, investigating the accident, determining its root and underlying causes and preparing a report of the investigation;
- Making and implementing recommendations to prevent a recurrence of the accident and ensuring feedback is provided to the workforce;
- Collecting evidence to be used in any possible litigation following the accident and managing the provision of information to the media.

## 5.5 - REVIEW OF HEALTH AND SAFETY PERFORMANCE

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### REASONS FOR REVIEWING HEALTH AND SAFETY PERFORMANCE

**Outline** the reasons why an organization should review and monitor its health and safety performance.

The reasons for an organisation reviewing and monitoring its health and safety performance are:

- To identify any sub-standard health and safety practices
- To review trends and identify those that are adverse in a bid to remedy them
- To compare actual performance against the established targets
- To benchmark performance
- To identify the use and effectiveness of control measures
- To set priorities and establish realistic timescales
- Assess compliance with legal requirements
- Provide information to senior management, board members and/or health and safety committee etc.

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## HEALTH AND SAFETY PERFORMANCE REVIEW – WHY?

**Outline** reasons why an organisation should review its health and safety performance.

These reasons should be written to include such areas as:

- To identify substandard health and safety practices and conditions;
- To identify trends in relation to different types of incident, or incidents in general by analysis of relevant incident data;
- To compare actual performance with previously set targets;
- To “benchmark” the organisation’s performance against that of similar organisations or an industry norm;
- To identify whether control measures are in use, to assess their effectiveness
- To be able to make decisions on appropriate remedial measures for any deficiencies identified;
- To identify any new or changed risks;
- To assess compliance with legal requirements and accepted national/international standards;
- To be able to provide a Board of Directors or safety committee with relevant information;
- To boost morale and motivate the workforce; and ultimately because monitoring and review is a vital component of any safety management system and is essential if the system is externally accredited and audited by a specific body.

The importance of reading a question carefully cannot be over-emphasised since a number of candidates outline circumstances that would suggest a review of a health and safety policy was indicated whilst others explain when an organisation should carry out a performance review rather than giving reasons why it should be carried out.

## PAPER 2

### WORKPLACE HAZARDS AND RISK CONTROL

#### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline common health, welfare and work environment requirements in the workplace
- Explain the risk factors and appropriate controls for violence at work
- Explain the effects of substance misuse on health and safety at work and control measures to reduce such risks
- Explain the hazards and control measures for the safe movement of people in the workplace
- Outline the hazards and control measure for safe construction and demolition work
- Explain the hazards and control measures for safe working at height
- Explain the hazards of, and control measures for, excavations.

#### 1.1 - HEALTH, WELFARE AND WORK ENVIRONMENT REQUIREMENTS

##### WELFARE – PROVISION OF FACILITIES

Outline FOUR requirements of welfare facilities that an employer must provide for his employees according to the workplace requirements of most national legislation

1. Sanitary conveniences relative to the number and gender of persons employed
2. Washing facilities with respect again to the number of persons employed and the type of work undertaken
3. Fresh drinking water availability – potable with drinking vessels
4. Accommodation for clothing, i.e. for outside clothing whilst wearing work clothing and visa versa
5. Facilities for changing to take due account of privacy
6. Facilities for resting and eating, these to be suitable in number, maintained in a clean condition and be sufficient to meet the number who will use the facility at any one time.

##### WORKPLAE WELFARE AND WORK ENVIRONMENT REQUIREMENTS

**Identify** welfare and work environment requirements that should be provided in a workplace.

The welfare and work environment requirements that should be provided in a workplace include:

- The provision of an adequate number of sanitary conveniences and washing facilities including showers for both sexes
- Storage areas for clothing including lockers and changing areas

- Facilities for the cleaning, and replacement of working clothes
- A rest room away from the working area with the facility for taking food and drink
- The provision of effective and sufficient ventilation for the work area
- An adequate heating system to maintain a reasonable temperature throughout the building
- An adequate standard of lighting for the tasks being undertaken
- The provision of adequate space
- Provision of suitable seating at the workstations
- The introduction of control measures to combat excessive noise.

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## OUTDOOR WORKING – EXTREME HEAT

(a) **Identify FOUR** health effects of working outside in extreme heat created by the sun.

(b) **Outline** control measures that could be used to reduce the effects of the sun on construction workers

Part (a)

Working out of doors in extreme heat caused by the sun may result in health effects such as:

- Burns,
- Damage to the eyes
- Skin cancer,
- Dehydration
- Heat exhaustion,
- Heat stroke,
- Sweat rash,
- Prickly heat,
- Headaches
- Fainting,
- Fatigue and
- Stress.

Part (b),

The control measures that could be used to reduce the effects of the sun on workers include:

- Limiting the duration of exposure by job rotation ensuring periods of work are alternated with periods of rest;
- Avoiding work when temperatures are at their highest;
- Ensuring an adequate supply of drinking water;
- The use of appropriate clothing for working in high temperatures
- Persuading workers to adopt a policy of keeping their bodies covered;
- Encouraging workers to maintain their salt levels;
- Working under canopies where this is possible;
- Wearing hats and eye protection and
- Applying sun protection cream.

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## OUTDOOR WORKING – ULTRAVIOLET LIGHT (SUN) AND OLD TEMPERATURES

Outdoor workers may be required to work in variable weather conditions.

**Describe** the measures that can be taken to reduce the risk to workers who:

(a) Are exposed to ultra-violet radiation from sunlight;

(b) Are exposed to cold temperatures.

Part (a)

The measures that can be taken to reduce the risk to workers who are exposed to ultra-violet radiation from sunlight include:

- The provision of advice to workers on the need to protect themselves from the sun;
- Encouraging them to keep covered up during the summer months and especially at lunch time when the sun is at its most powerful;
- The provision of shelter where workers might take their breaks;
- Providing sun screen and urging workers to use it on any part of the body that they are unable to cover up.

Part (b),

The measures that can be taken to reduce the risk to workers who are exposed to cold temperatures include:

- Decide whether the work might be delayed until the weather got warmer without compromising safety.
- If this was not possible - personal protective clothing appropriate for the environmental conditions would have to be issued to the workers.
- Workers should be allowed to take more frequent rest breaks in heated facilities and encouraged to drink warm fluids such as soup.
- Workers should also be given advice on recognising the symptoms of cold stress, on how the effects of hand arm vibration syndrome might be exacerbated by working in cold weather and on the precautions to be taken.

---

## COLD WORKING ENVIRONMENT

**Outline** the precautions to be taken to minimise the risks to persons working in cold stores at sub-zero temperatures

The following precautions need consideration for persons working in cold environments:

Procedures

- Safe system of work
- Undertaking a suitable and sufficient risk assessment

The Person

- Provision of thermal clothing such as insulated suits or jackets, gloves and head covering



- Drying out facilities for this clothing;
- Restricting time spent in the cold store
- Regular breaks
- The availability of warm drinks;
- Precautions against being locked in the cold store such as doors capable of being opened from the inside and alarms;
- Measures to protect the employees against the escape of refrigerant gas;

#### Equipment

- Racking designed to withstand low temperatures;
- The removal of ice build up;
- The need for pre-employment examinations and continuing health surveillance
- The provision to employees of information and training on the potential hazards associated with this type of work and the precautions to be observed.

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### WORKPLACE LIGHTING –EFFECTS OF INADEQUATE LIGHTING

**Describe** the effects inadequate lighting in a workplace would have on health and safety.

- Eye strain is a significant factor if close work is required and the lighting not being adequate to allow this. In addition a brighter level of lighting may be required for an older person doing such work when compared to a younger worker
- Headaches as a direct result of the eyestrain noted above.
- Persons ability to concentrate on the work may be affected by either eyestrain or the resultant headache, this may be exaggerated by flickering lights
- Adopting poor posture in-so-far as the persons affected will be adjusting their work position to achieve better vision
- Tripping over unseen objects – may be due to excessive shadows
- Human error is likely to increase as there will be an inability to see or perceive certain hazards.
- Flickering lights may induce pre-existing medical conditions such as certain types of epileptic fits

NOTE: Both individual health risks and physical risks are required response to this type of question

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### WORKPLACE LIGHTING – RISK ASSESSMENT – OPEN PLAN OFFICE

**Outline** which factors that should be considered in an assessment of the adequacy of lighting within an open plan office.

- The tasks being carried out (detailed close work or general lighting)
- The age of persons doing the work (older persons may require a brighter level of lighting)
- The equipment being used
- The size and layout of the office i.e. distance of workstations to windows and the use of partitions
- Natural light available at different times of the day and during the year (seasonal)
- Suitability of the number, type, intensity and hue of artificial lights
- Computer screen glare and or shadow
- Shadowed areas of the work environment, may increase the likelihood of hazards being generated

- Localised lighting, need for and availability of
- Maintenance of non-functional, flickering, damaged or dirty lights
- Provision and adequacy of emergency lighting.

## 1.2 - VIOLENCE AT WORK

### VIOLENCE BETWEEN WORKERS

**Identify** control measures that an employer could take to reduce the risk of violence between workers.

The control measures that an employer could take to reduce the risk of violence between workers include:

- Briefing staff on problems that are likely to occur and giving them training in dealing with them such as de-escalation techniques
- Introducing a policy of zero tolerance for workplace violence
- Setting up procedures for reporting any occurrence of violence
- Providing counselling for both perpetrators and victims of violence
- Arranging for re-location in different parts of the worksite where this is possible;
- Introducing a policy for alcohol and substance misuse including the disciplinary action to be taken against offenders
- Prohibiting the carrying of weapons on site
- Employing security personnel together with CCTV
- Introducing a recruitment strategy.

### VIOLENCE TOWARDS WORKERS IN A HOSPITAL EMERGENCY DEPARTMENT - CONTROLS

**Identify** control measures that can be implemented to reduce the risk of violence in a busy accident and emergency department.

An approach here to this question would be to consider control measures connected with

- The management of the operations in the department and then
- Those directly related to the more physical precautions provided in the public areas of the building.

The management of the operation:

Measures here would include

- The provision of awareness training to staff to enable them to recognise the early signs of aggressive behaviour and avoid, defuse or otherwise deal with a violent situation;
- Ensuring that staffing levels were adequate;
- Having strict security procedures in place to deal with the storage and issue of drugs;
- Utilising security staff to deter known offenders; and
- Ensuring an effective means of communication with patients particularly on the subject of waiting times.

For the public areas:

They should be well lit with attention being given to the décor and furnishings in an attempt to create a calm and open environment.

To protect the staff:

- There would be a need for wide counters and raised floor levels,
- Coded locks on doors,
- CCTV systems,
- Panic buttons and alarm systems.
- Signs would have to be displayed stressing the existence of a policy of zero tolerance for any form of violence.

---

## VIOLENCE AGAINST WORKERS

**Outline** the measures an employer might consider to minimise the risk of violence against workers.

There are a number of measures that may be considered, these would be dependant upon the work being undertaken and the persons vulnerability to violence and the type of violence potential.

- Risk Assessment is an obvious starting point to properly identify hazards and the adequacy (or not) of existing controls
- Internal policies regarding violence towards staff by colleagues, members of the public etc should be in place and actively enforced – this should include the encouragement of reporting such situation
- At entrances the introduction of physical security measures such as entry systems, screens, lighting, reception desk may be a consideration to control unauthorised entry
- CCTV to monitor activity,
- The provision of an alarm system should workers suffer / fear violence
- Removal of likely weapons from those entering – what could be considered as weapons may be controversial and a sensitive subject – but again risk assessments should be able to identify such eventualities and a poster clearly outlining ground rules for visitors and staff will help to explain the need for such precautions.
- If there is a need to remove such items from visitors, etc prior to entry a secure facility must be provided to hold the items until that visitor, etc leaves the premises
- Better seating and information on delays if these are envisaged to raise tensions
- Daily removal of cash or use non cash alternatives
- Queue management
- Sufficient staff (opening hours to suit the customers) to customer ratios
- Checking visitors credentials
- Accompanying staff when appropriate, this may involve journey planning / route planning
- Avoid lone working
- Improve communication
- Zero tolerance of aggressive behaviour

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## VIOLENCE AGAINST WORKERS – LARGE OFFICE OPEN TO THE PUBLIC

**A large office is open to the public for enquiries and the risk assessment has shown a significant risk of violence to workers from visitors.**

**Outline** measures that the employer could take to reduce the risk.

There are a range of measures available - such as,

- The design of the workplace and public areas to restrict access
- The use of security equipment such as cctv, alarm systems and personal alarms and panic buttons
- Secure areas with coded locks and physical barriers
- The use of check-in and check-out procedures for visitors
- The use of trained security staff
- Keeping the area free of anything that could be used as a potential weapon
- Introducing procedures for the reporting of incidents
- Posting signs warning of the action that would be taken in cases of violence
- Providing workers with training in confrontation management and stress reduction techniques.

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## VIOLENCE – FACTORS THAT MAY INCREASE THE RISK OF VIOLENCE AT WORK

**Outline** factors that may increase the risk of violence in the workplace.

The factors that may increase the risk of violence in the workplace include:

- Working alone or after normal working hours;
- Work involving the handling of money or other valuables;
- Work involving the exercise of authority such as enforcement;
- Employment involving working with people susceptible to violent outbursts or with mental health issues as do for example, health practitioners or those in the prison service;
- Dealing with people under the influence of alcohol or drugs;
- Employment involving working or travelling in the community;
- Dealing with people suffering from stress;
- Inappropriate design of the workplace with a lack of visual security;
- A failure to give employees at risk training and information particularly in the diffusion technique.

## 1.4 - MOVEMENT OF PEOPLE

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### PLANNING TRAFFIC ROUTES

Outline the factors that should be taken into account when planning traffic routes for internal transport.

- Keep pedestrians and vehicles apart
- Separate routes, designated crossing places and suitable barriers at recognised danger spots
- High visibility clothing to be provided and worn if necessary
- Clearly marked and signed traffic routes
- Roads, gangways and aisles should have sufficient width clearance for the largest vehicle
- Roads, gangways and aisles should have sufficient overhead clearance for the largest vehicle
- Speed limits established and enforced

- Adequate lighting to be provided
- Ensure good all round visibility
- Provision of clear directional signs
- Clear marking of doors and access/egress points
- Avoid designing in sharp and/or blind bends
- Avoid overhead obstructions
- The floor surface should be suitable and sufficient for the intended traffic
- Floors and traffic routes to be adequately maintained
- Gradients should be kept as gentle as possible (not too steep)
- Suitable and sufficient number of parking areas to be provided and be of the size to suite the vehicles intended to be parked therein
- Avoid reversing if possible
- Make people aware of the movement of vehicles

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## MOVEMENT OF VEHICLES – VEHICLE AND PEDESTRIAN INTERFACE

Outline the precautions that might be needed to ensure the safety of pedestrians in areas where vehicles are in use.

- A segregated system for vehicles and pedestrian traffic
- Appropriate roadway and aisle markings
- Maintaining a good level of visibility e.g. mirrors, transparent doors, provision of adequate lighting, audible warning on vehicles
- Establishing and enforcing site rules
- The provision of refuges
- The wearing of high visibility clothing
- Good standards of housekeeping
- Training and supervision of all those concerned/involved.

---

## ACCIDENTS ON STAIRS

(a) Give **FOUR** reasons why accidents may occur on stairs.

(b) Outline ways in which accidents on stairs may be prevented.

Part a)

1. Inadequate design (dimensions, treads, handrails)
2. Poor housekeeping (obstructions, spillages, trailing cables)
3. Poor lighting (shadows or glare)
4. Slippery surfaces (oil, water, ice)
5. Unsuitable footwear
6. Damaged flooring or covering
7. Manual handling loads on stairs
8. Hurrying up/down the stairs

Part b)

- Adequate width of walkways to be ensured
- Stairs to be fitted with handrails
- Lighting levels are to be adequate for the environment and traffic
- Emergency lighting provision to be ensured
- Surfaces should be non-slip
- Outside walkways/stairs to be covered
- Procedures in place and enforced for the timely removal of spillages
- Maintenance of defects to be undertaken in a timely manner
- Introduce and enforce a defect reporting procedure
- If loads have to be taken to a higher level – use a lift, if not available introduce and enforce a safe working procedure
- Instigate appropriate site rules for the use of stairs

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## REVERSING VEHICLES

**Outline** the means by which the risk of accidents from reversing vehicles within a workplace can be reduced.

- Introduction and enforcement on one way systems
- Drive-through systems
- Designated turning circles – marked and enforced
- Separation of vehicles and pedestrians
- Suitable workplace design – size and markings
- Audible reversing alarms
- Mirrors on/at blind corners
- Adequate levels of lighting – to remove shadow or reduce dazzle/glare
- Use of trained banksmen
- Wearing of high visibility clothing
- Site rules introduced and enforced
- Training of all concerned.

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## REVERSING VEHICLES – CONTROL MEASURES

**Identify** control measures to reduce the risk of accidents from reversing vehicles in the workplace.

The control measures to reduce the risk of accidents from reversing vehicles in the workplace include:

- The avoidance of the need for vehicles to reverse by the introduction of one way systems or a drive in/drive out layout;
- The separation of vehicles and pedestrians by the erection of barriers and signs;
- Vehicle design including the provision of good visibility, audible alarms, mirrors and sensors;
- Positioning mirrors at blind corners in the workplace and providing refuges
- Good standards of lighting;
- Procedural measures such as driver and pedestrian training,
- The use of banksmen,
- Site rules for reversing operations
- The use of high visibility clothing by those working in areas where there is vehicle access.

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## TRAFFIC ROUTE DESIGN FEATURES

The warehouse of a food manufacturer is to be re-developed to enable its storage capacity to be increased as well as to enable the use of internal transport to transfer goods to and from the loading bays.

(a) **Outline** the design features of the traffic routes that should be addressed in order to minimise the risk of fork lift truck related accidents.

(b) **Describe** additional measures that need to be taken to protect pedestrians from the risk of being struck by a fork lift truck in the warehouse.

Part a)

- Keep pedestrians and vehicles apart
- Separate routes, designated crossing places and suitable barriers at recognised danger spots
- High visibility clothing to be provided and worn if necessary
- Clearly marked and signed traffic routes
- Roads, gangways and aisles should have sufficient width clearance for the largest vehicle
- Roads, gangways and aisles should have sufficient overhead clearance for the largest vehicle
- Speed limits established and enforced
- Adequate lighting to be provided
- Ensure good all round visibility
- Avoid designing in sharp and/or blind bends
- Avoid overhead obstructions
- The floor surface should be suitable and sufficient for the intended traffic
- Floors and traffic routes to be adequately maintained
- Gradients should be kept as gentle as possible (not too steep)
- Suitable and sufficient number of parking areas to be provided and be of the size to suite the vehicles intended to be parked therein
- Avoid reversing if possible
- Make people aware of the movement of vehicles

Part b)

- A segregated system for vehicles and pedestrian traffic
- Appropriate roadway and aisle markings
- Maintaining a good level of visibility e.g. mirrors, transparent doors, provision of adequate lighting, audible warning on vehicles
- Establishing and enforcing site rules
- The provision of refuges to allow vehicle passing if aisles have a restricted width
- The wearing of high visibility clothing
- Good standards of housekeeping
- Training and supervision of all those concerned/involved
- Enforcing reasonable speed limits
- Introducing a „pedestrian has the right of way“ system
- Lift trucks using horns when entering the building, approaching blind corners, etc.
- Ban on people using mobile phones – which may be a distraction for the work environment

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## SLIP AND TRIP AVOIDANCE

**Outline** the precautionary measures that may be needed to prevent slips and trip hazards in an engineering factory.

- The condition of the floor/road surface – these need to be well maintained (not holes) and kept in a clean condition
- Having designated walkways
- Having a protected walkway – fencing, barrier, etc.
- Timely removal of any contamination of the walking surface from spillages and leaks, etc.
- Ensure that accumulations of debris, stacking of items, etc. that cause obstructions to a walkway are not permitted
- The availability of adequate space to undertake the expected task
- The environment – lighting levels to be adequate,
- Noise that may disguise traffic activity to be addressed
- Footwear being worn to be suitable and sufficient
- Introduction of training of persons so that they are aware of the dangers in the area and the site rules
- Provision of warning and/reminder signage

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## VEHICLES IN THE WORKPLACE

(a) **Identify FOUR** ways in which people can be injured by vehicles in the workplace.

(b) **Give** ways in which a vehicle driver who has not received adequate training may put the safety of other employees in the workplace at risk.

(c) **Identify** issues that should be included in a training programme for vehicle drivers in order to reduce the risk of accidents to themselves and other employees.

Part (a)

The most obvious way in which people may be injured by vehicles in a workplace is being struck and knocked down while the vehicle is in motion.

1. Being struck by something falling from a vehicle;
2. Being crushed between a vehicle and a fixed object;
3. Being injured if two vehicles collide;
4. Being trapped if a vehicle overturns;
5. Falling from a vehicle whilst it is in motion and
6. Being burned by the spillage of hot components such as oil or acid from battery operated vehicles.

Part (b),

There are a number of ways in which a driver who has not been properly trained might put the safety of persons in a workplace at risk. These include:

- Unauthorised or incorrect use of a vehicle;
- Operating in a restricted zone or exceeding the speed limit;



- Overloading a vehicle or loading a fork lift truck incorrectly;
- Parking in unauthorised areas;
- Taking refreshment, smoking or using a mobile phone whilst at the wheel;
- Leaving the ignition key in an unattended vehicle;
- Carrying out a reversing operation incorrectly;
- Carrying unauthorised passengers;
- An inability through incompetence to carry out routine checks of the vehicle and
- A failure to report defects.

Part (c)

- Issues that need to be considered in this training includes:
- Operation of the vehicle's controls and ways to manoeuvre it safely both forward and in reverse;
- Information on the internal traffic routes and site rules including speed limits together with the signage and markings used;
- The specific workplace hazards such as restricted areas and the presence of hazardous materials; parking restrictions in force and the method of parking the vehicle safely;
- The requirements for giving right of way to pedestrians and other vehicles; information on the safe working load of the vehicle and how to secure loads and stack them safely when unloading;
- Securing the vehicle after use and the procedures for key management;
- The precautions to be taken when refuelling the vehicle;
- The need to carry out preoperational checks of the vehicle and the procedures for the reporting of defects and unsafe conditions;
- Health issues such as physical fitness and eyesight; and the employees' legal duties as contained in relevant country legislation.

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## EXTERNAL STORAGE AREAS - HAZARDS

**Identify** possible hazards that could cause employees to be injured when walking through an external storage area of a workplace.

The factors that may increase the risk of injury to employees who need to walk through the external storage area of a workplace including: Answers were generally

- The condition of the floors with the possible presence of pot holes, loose coverings, oil and water;
- The presence of obstructions in the walkways;
- Changes in levels such as ramps, kerbs or steps;
- A failure to provide barriers or fences round pits, voids or trenches;
- The possibility of being struck by moving vehicles or by loads falling from them because of a failure to segregate vehicles from pedestrians by the provision of suitable walkways;
- Objects projecting or falling from racking;
- A lack of housekeeping;
- A poor standard of lighting; and inclement weather conditions.

## 1.5 - CONSTRUCTION HAZARDS AND CONTROL

### CONSTRUCTION SITE – TRAFFIC ROUTE - CONTROLS

A vehicle traffic route needs to be established on a construction site.

**Outline** control measures to consider for a suitable and sufficient traffic route.

The control measures that should be considered when establishing suitable vehicle traffic routes on a construction site include:

- The provision and maintenance of well-constructed roadways with adequate drainage, and appropriate for the type and number of vehicles using them;
- Ensuring that the number of steep gradients and tight bends are kept to a minimum;
- The routes are kept clear of obstructions such as overhead cables;
- The physical separation of pedestrians from site traffic areas by the provision of walkways;
- The introduction of designated crossing points;
- The elimination of reversing manoeuvres by the introduction of a one way system;
- Providing turning circles using banksmen where required;
- The provision of designated areas for loading, sheeting and unloading;
- The provision of a good standard of lighting;
- The introduction, monitoring and enforcement of speed limits;
- The provision of clear signage indicating the right of way.

### DEMOLITION WORK – MAIN HAZARDS

**Identify** the main hazards that may be present during the demolition of a building.

The main hazards associated with the demolition of a building include:

- Falls from a height or on the same level;
- Falling debris and premature collapse of the structure;
- Use of explosives;
- Contact with and noise from equipment and heavy plant;
- Dust possibly including asbestos;
- Manual handling;
- The presence of hazardous materials from previous uses of the building;
- The presence of cellars or vaults affecting the stability of structures and adjoining premises;
- The presence of storage tanks both above and below ground and their current or previous contents;
- The possible presence of services such as electricity, gas and water;
- Hot work
- Biological hazards from the presence of stagnant water and vermin.

### DEMOLITION WORK – CONSIDERATIONS

**Describe** what factors should be considered before a demolition project commences.

- Location and disconnection of public utilities such as gas, water electricity
- Legal considerations i.e. ownership and local authority regulations, neighbours and the effects of localised nuisance (dust, noise, sound) of the work
- Obtain building plans to determine any critical factors i.e. supporting walls and structures
- Assess soil structure to allow safe vehicle movement
- Identify any likely contaminants or contaminated land i.e. asbestos, dangerous substances, etc.
- Competency of contractors undertaking the work
- Communication, consultation and co-operation between the persons undertaking and or coordinating the work
- Degree of supervision required
- Training in any specific aspects that may be particular to the demolition project being undertaken

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## CHILDREN ON CONSTRUCTION SITES

**Outline** EIGHT precautions that should be considered to prevent accidents to children who might be tempted to gain access to a construction site.

1. Fencing to be maintained in a good condition of repair – ensure this by periodic inspections of the perimeter fencing
2. Warning signs of any dangers to be posted in conspicuous places
3. No man traps should be set to catch children and or other intruders
4. Security patrols to operate regularly
5. CCTV used where physical controls would prove difficult
6. Isolating services when not in use especially at times when the site may not be occupied i.e. week-end
7. Reducing heights of materials so that they do not become attractive climbing frame or pose less risk of becoming unstable
8. Covering excavations to ensure that children and others can not fall into the excavation
9. Removing ladders – lashing the ladders – to deny access to scaffolding
10. Securing tools, chemicals, equipment and vehicles under lock and key
11. Community liaisons, either in close proximity schools, youth centres, etc.

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## CONTRACTOR EVALUATION CRITERIA

**Identify** the criteria when selecting a contractor

Fortunately, a contractor who works well and meets the client's requirements in terms of the quality and timeliness of the work is likely also to have a better than average health and safety performance.

Cost, of course, will have to be part of the judgement but may not provide any indication of which contractor is likely to give the best performance in health and safety terms.

In deciding which contractor should be chosen for a task, the following should be considered:

- Do they have an adequate health and safety policy?
- Can they demonstrate that the person responsible for the work is competent?
- Can they demonstrate that competent safety advice will be available?
- Do they monitor the level of accidents at their work site?

- Do they have a system to assess the hazards of a job and implement appropriate control measures?
- Will they produce a method statement, which sets out how they will deal with all significant risks?
- Do they have guidance on health and safety arrangements and procedures to be followed?
- Do they have effective monitoring arrangements?
- Do they use trained and skilled staff who are qualified where appropriate? (Judgement will be required, as many construction workers have had little or no training except training on the job.)?
- Can the company demonstrate that the employees or other workers used for the job have had the appropriate training and are properly experienced and, where appropriate, qualified?
- Can they produce good references indicating satisfactory performance?

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## CONTRACTOR – REDUCING RISKS TO THEM PRIOR TO AND DURING PROJECT

Contractors are carrying out a major building project for your organisation.

**Outline** how your organisation could reduce the risks to contractors both before AND during the building project

- Selection of a competent contractor and ensuring that they have relevant experience in the type of work expected in the project.
- Induction training to be effectively delivered.
- Training in expected safe systems of work and to include permits to work; lock out and tag out.
- Checks to ensure that they are aware of their duties
- Satisfy yourself that they and anyone they employ or engage are competent and adequately resourced
- That they plan, manage and monitor their own work to make sure that workers under their control are safe from the start of their work
- Ensure that any contractor who they appoint or engage to work on the project is informed of your requirements and that they are allowed time to plan and prepare before starting their work
- That they provide workers under their control (whether employed or self-employed) with any necessary information, including about relevant aspects of other contractors' work, and site induction which they need to work safely, to report problems or to respond appropriately in an emergency
- Ensure that any design work they do complies with the requirements of your designers.
- That they co-operate with others and co-ordinate their own work with others working on the project

On arrival at the site, sub-contractors should ensure that:

- Share information with the contractor on the particular project risks.
- They report to the site office on arrival on site and report to the site manager
- They abide by any site rules, particularly in respect of personal protective equipment
- The performance of their work does not place others at risk
- They are familiar with the first aid and accident reporting arrangements of the principal contractor
- They are familiar with all emergency procedures on the site
- Any materials brought onto the site are safely handled, stored and disposed of in compliance, where appropriate, with the current control of substances hazardous to health regulations
- They adopt adequate fire precaution and prevention measures when using equipment which could cause fires
- They minimize noise and vibration produced by their equipment and activities

- Any ladders, scaffolds and other means of access are erected in conformance with good working practice and the work at height regulations
- Any welding or burning equipment brought onto the site is in safe operating condition and used safely with a suitable fire extinguisher to hand
- Any lifting equipment brought onto the site complies with the current lifting operation and lifting equipment regulations
- All electrical equipment complies with the current electricity at work regulations
- Connections to the electricity supply is from a point specified by the principal contractor and is by proper cables and connectors. For outside construction work, only 110 v equipment should be used
- Any restricted access to areas on the site is observed
- Welfare facilities provided on site are treated with respect
- Any vehicles brought onto the site observe any speed, condition or parking restriction.

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## CHECKING ON A CONTRACTORS COMPETENCE

**Outline** the checks that could be made in assessing the health and safety competence of a contractor.

- Review of their health and safety policy document – is it suitable and sufficient?
- What is their training programme?
- What is the standard of risk assessments
- How adequate are their method statements?
- How complete are their safe systems of work?
- What level of supervision will they be implementing?
- What are their accident incident statistics?
- Do they have records of any enforcement action?
- Have they done this type of work in the past?
- Have they adequate insurance coverage?
- What competence proof do they have for their key workers e.g. plant operators, electricians, etc.
- Do they have reliable references?
- Do you need to visit an existing project to see first hand how they perform on site?
- Are they members of a recognised trade association?

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## COMPETENCE OF CONTRACTOR - ASSESSING

**List** the factors that could be considered when assessing the health and safety competence of a contractor.

This is a list question thus a simple listing would suffice but the following points need to be considered for inclusion

- Previous experience in the type of work expected to be undertaken
- Reputation within the industry / with clients
- Quality and content of health and safety policy
- Availability of risk assessments
- Level of training and qualifications of staff including health and safety staff
- Accident / enforcement statistics
- Membership of official bodies
- Equipment maintenance records

- Detailed proposals of work to be undertaken
- Recommendations from past clients
- Ability to provide safe systems of work for the job i.e. resources
- Overall health and safety culture
- Their arrangements to fulfil their duties with respect of the health and safety plan
- A site visit to an existing project

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## COMPETENCE OF CONTRACTOR

**Identify** the factors that could be considered when assessing the health and safety competence of a contractor.

In deciding which contractor should be chosen for a task, the following should be considered:

- Do they have an adequate health and safety policy?
- Can they demonstrate that the person responsible for the work is competent?
- Can they demonstrate that competent safety advice will be available?
- Do they monitor the level of accidents at their work site?
- Do they have a system to assess the hazards of a job and implement appropriate control measures?
- Will they produce a method statement, which sets out how they will deal with all significant risks?
- Do they have guidance on health and safety arrangements and procedures to be followed?
- Do they have effective monitoring arrangements?
- Do they use trained and skilled staff who are qualified where appropriate? (Judgement will be required, as many construction workers have had little or no training except training on the job.)
- Can the company demonstrate that the employees or other workers used for the job have had the appropriate training and are properly experienced and, where appropriate, qualified?
- Can they produce good references indicating satisfactory performance?

## 1.6 - WORKING AT HEIGHT

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### CONTRACTORS WORKING ON A ROOF

Contractors are to carry out maintenance work on a roof and working at height cannot be avoided. **Outline** measures to consider to help reduce the risk of injury to contractors and others.

The measures to consider to help reduce the risk of injury to contractors and others include:

- The initial completion of a risk assessment of the work to be carried out;
- The production of a method statement detailing the safe system of work to be followed.
- The provision of safe means of access to the place of work
- The provision of roof edge protection such as guard rails and toe boards to prevent the fall of persons and materials from the roof.
- If the provision of this type of protection was not practicable then the use of other equipment such as safety harnesses with adequate fixing points and/or nets might be necessary.
- Identify areas of the roof containing fragile materials, to mark them with barriers or signs and to prevent falls through them by the use of covers.
- The possible provision of a hoist to transport tools, equipment and materials to the roof;

- The use of chutes should be considered for the removal of rubbish.
- The use of competent personnel fully briefed and aware of the risks involved and the precautions to be observed
- Draw up procedures to deal with any emergency that might occur.
- The erection of barriers and signs to prevent persons passing beneath areas of the roof where work was being carried out.

---

## WORK ON A FLAT ROOF

**Outline** the precautions that may be needed when carrying out repairs to a flat roof of a building

Before starting repair works the occupants to be informed about the work that is to take place and the precautions which they should observe.

- Protection for person falling from height
- Edge protection to prevent person fall from height by providing proper guarding of edges
- Protection for falling materials:
- Toe boards at least 150 mm high to be fixed to prevent materials falling from the roof
- Restricted entry by providing entry pass or visitors log
- Public / visitor entry to be restricted by providing barriers or warning signs
- Access/Egress Proper and safe access and egress be provided by scaffolding or access platform (mechanical or electrical) or by ladders
- Suitable controls to be taken in the use of chemical agents by providing personal protective equipment and preventing the entry of chemicals through though inhalation, ingestion or absorption by prohibiting eating, drinking and smoking in work areas.
- Appropriate protective equipment to be used, gloves, hard hat, goggles, personal fall arrest equipment (in applicable), etc.
- Environmental and climatical controls to be introduced as appropriate
- Waste materials are to be transported in a skip covered by a net
- The fixing of a suitable and sufficient safety net below the work area under the roof by a competent persons can prevent persons and or materials from falling onto areas below
- Electrical tools to be used with electricity control measures such as proper earthing, insulation and protection.
- Use of low voltage work equipment will be more suitable for working on roofs.
- Presence of asbestos cannot be neglected if the roofing material is of a sheet nature.
- Adequate clearance shall be maintained from overhead services.

---

## WORK ON A SLOPING ROOF

**Outline** the precautions to be taken when repair work is to be carried out on the sloping roof of a building.

There are a number of precautions that need to be taken in such a situation, including:

- The use of competent and trained persons
- Undertaking a risk assessment to identify hazards and adequacy of controls
- Working to a safe system of work
- The display of appropriate warning signs (e.g. fragile roof, use crawling boards etc)

- The provision of suitable and sufficient equipment including roof edge barriers or scaffold, roof ladders or other suitable and sufficient access equipment, crawling boards / toe board or scaffold fanning
- Availability of suitable and sufficient means of safely lowering broken tiles and materials a properly inspected and erected hoist or the provision of an enclosed debris chute into skips1
- Electrical isolation.
- Where barriers cannot be erected the use of fall arrest devices such as safety net and harness.
- The provision of adequate training and supervision will also be required.

## SCAFFOLD LOADING BAY

**Identify**, by means of a labelled sketch, the main requirements for a loading bay on a scaffold in order that materials for bricklayers and roofers can be safely placed on the bay by a fork-lift truck.

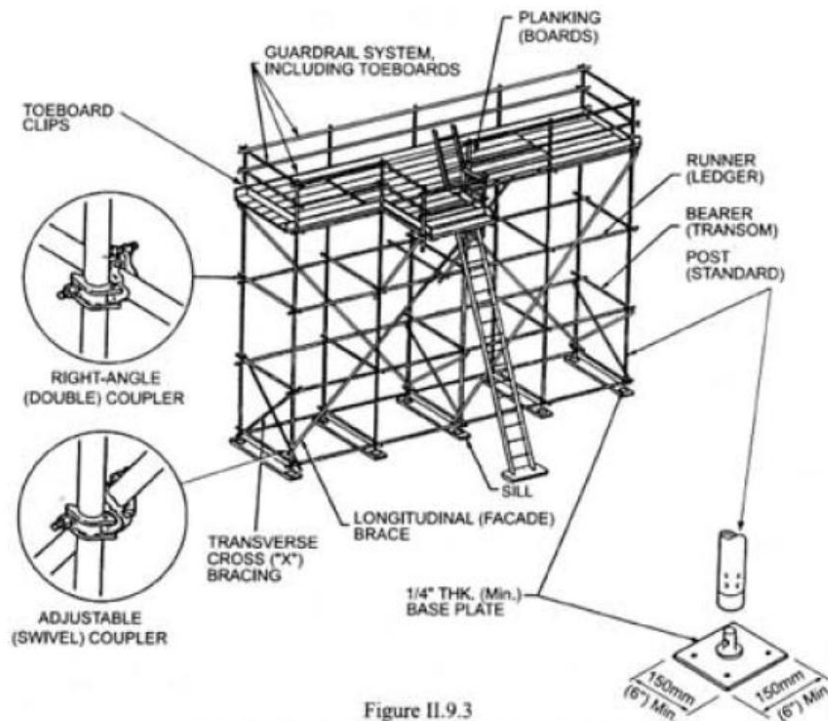


Figure II.9.3  
**TYPICAL TUBE AND COUPLER SCAFFOLD**

## INDEPENDENT TIED SCAFFOLD – PROTECTION OF THE PUBLIC

An independent tied scaffold is to be erected on a building in a busy town centre location. **Outline** the precautions that should be taken to reduce the risk of injury to members of the public during erection and use of the scaffold.

The situation outlined in the question is one seen often in town centres. The precautions that should be taken in such a situation should include:



- Excluding the public from the area where the scaffold is to be erected,
- Obtaining a temporary pavement or even street closure if this is thought to be necessary;
- Undertaking the erection work in the quiet hours such as early evening or late evening;
- Erecting fans, tunnels and nets
- Using barriers and signs to direct the public away from the operation;
- Taking care not to raise or lower materials over areas where members of the public are likely to be present;
- Storing scaffold materials safely on site;
- Erecting cones and signs to direct traffic flow;
- Preventing unauthorised access to the scaffold by boarding over the access ladder;
- Using an internal hoist and/or chutes;
- Providing a close boarded working platform with toe boards and guard rails;
- Providing a good standard of lighting for enclosed walkways and
- Ensuring the initial erection and subsequent regular inspections of the scaffold are carried out by competent personnel.

---

### ROOFING CONTRACTOR – FRAGILE ROOF WORKING AND INDEPENDENT TIED SCAFFOLD

A roofing contractor is required to carry out extensive repair work on a fragile roof on a large manufacturing building.

(a) **Outline** the factors that should be considered in the selection process for hiring the roofing contractor.

(b) **Identify** the main risks to the contractors from working at height

(c) **Identify** possible control measures for the erection of an independent tied scaffold.

Part a)

In deciding which contractor should be chosen for a task, the following should be considered:

- Do they have an adequate health and safety policy?
- Can they demonstrate that the person responsible for the work is competent?
- Can they demonstrate that competent safety advice will be available?
- Do they monitor the level of accidents at their work site?
- Do they have a system to assess the hazards of a job and implement appropriate control measures?
- Will they produce a method statement, which sets out how they will deal with all significant risks?
- Do they have guidance on health and safety arrangements and procedures to be followed?
- Do they have effective monitoring arrangements?
- Do they use trained and skilled staff who are qualified where appropriate? (Judgement will be required, as many construction workers have had little or no training except training on the job.)
- Can the company demonstrate that the employees or other workers used for the job have had the appropriate training and are properly experienced and, where appropriate, qualified?
- Can they produce good references indicating satisfactory performance?

Part b)

- Falling from height

- Being struck by falling materials
- Scaffold collapse poorly maintained access equipment, overloading
- Contact with overhead services and structures
- Fragile roof surfaces – falling through
- Weather
- Access equipment being struck by passing vehicles
- Slips, trips and falls – inappropriate maintained walkways
- Unprotected edges
- Deterioration of materials

Part c)

- Scaffolding must only be erected by competent people who have attended recognised training courses and who are authorised to do the work.
- Any work carried out on the scaffold must be supervised by a competent person.
- Any changes to the scaffold must be done by a competent person
- Adequate toe boards, guardrails and intermediate rails must be fitted to prevent people or materials from falling
- The scaffold must rest on a stable surface, uprights should have base plates and timber sole plates if necessary
- The scaffold must have safe access and egress
- Work platforms should be fully boarded with no tipping or tripping hazards
- The scaffold should be sited away from or protected from traffic routes so that it is not damaged by vehicles
- Lower level uprights should be prominently marked in red and white stripes
- The scaffold should be properly braced, secured to the building or structure
- Overloading of the scaffold must be avoided
- The public must be protected at all stages of the work
- Regular inspections of the scaffold must be made and recorded.

---

## REASONS WHY A SCAFFOLD MAY COLLAPSE

Identify reasons why a scaffold may collapse.

One of the main reasons why a scaffold may collapse is because it was not properly designed for its intended purpose. Other reasons include

- Incomplete and incorrect erection
- The condition of the ground on which it was erected
- The poor condition or incompatibility of its components
- Unauthorised alteration or interference with the erected scaffold
- Uneven load distribution on or overloading of the scaffold
- Being struck by passing traffic and as a result of severe weather conditions.

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## PRECAUTIONS TO BE TAKEN TO MINIMISE RISKS TO THOSE WORKING ON SCAFFOLDS

Identify precautions to be taken to minimise the risks to workers when working on a scaffold.

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The precautions to be taken to minimise the risks to workers when working on a scaffold include:

- Ensuring the original erection and any subsequent alterations were carried out by or under the supervision of competent persons
- Erecting the scaffold on stable ground, using base and sole plates
- Ensuring that working platforms were close boarded and were provided with guard-rails, mid rails and toe boards to prevent the fall of persons and materials
- Providing adequate bracing and tying the scaffold into the building or structure; providing safe access such as by secured ladders to the working platforms
- Providing protection if the scaffold was adjacent to traffic routes
- Ensuring the scaffold was inspected on a regular basis by a competent person
- Providing personal protective equipment for the workers such as boots and hard hats.

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## REASONS FOR INSPECTING SCAFFOLDS

**Identify** when a scaffold should be inspected.

A scaffold should be inspected at the following situations:

- Before being taken into use
- At periodic intervals thereafter as may be prescribed for the different types of scaffold
- Following any alterations to the scaffold
- Following any adverse weather conditions or other events such as a collision or fire, any of which might be likely to affect its strength.

---

## SCAFFOLD INSPECTION – CONSIDERATIONS

**Give** details of the inspection duties that should be carried out to ensure a scaffold erection is safe.

- A competent person to inspect all components of a system before first use and periodically thereafter
- Erection of scaffold systems by experienced, competent and authorised operatives
- Supervision of the erection of the system by a competent person
- Consideration to be taken regarding the use of the scaffold and type of structure therefore needed
- Inspect scaffold every 7 days (this can vary from country to country or even within different areas of the same country)
- The inspection of the scaffold after incidents of inclement weather by a competent person
- Details of inspection to be maintained in an appropriate register, various countries have differing formats on which this can be entered.

---

## MOBILE TOWER SCAFFOLD – SAFE USE

Mobile tower scaffolds should be used on stable, level ground. **Identify** additional factors that should be considered for the safe use of a mobile tower scaffold.

The additional factors that should be included for the safe use of a mobile tower could include the following:

- Ensuring the correct ratio between the height and base dimensions of the tower;

- The use of diagonal bracing together with outriggers;
- Wheels capable of being locked when the tower was in use;
- Ensuring the platform was fully boarded;
- Toe boards and guard rails were provided;
- The provision of a suitable means of access, preferably a fixed internal ladder;
- Positioning the tower clear of overhead hazards such as power lines;
- Ensuring the tower was not overloaded,
- That it was positioned to avoid over reaching;
- That it was not moved when loaded with equipment and/or persons;
- Giving due consideration to its use in adverse weather conditions.

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## MOBILE ELEVATING WORK PLATFORM (MEWP) – SAFE WORKING PRACTICE

**Identify** safe working practices for the use of a mobile elevating work platform (MEWP).

Safe working practices which should be adopted for the use of a mobile elevating work platform (MEWP) include

- The involvement of competent persons both to operate and work from the platform;
- The completion of any statutory testing and inspection requirements;
- Its use only on firm level ground
- Checks being made on the presence of overhead obstructions such as power cables;
- The use of outriggers which should be locked in position;
- The correct inflation of the tyres with the wheels immobilised during elevation of the platform;
- The prohibition on moving the platform when elevated or in use;
- The use of harnesses by workers on the platform;
- The erection of barriers round the area where the platform is to be used;
- Ensuring the platform is not overloaded
- Securing all tools and equipment before the platform is moved; and
- Introducing emergency procedures in the case of failure of the platform.

---

## MOBILE ELEVATING WORK PLATFORM (MEWP)

**Outline** the factors to be considered in the selection and use of personal head protection at work.

In the selection of personal head protection for a work activity, factors to be considered include:

- Its suitability for the task, its quality, for instance whether it carries a CE marking,
- Its compatibility with other personal protective equipment such as ear defenders
- Its cost relative to the risk involved.
- Its size, fit and adjustability, comfort factors such as its manufacture from non-irritant materials and the existence of an absorbent sweat band
- Its colour if this is necessary to designate different categories of worker.
- Consideration would have to be given to procedures for the cleaning and replacement of the sweat bands,
- The regular inspection of the equipment for signs of deterioration,
- Its replacement at intervals recommended by the manufacturer,
- The provision of suitable storage for the equipment when not in use

- The arrangements for its cleaning and inspection before being issued to another person.

---

## SAFE USE OF LADDERS – HAZARDS – ELIMINATION AND REDUCTION

(a) **Identify** the principal hazards associated with the use of ladders at work?

(b) **Explain** how these hazards indicated above may be eliminated or reduced.

Part (a)

- Poor maintenance of ladders is a significant concern. Areas of concern centre around visible damage, poor maintenance, no pre-user checks, etc.
- Incorrect use in so far as ladders being used in an unsafe manner, sometimes by persons not in receipt of the proper training in how to complete the work expected of them using such equipment
- Ladders being used in incorrect or inappropriate locations applicable to the type of ladder available i.e. metal ladders being used close to overhead live electrics

All of the above can lead to persons falling from height and sustaining injuries to themselves and or others as well as damaging plant, equipment and building fabric

Part (b)

The hazards indicated above may be eliminated or reduced by:

- Periodic inspection of ladders to identify their state for continued safe use
- Effective repairs to damage to be undertaken by competent persons, if this was not possible then the equipment should be withdrawn and replaced
- The correct storage is important to ensure that their condition does not deteriorate over time making them unsafe for use in the future.
- Pre use inspections for visual defects may assist in the early identification of ladder related hazards
- 75 degrees slope (1 in 4)
- Ladders should be secured at their top and base to prevent sliding or slippage
- Not to use aluminium or metal ladders near overhead cables
- Persons trained in the safe and correct use of this equipment
- Management to periodically monitor work involving ladders to ensure that it is being undertaken in an appropriate and safe manner.

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## LADDERS – SAFE USE

**Explain** the issues that needs to be addressed if the work needs to be carried out safely in a ladder

- Using the correct ladder
- Using competent trained persons
- Ensuring the length of the ladder is adequate
- Do not use the top three rungs
- Ladders used for access should project at least 1 m above the landing point and be tied; alternatively a safe and secure handhold should be available

- Stepladder - don't use the top two steps of a stepladder, unless a suitable handrail is available on the stepladder
- Stepladder - don't use the top three steps of swing-back or double-sided stepladders,
  - Where a step forms the very top of the stepladder;
  - The ladder or stepladder rungs or steps are level.
  - The weather is suitable - do not use them in strong or gusting winds
  - Users to wear robust, sensible footwear (e.g. safety shoes/boots or trainers);
  - Users to know how to prevent members of the public and other workers from using them;
- Users are fit - certain medical conditions or medication, alcohol or drug abuse could stop them from using ladders.
- On a ladder or stepladder, don't:
  - Move them while standing on the rungs / steps;
  - Support them by the rungs or steps at the base;
  - Slide down the stiles;
  - Stand them on moveable objects, such as pallets, bricks, lift trucks, tower scaffolds, excavator buckets, vans, or mobile elevating work platforms;
  - Extend a ladder while standing on the rungs.

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## LADDERS – SAFE USE – ACCIDENT PREVENTION

**Identify ways in which accidents may be prevented when using portable ladders as a means of access.**

Ways in which accidents might be prevented when using portable ladders include:

- Using only authorised ladders which were regularly maintained and inspected;
- Using the correct ladder for the task to be undertaken ensuring it was of suitable length and non-conductive;
- Carrying out a pre-use inspection of the ladder to ensure it was in good condition, unpainted and with no splits in the stiles;
- Placing the ladder on a firm base, at the correct location to prevent over reaching, at the correct angle (between 70-80°), ensuring it extended at least four rungs beyond the landing point and that it was secured both at the top and bottom.
- Ensuring the ladder was not overloaded – one person to climb at a time
- That it was not erected near overhead cables,
- That its base was protected from collision,
- It should be used only for work of short duration and not in inclement weather
- The worker using the ladder should avoid wearing muddy or greasy footwear,
- Using a holster or tool bag to carry tools and
- Maintain three points of contact on the ladder.

## 1.7 - EXCAVATIONS

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### EXCAVATION SAFETY - PRECAUTIONS

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**Outline** the main precautions to be taken whilst undertaking an excavation project.

Excavation work is being undertaken on a construction site. Identify the control measures that should be in place to minimise the risk to workers.

- Detection of services using plans, cable / pipe detectors etc.
- Supporting the sides to prevent collapse
- Storage of materials and spoil away from the edge to prevent them falling into the excavation
- Measures to prevent vehicles falling into excavations such as stop blocks, mounds, etc
- Guard rails and barriers
- Measures to prevent collapse of adjacent structures
- Safe means of access / egress
- Testing for, and ventilation of, noxious fumes
- Measures to pump out water (dewatering) to prevent or reduce the likelihood of flooding
- Safe procedures for working with mechanical plant
- Inspection, training and supervision of the staff involved and those providing supervision.
- Provision of information, instruction, training and supervision of an appropriate standard

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## EXCAVATIONS – CONTROL MEASURES

**Outline** control measures needed to improve safety during excavation work on a construction site.

The control measures needed to improve safety during excavation work include:

- The provision of support for the sides such as shoring or benching where there is a risk of collapse;
- The detection of underground services such as gas or electricity by the use of plans or the use of cable/pipe detectors;
- Storing materials, equipment and spoil away from the edge of the excavation;
- Providing means of preventing vehicles falling into the excavation such as stop blocks;
- Using edge protection such as barriers or guard rails to prevent persons from falling into the excavation;
- Protection against flooding by the provision of pumps;
- Supporting adjacent buildings against collapse;
- Providing safe means of access and egress to the excavation;
- Testing deep excavations for fumes;
- Providing means of ventilation where necessary;
- Carrying out regular inspections of the excavation by a competent person;
- Providing adequate lighting;
- Ensuring the use of personal protective equipment such as hard hats and boots
- Introducing procedures to deal with possible biological hazards or contaminants.

## TRANSPORT HAZARDS AND RISK CONTROL

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the hazards and control measures for the safe movement of vehicles in the workplace
- Outline the factors associated with driving at work that increase the risk of an incident and the control measures to reduce work-related driving risks.

### 2.1 - SAFE MOVEMENT OF VEHICLES IN THE WORKPLACE

#### NEW VEHICLE ROUTE – FEATURES TO REDUCE THE RISK TO PEDESTRIANS

A new vehicle route is to be provided into the goods delivery area of a workplace. **Identify** features of the vehicle route in order to reduce the risk of pedestrians being injured by vehicles.

The features of the vehicle route to be considered in order to reduce the risk of pedestrians being injured by vehicles include:

The width of the route which should be sufficient for the number and size of the vehicles which would use it;

- A firm and even road surface subject to regular maintenance;
- The avoidance of sharp bends;
- The introduction of a one way system;
- The separation of vehicles and pedestrians;
- The provision of barriers and refuges;
- Designated crossing points;
- Visibility aids such as vision panels in doors, visibility mirrors;
- An adequate standard of lighting;
- The provision of traffic and pedestrian signage
- The introduction of speed retarders.

#### TRAFFIC ROUTE – PHYSICAL FEATURES

**Describe** the physical features of traffic routes within a workplace designed to ensure the safe movement of vehicles.

- Designed to keep pedestrians and vehicles apart
- Separate routes, designated crossing places and suitable barriers at recognised danger spots
- High visibility clothing to be provided and worn if necessary
- Clearly marked and signed traffic routes
- Roads, gangways and aisles should have sufficient width clearance for the largest vehicle
- Roads, gangways and aisles should have sufficient overhead clearance for the largest vehicle
- Speed limits established and enforced



- Adequate lighting to be provided
- Ensure good all round visibility
- Provision of clear directional signs
- Clear marking of doors and access/egress points
- Avoid designing in sharp and/or blind bends
- Avoid overhead obstructions
- The floor surface should be suitable and sufficient for the intended traffic
- Floors and traffic routes to be adequately maintained
- Gradients should be kept as gentle as possible (not too steep)
- Suitable and sufficient number of parking areas to be provided and be of the size to suite the vehicles intended to be parked therein
- Avoid reversing if possible
- Make people aware of the movement of vehicles
- Provision of trained banksman if reversing has to take place

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## SEGREGATION OF PEDESTRIANS AND VEHICLES

(a) **Identify** THREE control measures to segregate pedestrians and vehicles in the workplace.

(b) **Identify** measures to reduce the risk to pedestrians when segregation is not practicable.

Part (a)

Control measures such as:

- The provision of separate walkways which are clearly marked;
- The provision of barriers and fencing;
- Site rules which are strictly enforced;
- The issue of instructions to drivers; and
- The provision of instruction and training to pedestrians on the precautions that must be observed.

Part (b),

When segregation is not possible, measures to reduce the risk to pedestrians include:

- The provision of designated safe crossing points and refuges;
- Fitting vehicles with audible or visual alarms for example to give warning of a reversing operation;
- The use of a banksman to ensure safe vehicle movement in areas where pedestrians are likely to be present;
- Ensuring a good standard of visibility by the provision of mirrors, transparent doors and CCTV;
- The introduction of a speed restriction on vehicles;
- The use of trained and authorised drivers particularly for forklift trucks;
- The provision and use of high visibility personal protective equipment; and
- The provision of a good standard of lighting which avoids the possibility of glare.

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## PEDESTRIANS WALKING THROUGH A WAREHOUSE

**Outline** the factors that may increase the risk of injury to pedestrians who need to walk through a warehouse.

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- The condition of the floor/road surface – slippery, holes, potholes, uneven, etc.
- Not having designated walkways
- Not having a protected walkway – fencing, barrier, etc.
- Contamination of the walking surface from spillages and leaks, etc.
- Accumulation of debris, stacking of items, etc. that cause obstructions to a walkway
- The task that may be being completed – manual handling – carrying
- The availability of adequate space to undertake the expected task
- The environment – lighting levels, noise that may disguise traffic activity
- Footwear being worn may not be suitable and/or sufficient
- Person factors such as being unaware of the dangers, fooling around, taking shortcuts, etc.
- The lack of warning and/or reminder signage

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## PEDESTRIANS IN AREAS WHERE VEHICLES ARE MANOEUVRING

**Identify** control measures that could be implemented to reduce the risks to pedestrians in areas where vehicles are manoeuvring.

Control measures to be considered include:

- The management of traffic movement such as the introduction of one way systems
- The designation of specific traffic routes which should be clearly marked;
- Segregation of pedestrians from transport with demarcation of walkways and the provision of barriers and refuges;
- Introducing safe systems of work for loading, unloading and stacking using banksmen when necessary;
- Maintaining good visibility by means of mirrors, transparent doors and the provision of lighting;
- The enforcement of site rules covering speed restrictions and limited areas of access for vehicles;
- The fitting of visual and audible alarm devices to vehicles;
- Ensuring that workers wore high visibility clothing;
- Ensuring that floors were regularly cleaned and kept free from spillages
- Ensuring that workers were fully trained in the precautionary measures that should be taken and that
- An effective level of supervision was in place to ensure the controls were followed.

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## PERSONS INJURED BY VEHICLES, DRIVER TRAINING

(a) **Identify** FOUR ways in which people can be injured by vehicles in the workplace

(b) **Give** ways in which a vehicle driver who has not received adequate training may put the safety of other employees in the workplace at risk.

(c) **Identify** issues that should be included in a training programme for vehicle drivers in order to reduce the risk of accidents to themselves and other employees.

Part (a)

The most obvious way in which people may be injured by vehicles in a workplace is:

- Being struck and knocked down while the vehicle is in motion.
- By something falling from a vehicle;

- Being crushed between a vehicle and a fixed object;
- Being injured if two vehicles collide;
- Being trapped if a vehicle overturns;
- Falling from a vehicle whilst it is in motion and
- Being burned by the spillage of hot components such as oil or acid from battery operated vehicles.

Part (b),

There are a number of ways in which a driver who has not been properly trained might put the safety of persons in a workplace at risk. These include:

- Unauthorised or incorrect use of a vehicle;
- Operating in a restricted zone
- Exceeding the speed limit;
- Overloading a vehicle
- Loading a fork lift truck incorrectly;
- Parking in unauthorised areas;
- Taking refreshment,
- Smoking or using a mobile phone whilst at the wheel;
- Leaving the ignition key in an unattended vehicle;
- Carrying out a reversing operation incorrectly;
- Carrying unauthorised passengers;
- An inability through incompetence to carry out routine checks of the vehicle and
- A failure to report defects.

Part (c)

The issues that should be included in training programme for vehicle drivers in order to reduce the risk of accidents to themselves and other employees

- Operation of the vehicles controls and ways to maneuver it safely both forward and in reverse;
- Information on the internal traffic routes and site rules including speed limits together with the signage and markings used;
- The specific workplace hazards such as restricted areas and the presence of hazardous materials;
- Parking restrictions in force and the method of parking the vehicle safely;
- The requirements for giving right of way to pedestrians and other vehicles;
- Information on the safe working load of the vehicle and how to secure loads and stack them safely when unloading;
- Securing the vehicle after use and the procedures for key management;
- The precautions to be taken when refuelling the vehicle;
- The need to carry out preoperational checks of the vehicle and the procedures for the reporting of defects and unsafe conditions;
- Health issues such as physical fitness and eyesight; and the employees' legal duties as contained in national/local legislation

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WORKPLACE COLLISIONS – REASON RE PHYSICAL WORKPLACE LAYOUT

Following the introduction of fork-lift trucks into a workplace several collisions have occurred. Give reasons why the physical layout of the workplace may have contributed to the collisions.

There are several reasons which may have contributed to the collisions, these include:

- A failure to designate traffic routes with suitable road markings
- The routes provided were of insufficient width with no passing bays
- Little room allowed for parking.
- Speed restrictions might not have been imposed
- No signage provided so that there was no indication given of priority at junctions.
- Visibility for drivers could have been impaired, particularly at blind corners where no mirrors were provided
- The lighting provided was not to a good standard.
- A failure to maintain a good standard of housekeeping would also not have helped particularly if this led to obstructions being allowed to remain on traffic routes.

Remember – this question is about physical layout and vehicle movement

## 2.2 - DRIVING AT WORK

### RISK ASSESSMENT – LONG DISTANCE LORRY DRIVER

**Outline** the factors to consider when assessing the risks to a long distance delivery driver.

The factors to be considered in assessing the risk to a long distance lorry driver would include the following:

Job:

- Duration of the journey,
- Complexity of the routes,
- Traffic
- Means of communication to convey any message,
- Security issues like potential and violence.

Individual factors:

- Physical and psychological capabilities of the driver to cope with the demands of the job, and
- The level of training provided.

The vehicle:

- Soundness and proper maintenance schedule of the vehicle to be considered

Load:

- Nature and weight of the load like hazardous / bulky / wet or dry, shall be considered.
- Further there has to be provision for emergency procedures and means of handling materials.

### LONG DISTANCE LORRY DRIVER – SAFETY HAZARDS

**Identify** EIGHT health and safety hazards relevant to the role of a long distance delivery driver.

Health and safety hazards relevant to the role of a long distance delivery driver include:

- The duration of the journey,
- The hours of driving with the possibility of fatigue
- Issues connected with the route to be followed
- The different road conditions
- The weather and other environmental factors
- Inadequate vehicle maintenance
- The possibility of breakdown
- The manual and/or mechanical handling of the goods being carried and other hazards associated with them such as exposure to chemicals
- Physical hazards such as exposure to noise and vibration
- The possibility of accidents or collisions
- Lone working with a possible absence of communication and supervision;
- The lack of emergency procedures including the provision of first aid
- Inadequate welfare facilities
- Security hazards including the possibility of violence and
- Psychological hazards such as stress.

## MUSCULOSKELETAL HAZARDS AND RISK CONTROL

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain work processes and practices that may give rise to work-related upper limb disorders and appropriate control measures
- Explain the hazards and control measures which should be considered when assessing risks from manual handling activities
- Explain the hazards, precautions and procedures to reduce the risk in the use of lifting and moving equipment with specific reference to manually operated load moving equipment
- Explain the hazards and the precautions and procedures to reduce the risk in the use of lifting and moving equipment with specific reference to mechanically operated load moving equipment.

### 3.1 - WORK-RELATED UPPER LIMB DISORDERS

#### ERGONOMICS - DEFINITION

**Define the term 'ergonomics'**

You should note that there are many acceptable definitions, any of the following would be deemed appropriate:

- The study of the interaction between workers and the work environment
- Making the job or task fit the person
- The study of how people interact with machinery or equipment within the workplace
- Ergonomics is the application of scientific information concerning humans to the design of objects, systems and environment for human use
- Fitting the job to the people who have to do it, through the design of equipment and procedures
- Fitting the person to the job, through the use of placement procedures or training
- The study of how the workplace relates to human functions

#### MEANING OF THE TERM ERGONOMICS, ERGONOMIC PROBLEMS WITH THE USE PROCESS EQUIPMENT

An item of process equipment which has two large fixed control panels together with a computer screen has been introduced into a workplace. One person operates the equipment which includes loading and unloading material by hand. An ergonomic assessment has been undertaken.

(a) **Give** the meaning of the term 'ergonomics'.

(b) **Identify** potential ergonomic problems associated with the use of this equipment.

Part (a)

An acceptable answer for the meaning of the term „ergonomics“ would have been a study of the interface between the person, the equipment and the working environment.

Part (b)

Potential ergonomic problems that might arise from the use of the equipment described in the scenario include:

- Manual handling issues;
- The effect of repetitive work and/or actions;
- Postural issues such as twisting or stooping;
- The duration of shifts with no opportunity for breaks;
- The control buttons might be out of reach;
- It might be difficult to see the computer screen from the operating position
- The operator might be subjected to reflected glare from the screen;
- There could be the possibility of environmental issues arising such as temperature, lighting and space constraints.

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## ERGONOMIC MACHINE OPERATORS WORKSTATION DESIGN

List SIX observations of a machine operators station which could suggest that the machine has not been ergonomically designed

- The need for excessive force or repetitive movements
- The need for the operator to constantly stretch
- The need for the operator to regularly stoop
- Machine controls located in awkward positions
- Machine controls unmarked or poorly marked
- The functions of machine controls are not obvious
- Lack of visibility by the operator of the process or its controls
- Size or weight of work item making it difficult to position or because of type of machine protection
- Difficulty in changing, adjusting or cleaning the machine tools

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## WORK RELATED UPPER LIMB DISORDERS (WRULD)

In relation to work-related upper limb disorders (WRULDs):

(a) **Identify** the typical signs and symptoms that might be experienced by affected individuals;

(b) **Identify** the factors that could increase the risk of WRULDs.

Part (a),

Typical symptoms such as:

Pain to:

- The back,
- Neck
- Shoulders and/or arms,

- Swollen joints,
- Reduced mobility and stiffness,
- Cramps and muscle fatigue and
- Loss of strength in the hands and grip.

Such conditions will typically affect sleep and normal functioning.

Part (b)

- Workstation layout
- The failure to provide sufficient breaks
- Space constraints resulting in poor working postures;
- Excessive force
- Awkward hand movements needed to carry out an operation;
- Poorly designed tools and equipment;
- The frequency with which tasks needed to be repeated;
- The use of vibrating tools and equipment;
- The involvement of vulnerable workers such as those with pre-existing medical conditions and pregnant women;
- Environmental factors such as working in areas where the temperature is low; and
- A lack of training in the precautionary measures that should be taken to reduce the possibility of suffering from WRULDs.

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## DISPLAY SCREEN EQUIPMENT – ERGONOMIC ASSESSMENT

**Outline** which factors should be considered in an ergonomic assessment of a DSE workstation.

- Equipment in use, screen, keyboard, mouse, document holder, foot-rest, etc.
  - Environment in terms of lighting, heating noise etc.
  - Task being undertaken, basic office use, data entry, information requiring a high degree of concentration, etc.
  - The individual themselves and their interrelationships between the following four points
1. Repetition of the work – highly repetitive, rapid hand and finger movements, etc.
  2. The actual working posture of the individual i.e. fingers, hands and wrists
  3. Working posture of shoulders and arms, are they appropriate
  4. Psychosocial factors such as
    - The pace of work,
    - Unplanned overtime / shift work,
    - Little control over own work,
    - Stressful deadlines,
    - Lack of training

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## DISPLAY SCREEN EQUIPMENT

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(a) **Outline** the possible risks to health associated with the use of display screen equipment (DSE).

(b) **Identify** the features of a suitable seat for use at a DSE workstation.

Part (a)

Work-related upper limb disorders such as:

- Pain in shoulders, this could as a result of poor posture (sitting)
- Arms (including forearms), again from poor posture or awkward actions
- Wrists, hands, fingers, this could be the result of lack of wrist or lower arm support, appropriate layout of DSE equipment and the like. Another reason for finger and wrist pains is the excessive use of force used on keys, etc.
- Neck pains can be as a result of excessive head movement i.e. referencing a document, and to which a document holder has not been provided thereby causing exaggerated head and or neck movement.

Eye strain

- This could be caused predominantly from glare or screen reflection. Also a contributor here would be a poorly adjusted screen or characters that are not easy for the operator / user to see.
- Stress
- This can be induced if the worker has not had the appropriate training in the use of the software as an example by may be exaggerated by environmental factors such as inappropriate lighting
- The required pace of work may add to the stress being experienced by a „user“
- Shift patterns may also be a consideration under this heading.

Headaches

- These may be attributed to maybe eye-strain and/or stress or even the amount of concentration required.

Alternative Answer to Part (a)

There are three basic ill-health hazards associated with DSE. These are:

1. Musculoskeletal problems
2. Visual problems
3. Psychological problems.

A fourth hazard, of radiation, has been shown from several studies to be very small and is now no longer normally considered in the risk assessment.

Similarly, in the past, there have been suggestions that DSE could cause epilepsy and there were concerns about adverse health effects on pregnant women and their unborn children. All these risks have been shown in various studies to be very low

Part (b)

Considerations here being:

- Suitable for the individual – remembering that some chairs have a maximum weight limit
- Appropriate base for stability and type of floor e.g. a five-star base design with castors for use on carpeted flooring
- Height adjustable
- Back support
- Lumbar support
- Ability to be tilted (if this is the case then a tilt lock should be incorporated to save the user losing balance)
- Arm support (not interfering with allowing the user to get close to table)
- Ability to swivel – allowing ease of access into the work station / desk
- If the knees of the user are lower than the hips when seated, then a footrest should be provided.

---

## DISPLAY SCREEN EQUIPMENT WORKSTATION FEATURES - SEAT

**Identify** the features of a suitable seat for use at a DSE work station

Here the features are fairly straightforward, being:

- The seat must be adjustable to suit the operator (height and tilt)
- Seat should be stable and comfortable
- Should have at least five legs
- With a back rest and foot rest
- The back rest shall be able to tilt and adjust
- A lumbar support could be beneficial
- Arms, if fitted must not prohibit the user getting close to the desk

## 3.2 - MANUAL HANDLING HAZARDS, RISKS AND CONTROL MEASURES

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### MANUAL HANDLING INJURIES AND LOAD AFFECTING THE RISK OF INJURY

(a) **List** FOUR specific types of injury that could be caused by the incorrect manual handling of loads.

(b) **Identify** factors in relation to the load that will affect the risk of injury.

Part (a),

A list of potential injuries could include:

- Spinal disc compression or prolapsed disc,
- Strains to tendons or muscles,
- Hernia,
- Dislocation or fracture of bones,
- Cuts and abrasions and
- Crushing or impact injuries.

Part (b)

This part is aimed at exploring "knowledge of the way the nature of a load can present a risk of injury during manual handling activities".

Here you need to identify matters such as:

- The size, weight and shape of the load,
- The possibility that the contents might move or the load become unbalanced,
- The position of the centre of gravity,
- Difficulty in securing a firm grasp of the load,
- The presence of sharp edges and
- The possibility that the contents of the load might be hazardous.

Some candidates do not read the question with sufficient care and provided answers relating to the load, task, environment and the individual. Others confuse „task“ and „load,, and identified factors relevant to the former and not the latter.

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## MANUAL HANDLING – LOAD, INDIVIDUAL AND TASK

**Outline** the factors that may arise from manual handling activities in relation to load, individual, task

### Load

- Physical size
- Weight
- Rigidity
- Stability
- Sharp edges
- Temperature – hot / cold
- State – dry, wet, slippery

### Individual

- Physical abilities
- Medical conditions
- ISIT
- Risk assessment
- Provision of PPE

### Task

- Lifting
- Lowering / putting down
- Pushing
- Pulling
- Distance to travel / carry
- Is twisting the body essential

---

## MANUAL HANDLING – LOAD, INDIVIDUAL AND TASK

(a) **Outline** a good lifting technique that could be adopted by a worker when lifting a load.

(b) **Give** TWO examples of how a manual handling activity might be avoided.

Part (a)

A good lifting technique that could be adopted by a worker when lifting a load being:

- Assessing the weight and size of the load
- The distance it is to be carried
- Adopting the technique of placing the feet close to the load and slightly apart to ensure a good balance
- Bending at the knees, keeping the back in natural alignment, the head up and the chin in;
- Securing a firm grip on the load
- Keeping it close to the body while lifting it smoothly using the leg muscles
- Refraining from twisting the trunk when turning to the side.

Part (b),

Ways of avoiding manual handling could include considerations of using:

- Lifting equipment such as hoists, cranes or pulley blocks;
- Transportation equipment such as conveyors, air pallets or chutes and
- Mechanical means such as fork lift trucks, trolleys or barrows.

---

## MANUAL HANDLING – RISK ASSESSMENT CONSIDERATIONS

**Outline** the FOUR main factors that should be considered when carrying out a manual handling risk assessment

1. Task to be undertaken (lift, carry, push, pull)
2. Individual undertaking the task (not all individuals have the same abilities or capabilities)
3. Load that has to be handled (its physical size, weight, stability, etc)
4. Environment in which the load has to be handled (need to consider things like route (potholes, steps, ramps), lighting, resting places if distance excessive, etc.

A good way to remember these is T I L E or L I T E

---

## MANUAL HANDLING INJURY - STOREMAN

A storeman is engaged in placing boxes of metal components by hand onto shelves.

(a) **List** FOUR types of injury to which the storeman may be at risk while carrying out this operation.

(b) **Outline** the factors in relation to the task that will affect the risk of injury.

Part a)

- Had injuries from sharp items or from swarf
- Arm injury from striking against rack/shelving
- Back injuries due to bending and/or twisting and/or stretching
- Head injuries – striking against a low or close shelf
- Foot/leg injuries due to dropping the items
- Back injury if load is heavy
- Personal injuries – falling over stacked items at ground or near ground level
- Hand injuries if contact was made with the shelf/shelves during positioning of the boxes into/onto them

Part b)

Placing boxes of metal components onto shelves by hand

- Positioning of the stock of boxes – if these are too close to the work they may cause an obstruction leading to tripping/falling
- Positioning if not appropriate could lead to the need for a twisting of the trunk whilst lifting thereby increasing the risk of injury
- Height of the stock boxes – the height may give rise to excessive bending which will exaggerate the risk of injury when related to
- The weight of the boxes of components – if too heavy or unstable (round components rolling) could cause the storeman to undertake a compensatory movement which could give rise to back/spine injuries
- The boxes not having handles may mean that the storeman could not handle the boxes properly, maybe leading to dropping them and causing leg and/or foot injuries
- The height of the shelves – if low may cause the need for excessive bending, if too high for excessive stretching – both giving rise to the potential to back injuries
- If the boxes had to be carried for any distance the risk of injury may be increased.
- The physical capability of the person doing the work – he has to be suitably fit.
- The environmental conditions e.g. lighting – if not appropriate may give rise to an increase in the possibility of injury.

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## MANUAL HANDLING – SOURCES OF INFORMATION

An organisation has had an increase in the number of manual handling accidents and associated ill health. **Identify** sources of information that may be available to help reduce the risks to the workers.

Sources of information that may be available to an organisation in their quest to reduce the number of manual handling accidents to members of their workforce include:

- International agencies such as the ILO;
- National enforcement agencies such as the Health and Safety Executive in the United Kingdom;
- Employers organisations
- And Trade Unions;
- National and international standards making bodies such as ISO;
- Information from manufacturers and also from other organisations carrying out work of a similar nature;
- Professional health and safety bodies such as IOSH and rospa in the United Kingdom;
- Occupational health services;
- Risk assessments

- Accident and ill-health statistics
- Consultation with the workers themselves who from their experience could be in a position to offer information on procedures that could be followed to reduce the risks.

Many candidates do not read this type of question with sufficient care and described the assessment process for manual handling activities rather than identifying relevant sources of information.

Candidates also tend to concentrate only on sources immediately available within the organisation and do not consider the broader availability of information.

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## GOOD MANUAL LIFTING TECHNIQUES

(a) **Outline** a good lifting technique that could be adopted by a person when lifting a load from the ground.

(b) **Give TWO** examples of how a manual handling task might be avoided.

Part a)

- Ensure appropriate clothing is worn to avoid entanglement or inhibition of movement
- back straight
- Grip the Test the weight to ensure within your capability
- Keep feet slightly apart,
- Bend knees
- Lower the body to the load
- Keep the load firmly and close to the body
- Smoothly lift the load – first to knee level, then to waist level
- Avoid any jerking movement
- Make sure you can see where you are going
- Without twisting the body turn by feet movement
- Move the load to the required destination, at all times keeping the load as close as possible to your body
- Set the load down at the desired location, first from the waist level, then to knee level and then to the floor.

Part b)

- Replace with mechanical means
- Use of a sack truck
- Use of a conveyor
- Use of mechanical lifting equipment (lift truck, scissor lift)
- Use of rollers

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## MANUAL HANDLING – AIRPORT BAGGAGE HANDLER

**Outline** factors to be considered when undertaking a manual handling assessment of the work undertaken by a baggage handler in a large busy airport

Think LITE

## Load

- Varying sizes of luggage
- Unknown weights
- Unknown contents
- Stability of baggage – centre of balance
- Lodged / jammed baggage release

## Individual

- Physical abilities
- Medical conditions
- Twisting body requirement

## Task

- Lifting bags from one location e.g. belt, cage
- Lowering e.g. from a cage onto a belt
- Pulling e.g. jammed bag, the cart full of bags
- Pushing – the cart of bags, helping a bag move along a conveyor
- Carrying luggage

## Environment

- Limited space, e.g. from receiving hatch
- Lighting, e.g. may be bright sun
- Heat e.g. outside on the apron relating to weather, aircraft engines
- Air movement

Other than the pure manual handling aspects considered above one has to think also about:

- Falling from height e.g. from a conveyor, steps, loading equipment, etc
- Drawing in to engine turbines if too close and they are operating
- Movement of vehicles around the aircraft, e.g. fuel, food, luggage and passenger transporters
- Chemical spillages that may come from passenger luggage and any broken items

## 3.4 - MECHANICALLY OPERATED LOAD HANDLING EQUIPMENT

### MECHANICAL HANDLING SYSTEMS – CONVEYOR – CONTROL MEASURES

In a factory a conveyor system is used to transfer manufactured articles to the warehouse area. **Identify the control measures to be taken to reduce the risk of injury to workers from the conveyor.**

Here you need to refer to control measures such as:

- The provision of guarding for transmission machinery and the intakes of belts and drums;
- The erection of barriers to keep workers away from the conveyor;
- The provision of emergency stop buttons for the system conveniently situated and easily accessible;

- Ensuring operators are trained in the use of the conveyor system and the hazards associated with its use such as the danger that could arise from overloading the conveyor, wearing loose items of clothing or allowing long hair to hang loose;
- Using a signal to warn workers that the conveyer is about to be put into operation;
- Ensuring maintenance and servicing work is carried out only by authorised personnel and that the power supply to the conveyer is disconnected or locked off before the start of the work and
- Encouraging workers to report unsafe practices to the supervisor.

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## LEAVING A LIFT TRUCK UNATTENDED

**Outline** EIGHT rules to follow when a forklift truck is left unattended during a driver's work break.

Rules to follow when a forklift truck is left unattended during a driver's work break include:

- Parking the truck away from other vehicles
- Parking in a position that does not obstruct emergency exits, walkways and fire points;
- Leaving it on a firm level surface
- Leaving it in a designated area
- Leave with the mast tilted slightly forward
- Leave with the forks resting on the floor;
- Switching the power off,
- Leave with the front wheels turned in towards the kurb
- Applying the brake,
- Removing the key and returning it to a responsible person to prevent unauthorised use.

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## BATTERY POWERED LIFT TRUCK – OPERATION

**List** the hazards associated specifically with battery powered lift trucks

- Quiet operation
- Speed
- Stability / instability
- Battery changing
- Battery charging – fire, explosion, chemical spills
- Electrocutation
- Weight (counter-balanced)
- Lack of a suspension system

---

## FORK-LIFT TRUCK - INSTABILITY

**Identify** EIGHT ways in which a fork-lift truck may become unstable during operation.

Typical to mention are:

- Insecure, excessive or uneven loading;
- A failure to position the load correctly on the forks;
- Incorrect elevation of the forks when travelling;



- Uneven or unconsolidated ground;
- Crossing or turning on slopes or ramps at an angle;
- Obstructions both overhead and at low level or changes in level for example, edges of loading bays;
- Cornering at excessive speeds;
- Making contact with pot-holes;
- Sudden braking;
- Poor condition of tyres;
- Mechanical failure and
- Collision with other vehicles.

---

## FORK LIFT TRUCK – HAZARDS

### Identify the hazards associated with fork lift trucks

The hazards related to fork lift trucks are wide ranging:

- Electric lift trucks are silent in operation and have a range of issues associated with battery charging, etc.
- Lift trucks can be relatively unstable due to the centre of gravity dynamics when transporting loads, especially up and down inclines or even across an incline.
- They are prone to tipping when they make contact with small pot holes or uneven surfaces and also when they attempt to turn at very tight angles.
- Moving with the forks raised to high also present hazards to pedestrians should they be in the same vicinity.
- Overloading – exceeding the rated capacity of a lift truck can also lead to mechanical failure of lifting parts with dramatic and injurious consequences.
- Poor visibility is often experienced when lift trucks are operated in a way when the transported load obstructs the operators vision
- Sliding loads can be problematic in transit, due mainly to the lack of friction between the layers of goods being carried
- Should such vehicle tip / topple and they were not fitted with roll over protection systems then driver injury is quite foreseeable.
- When operating in locations such as warehouses, should lighting levels not be sufficient then the loading / unloading of racks can generate problems when the operator mis-judges heights etc. This often leads to items falling off pallets at height.
- Normally there is minimum age requirements for operators in line with local road traffic regulations.
- Competency of operators is often called into question as normal vehicle drivers feel that they can operate such lift trucks in a safe manner – this is not the case and specialised training is normally required.

---

## FORK LIFT TRUCK – DAILY INSPECTION

List EIGHT routine inspection items included on a checklist at the beginning of a shift, before using a fork-lift truck.

- Tyre pressure and condition
- Lights functioning (where fitted)
- Secure and properly adjusted seat
- Undamaged mirrors with good vision potential
- No leakages from various fluids – diesel, battery acid, oil, brake fluid etc.

- Battery connections and good and sound with no identifiable shorts
- Lifting chains and associated equipment in good visual order
- Horn operates
- Reversing audible signals operable where fitted
- Forks in good order e.g. no signs of physical damage, bending, etc
- Undertake break checks, including hand break
- Forks do not drop when raised – hydraulic fluid levels ok
- No play in steering wheel

---

## BATTERY POWERED FORK LIFT TRUCKS – HAZARDS AND PRECAUTIONS

**Identify** the hazards associated with battery powered forklift and state the precautions in each case HAZARDS & PRECAUTIONS

Silent operation

- Warning devices e.g. Flashing beacons, designated working areas

Instability

- Correct loading / safe systems of work

Easy to use

- Proper key control
- Authorised users only

Can achieve a reasonable level of speed

- Speed restrictor

Electric shock

- Safe system of work for connecting and disconnecting batteries

Fumes during charging

- Good battery maintenance, area venting, gas detectors, LEV or good natural ventilation (dilution)

Chemical spillage

- PPE, emergency eyewash, safe system of working and first aid facilities

Lifting equipment failure

- Battery hoist
- Maintenance, inspection and thorough examination

Fire

- Sensible storage of items in the area of charging

- Provision of suitable extinguishers

Slips and trips on spillages or trailing cables

- Good housekeeping standards

Heavy

- Foot protection

---

## LIFTING A LOAD BY A CRANE

**Outline** the procedure for a safe lifting of a load by the use of crane.

- Suitability of the lifting tackle – it must be inspected - must be free of damage, certified
- Safe working load - the weight of the load should not exceed the safe working load of the crane
- Free from defect - the crane itself should be free from any defects such as hydraulic defects, tyre conditions etc.
- Competence of the persons involved - driver, slinger and the signaller. All must be competent and authorised and be in receipt of adequate training for the equipment to be used (type of crane, lifting accessories, etc),
- The load to be lifted vertically,
- The load should be secured, balanced and controlled during the lift,
- Taglines may be used as required
- Ensure proper slewing, lowering and moving of the load under control.

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## MOBILE CRANE – CAUSES OF OVERTURNING

**Identify** possible causes of a mobile crane overturning on a construction site.

Possible causes that might cause a mobile crane on a construction site to overturn:

- The failure to set the crane on a level footing,
- Siting it on poor and unconsolidated ground
- Failing to distribute the weight of the crane by providing adequate timber beneath outriggers.
- The condition of the tyres,
- Mechanical or hydraulic failure,
- Overloading,
- Incorrect slinging resulting in an unstable load,
- Operating when winds were too strong
- Driver error such as slewing too quickly,
- Causing an abrupt
- Movement of the jib,
- Travelling with a load over poor terrain
- Colliding with structures, overhead cables or another vehicle.

---

## FORKLIFT TRUCK – MINIMISING THE CHANCE OF OVERTURNING

**Identify** EIGHT rules to be followed to minimise the risk of forklift trucks overturning.

1. Ensure that the load being carried is stable
2. Where necessary restrain loads
3. Do not exceed the safe working load of the truck.
4. The driver should refrain from driving outside designated areas such as on uneven ground
5. The driver should keep a careful watch for obstructions.
6. Refraining from driving or manoeuvring or using the forward tilt with the load elevated
7. Avoiding turning or crossing on ramps or slopes at an angle,
8. Avoid reversing down slopes when loaded
9. Avoid taking corners at excessive speed
10. Remembering always to brake gradually
11. Carrying out checks on the truck before use.

---

## PERSONS WORKING IN PATH OF A GANTRY CRANE

**Outline** the precautions to be taken when employees are working at ground level in a workshop where loads are lifted and transported by means of an overhead gantry crane.

- Ensure crane operator trained and authorised
- Crane only to be used within its established and certificated safe limits
- Crane inspected and certificated
- Loads to be properly secured to prevent slippage
- Use of tag lines as appropriate to prevent swinging
- All lifting tackle tested and certificated and inspected prior to use
- Employees not to work under the path of the crane
- No-one should stand on the track
- Safe system of work established and enforced
- When crane approaching staff – sound warning device or give warning
- Set down area properly established
- All persons in the vicinity to be issued with and use appropriate PPE

---

## PRECAUTIONS WHEN USING A MOBILE CRANE

**Outline** the precautions that should be taken when using mobile cranes.

The precautions include:

- Ensuring the crane and its attached lifting gear are suitable for the task and that their test certificates and examination reports are up to date;
- That the ground on which the crane is to be sited is flat and firm;
- That the outriggers of the crane are always correctly positioned;
- That the driver and slinger to be used in the operation are competent
- That there is a good means of communication available between the driver and the other workers involved in the operation;
- That there are no obstructions such as overhead power lines or buildings in the vicinity of the lift;
- That warning signs and barriers are erected to ensure that the area where the lifting operations are to take place is kept clear of personnel not directly involved in the operation;
- That due consideration is given to the prevailing weather conditions;
- That the load is carried near to ground level and
- That the operations are ideally carried out to an arranged lifting plan.

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## MOBILE CRANE – DRIVER CHECKS

A mobile crane has been permitted to be used on a construction site.

**Identify** checks that the driver should carry out before the lifting operation.

The checks that should be undertaken include:

- The prevailing weather conditions;
- The availability of current inspection certificates for the crane;
- The condition of the ground on which the crane was to be sited to ensure it was firm and level;
- The availability and condition of the lifting accessories;
- That outriggers were deployed and were properly positioned;
- That the load to be lifted was within the safe working load of the crane;
- That adequate communication systems were in place and that the driver and the banksman fully understood the signalling system to be used;
- That the landing position was clear
- That there were no obstructions in the lifting path;
- That no site personnel were working under the line of traction

## WORK EQUIPMENT HAZARDS AND RISK CONTROL

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline general principles for selection, use and maintenance of work equipment
- Explain the hazards and controls for hand-held tools
- Describe the main mechanical and non-mechanical hazards of machinery
- Explain the main control methods for reducing risk from machinery hazards.

### 4.1 - GENERAL PRINCIPLES FOR SELECTION, USE AND MAINTENANCE OF WORK EQUIPMENT

#### SAFE USE OF WORK EQUIPMENT – INFORMATION, INSTRUCTION AND TRAINING

With respect to the safe use of work equipment, employers are required to provide adequate information, instruction and training.

(a) **Identify THREE** categories of employees that should receive information, instruction and training on the safe use of work equipment.

(b) **Outline** the issues that could be included in such information, instruction and training.

Part (a)

Categories of employees that should receive information, instruction and training should at least include:

- Users,
- Supervisors,
- Managers,
- Maintenance staff and
- Vulnerable persons.

Part (b),

The issues that might be included in the information, instruction and training given on the safe use of work equipment include:

- The manufacturer's instruction and maintenance manual;
- The written operating procedures;
- The methods of use of the equipment including its functions and the stop and start controls;
- The hazards arising from the use of the equipment such as moving parts, hot surfaces or ejected particles;
- The risks associated with its use as identified in the completed risk assessments;
- The precautions to be taken such as the use of guarding and personal protective equipment;
- The procedures for adjusting, cleaning and storing the equipment; the methods for isolating and disconnecting the equipment from its power source;
- The need to carry out pre-use inspections and the procedures for reporting defects;

- The emergency procedures to be followed in the event of fire, spillage or break-up; and
- The legal duties placed on the employee when using the equipment.

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## NEWLY INSTALLED MACHINE – PRE USE SAFETY FACTORS

An employer has installed a new item of machinery in their workplace.

**Outline** the factors to be considered before the machine is put into use.

The following factors such need consideration:

- Conformity to EU requirements through the CE mark or the issue of a declaration of conformity;
- The suitability of the machine for the task, location and environment;
- The availability of operating and maintenance instructions;
- The completion of training for employees and supervision;
- The commissioning and the provision of a practical demonstration by the machine suppliers;
- The correct siting of the machine with regard to its stability, the level of lighting and the space provided for operation and for carrying out maintenance;
- Ensuring that protective devices were in place for the dangerous parts of the machine
- Controls were properly labelled and were tested to ensure they functioned correctly;
- Ensuring control measures were in place to counter the potential environmental effects of dust, fumes, noise and vibration;
- The selection of competent personnel to operate the machine and the preparation of a schedule for its regular inspection and maintenance.

## 4.2 - HAZARDS AND CONTROLS FOR HAND-HELD TOOLS

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### NON MECHANICAL HAZARDS – HAND TOOLS

(a) **Outline** defective conditions of non-powered hand tools that could present risks to the user.

(b) **Outline** the requirements for the safe use of non-powered hand tools.

Part (a)

Defective conditions such as:

- Split shafts on tools such as on a hammer or an axe;
- Loose heads on tools, again with the hammer or axe in mind;
- Handles missing from files;
- Burred or mushroomed heads on chisels;
- Blunt blades on chisels, saws or knives;
- Split handles on tools; bent spanners or spanners with splayed jaws;
- Worn sockets and screwdrivers; and corroded tools.

Part (b),

The requirements for the safe use of non-powered hand tools include:

- Selecting the appropriate or suitable tool for the task;
- Ensuring that the users carry out regular inspection of the tools;
- Introducing a programme of routine maintenance and replacing those tools that are found to be defective;
- Arranging for storage facilities for the tools to be available; and
- Training the users in the safe use and inspection of hand tools.

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## WOOD CHISEL – SAFETY PRECAUTIONS

**Outline** the safety precautions a worker should take while using a wood chisel.

The safety precautions a worker should take while using a wood chisel include:

- It is necessary to use a suitably sized chisel for the job and to check that the handle was firmly attached and was not damaged.
- The chisel should be kept sharp and struck with a wooden or plastic mallet.
- It should not be used if the blade is damaged.
- When using the chisel, the operator should adopt a stable stance to reduce the risk of overbalancing if the chisel should slip, chip, cut or pare away from the body keeping hands and body behind the cutting edge and replace the protective cap on the chisel when it is not in use.
- The user should wear the appropriate personal protective equipment such as goggles or face shield.

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## PORTABLE ELECTRICAL APPLIANCES – FAULTS AND BAD PRACTICES

With respect to the use of portable electrical appliances in the workplace, **identify EIGHT** examples of faults and bad practices that could contribute to electrical accidents.

Examples of faults and bad included:

- An initial failure to select the right equipment for the job and/or environment;
- Inadequate checks on the equipment before use to ensure it was not damaged and a lack of procedures for its regular maintenance;
- Incorrect fuse rating and a failure to use residual current devices;
- Poor earth protection;
- The overloading of sockets;
- The use of cables which were split, twisted, kinked or jointed;
- Poor cable management resulting in trailing cables;
- The use of coiled extension cables and cables that were insufficiently protected and liable to damage particularly in workshop or construction environments;
- Plugs with bent pins or broken cases;
- Unauthorised repairs to the appliances and
- Misuse and abuse of the equipment by employees.



## 4.3 - MACHINERY HAZARDS

### MECHANICAL HAZARDS

**Provide** sketches to show clearly the nature of the following mechanical hazards from moving parts of machinery:

(a) - Entanglement

(b) - Crushing

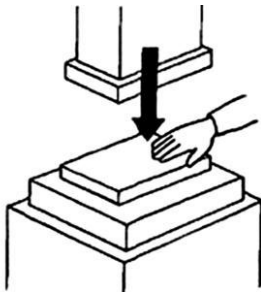
(c) - Drawing In

(d) - Shear

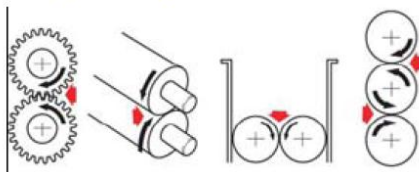
Part (a) Entanglement



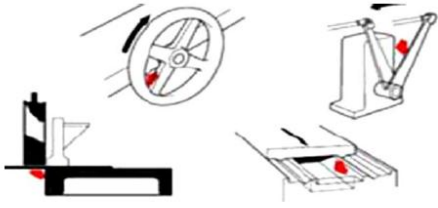
Part (b) Crushing



Part (c) Drawing-in



Part (d) Shear.



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## MECHANICAL AND NON MECHANICAL HAZARDS

### Identify:

(a) **TWO** mechanical hazards associated with moving parts of machinery.

(b) **TWO** non-mechanical hazards to which a machine operator may be exposed.

Part (a)

Mechanical

1. Entanglement
2. Trapping
3. Collision / Impact
4. Crushing
5. Piercing / injection / stabbing / puncture
6. Friction / abrasion
7. Shearing / severing
8. Cutting
9. Drawing in
10. Ejection of particles

Part (b)

Non-Mechanical

1. Fire
2. Contact with hot surfaces
3. Electricity
4. Noise
5. Dusts

6. Fumes
7. Vibration
8. Heat / fire
9. Light – excessive
10. Radiation
11. Hazardous chemicals
12. Biological
13. Extremes of temperature
14. Possibility of slips, trips and falls
15. Ergonomics related issues

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## WORK EQUIPMENT – POWERED CYLINDER MOWER – MECHANICAL AND NON MECHANICAL HAZARDS

A petrol powered cylinder mower is to be used by a grounds-man to prepare a grass tennis court prior to a major tournament.

**Outline** the mechanical AND non-mechanical hazards that the grounds-man could be exposed to during the use of the cylinder mower.

Mechanical hazards to which the grounds-man might be exposed include:

- Entanglement with and being cut by the rotating cylinder blades;
- Shearing between the rotating cylinder and the bottom blade;
- The danger of being drawn in between exposed parts of the transmission machinery such as belts and pulleys and gears;
- Crushing between the roller and the ground;
- Being struck by material ejected from the machine and
- Impact with the moving mower.

Non mechanical hazards include:

- Noise from the engine;
- Vibration through the machine handles;
- Heat from the exhaust;
- Exhaust fumes and petrol vapours;
- Ergonomic issues such as pulling the starter cord and
- Handling the machine and exposure to the sun's rays.

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## MECHANICAL HAZARDS OF MACHINERY

**List** Eight types of mechanical hazards associated with machinery

1. Entanglement
2. Trapping
3. Collision / Impact
4. Crushing
5. Piercing / injection / stabbing / puncture
6. Friction / abrasion
7. Shearing / severing
8. Cutting
9. Drawing in
10. Ejection of particles

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## MAINTENANCE WORK ON A COMMERCIAL WASHING MACHINE – MEASURE TO REDUCE THE RISK OF INJURY

Maintenance is to be carried out on a large washing machine within a commercial laundry.

**Outline** measures to be taken to reduce the risk of injury during the maintenance of the washing machine.

The measures that should be taken to reduce the risk of injury during the maintenance of the washing machine include:

- A suitable and sufficient risk assessment should be undertaken prior to the work commencing;
- Attempt to complete the maintenance work during a quiet period, for example during a weekend,
- Inform all employees of what was to happen.
- A safe system of work would need to be prepared for the operation and this would involve isolating and locking off the electrical power to the machine, isolating pipelines by closing and locking off valves, releasing stored energy such as any build-up of pressure and allowing the washing machine, if hot, to reach room temperature before work started.
- Barriers would need to be erected around the working area and safe means of access provided to the machine for members of the maintenance staff
- The maintenance staff should be skilled and competent in the work that had to be performed.
- A good standard of lighting would have to be provided
- If any specialised tools were required for the maintenance work they should be issued to the employees and used.
- Personal protective equipment such as overalls, gloves, and eye and head protection should be issued to and worn by those involved in the operation.

---

## TYPICAL WORKPLACE HAZARDS – GARAGE WORKSHOP

**Identify** specific hazards that may be encountered in motor vehicle repair premises

- Moving vehicles
- Damaged vehicles
- Fuel leakage
- Hot work – welding, cutting, grinding, soldering
- Electrical short circuits on vehicles
- Exhaust emissions from vehicles
- Vapours and fume from paint spraying
- Storage and use of flammable substances e.g. paints and thinners
- Naked flames – e.g. welding
- Various chemicals including used oil, paints, thinners, powder coating
- Slippery surfaces due to spillages such as oil and fuel
- Poor working postures e.g. working on an engine while still in the engine compartment
- Fall from height – working close to pits
- Use of lifting equipment – hoists and jacks and their suitable maintenance and capabilities
- Trailing cables e.g. inspection lamps
- Damaged bodywork giving sharp edges
- Noise from cutting operations, metal shaping, engines without exhausts fitted
- Slip, trip and fall hazards due to items being left on the floor e.g. tools, equipment etc.
- Dust from grinding, sanding, brake fittings, clutches, etc.

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## WORK EQUIPMENT – CHAINSAW – HAZARDS, PPE AND CONTROLS

An employee is to use a petrol-driven chainsaw to fell a tree from ground level.

(a) **Outline** the hazards faced by the employee in carrying out this task.

(b) **List FIVE** items of personal protective equipment that should be provided to, and used by, the employee.

(c) **Outline** control measures other than personal protective equipment that would be necessary to ensure the health and safety of the chainsaw operator and other persons involved in the operation.

Part (a) Hazards

- Fire from petrol on hot parts
- Burns from hot equipment parts
- Entanglement in chain
- Dust – respiratory
- Chipping – impact
- Noise from the sawing operation
- Falling items – wood, branches, etc.
- Heat stress – working outside with PPE
- Slips on wet surfaces
- Trips and
- Falls due to uneven surfaces

Part (b) PPE

- Head Protection – hard hat

- Face protection – visor
- Eye protection – goggles
- Ear protection – muffs
- Gloves – hand protection
- Apron – chainmail – entanglement
- Safety footwear
- Legs – use of gators around the ankle area
- Overalls – body protection
- Mask – Appropriate respiratory protection

Part (c) Control Measures

- ISIT
- Segregation
- Risk Assessment
- Method Statement
- Safe Operating Procedures
- Fire controls
- Chemical controls including storage
- First aid facilities and arrangements
- Warning signs and signals plus awareness training
- Welfare facilities – washing and changing

---

## MECHANICAL HAZARDS RELATED TO MAINTENANCE OPERATIONS

(a) **Identify FOUR** hazards associated with maintenance operations on machinery in the workplace.

(b) **Give FOUR** examples of how a worker could be injured when carrying out maintenance operations on an item of machinery in the workplace.

(c) **Outline** measures to be taken to minimise the risk of injury during the maintenance of machinery.

Part (a)

Hazards here could include:

1. Contact with dangerous moving parts of the machinery;
2. Electricity;
3. Stored energy such as heat or pressure;
4. Contact with gases, fumes and vapours
5. Exposure to radiation
6. Exposure to biological agents;
7. Manual handling of heavy machine parts or tools;

8. Noise and vibration and
9. Working at height
10. Working in confined spaces.

Part (b),

A worker might be injured whilst carrying out maintenance work on an item of machinery by:

1. Contact with moving parts of the machine;
2. Contact with live electrical components;
3. Contact with hot surfaces causing burns;
4. Being overcome by emissions of gas or vapours;
5. Contact with high pressure fluid
6. Falling from a height
7. Falling on the same level.

Part (c)

Measures such as the following may reduce risks during such work:

- Designing the machine where possible to reduce the need to remove guards for routine maintenance and lubrication;
- To operate a permit to work system which would help to ensure that electrical power to the machine was isolated and locked off, and all pipelines leading to the machine were similarly isolated;
- To release stored energy and to allow sufficient time for the machinery to cool down before maintenance starts.
- Where necessary, means of access such as a scaffold may have to be erected and barriers and warning signs placed round the machinery to advise workers that maintenance work was in progress.
- It would be necessary to use only skilled and competent personnel in possession of specialised tools where required, to carry out the work;
- To provide them with personal protective equipment such as head protection, eye protection and harnesses;
- To ensure adequate standards of lighting and ventilation in the work area and
- To arrange for the work to be properly supervised.

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## PETROL CHAINSAW USE - HAZARDS

**Outline** the hazards and risks to which a worker could be exposed when cutting down a tree using a petrol driven chainsaw.

Here there are a good range of hazards associated with the task including:

- Contact with the moving parts or the hot exhaust system of the chainsaw;
- Exposure to fumes and dust;
- Hazards arising from manual handling operations;
- Exposure to noise and vibration;
- Falls from a height;
- Handling lubricating oils which might lead to dermatitis;
- Flying particles such as tree bark and sawdust;
- Uneven ground or wet grass which could lead to slips and falls;
- Falling objects such as branches or the tree itself;
- Contact with overhead services;
- Hazards arising from adverse weather conditions and stings or bites from insects or reptiles.

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## WORK EQUIPMENT HAZARDS AND CONTROL – FLOOR POLISHER

Factory cleaning staff have to use a rotary floor polisher each night.

(a) **Identify** the associated hazards

(b) **Outline** what control measures could be used to reduce the risks

Part (a)

The associated hazards could include:

- Entanglement of persons in the rotating parts
- Slips, trips and falls on wet or slick surfaces
- Noise from the machine
- Vibration generated by the machine function
- Electrical hazards when considering wet substances and electrical components
- Ergonomic hazards resulting from the excessive bodily forces required to move and use the machine
- Possible chemical contamination of the operator from the cleaning agents used

Part (b)

The possible control measures could be:

- Guarding of dangerous parts of equipment
- Cable management to remove slip and trip potential
- Isolation of the electrical source for the task of changing brushes, polishing pads, etc
- Appropriate slip resistant footwear worn
- Regular testing and maintenance of the equipment to ensure is state for continued safe use
- Residual current devices – RCD"s (trip devices)
- Information, instruction, training and supervision to ensure proper use of equipment
- Operator to be trained in and to undertake pre-use safety checks of the equipment to be used
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## WORK EQUIPMENT – HAZARDS AND CONTROL – CEMENT MIXER

(a) **Identify** the hazards associated with the use of a cement mixer

(b) For the hazards identified above, **outline** control measures that can be used to reduce the risks  
HAZARDS  
CONTROLS MEASURES

### Manual Handling

- Mechanical handling aids
- Training in correct lifting techniques
- Adequate rest breaks

### Corrosive and irritant properties of the cement

- Provision and use of suitable and sufficient PPE e.g. gloves and overalls to help prevent contact with the cement
- RPE provided to prevent inhaling dust

### Contact with moving parts and Ejection of materials

- Provision and maintenance of guards to prevent ejection of materials

### Noise

- Provision of hearing protection or job rotations to reduce time exposed to the noise

### Power supply (fuel – internal combustion engine)

- Not to be used in confined space – CO being emitted
- Storage for flammable substances to be adequate – minimal storage of quantities of fuel also advised
- No smoking controls in areas where fuel stored to reduce the likelihood of a fire outbreak

### Power supply – electric

- Maintenance of equipment
- Use of RCDs to reduce risk and severity of shock

Risk assessment prior to the commencement of the activity should identify the above

Development and use of safe systems of work would assist in generating appropriate controls

Training would be required in all aspects mentioned here – and refresher training – maybe in the form of tool-box talks

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## WORK EQUIPMENT – HAZARDS AND CONTROL – ELECTRIC SANDER

A portable electric sander is being used in a factory.

(a) **Identify** hazards that may be present.

(b) **Outline** control measures that could be taken to reduce risk. HAZARDS CONTROL MEASURES

Entanglement with the rotating parts of the machine;

- Ensuring appropriate guards are in place and properly maintained (not damaged/missing)
- Ensuring that operators do not wear items of loose clothing which might become entangled in the machine

Being struck by ejected material;

- Use of personal protective equipment such as eye protection.
- Giving consideration to segregating the work to minimise the risk to other workers

The possibility of electric shock;

- Regular mechanical and electrical testing of the equipment
- Use of RCD"s to reduce risk and severity of shock

Exposure to dust, noise and vibration;

- Use of personal protective equipment such as eye and hearing protection.
- Giving consideration to segregating the work to minimise the risk to other workers.
- Introducing job rotation to minimize periods of exposure

Ergonomic issues related

- Ensuring that operators are trained to use the appliance in a way that will minimise the risk of fatigue and discomfort

Risk assessment prior to the commencement of the activity should identify the above

Development and use of safe systems of work would assist in generating appropriate controls

Training would be required in all aspects mentioned here – and refresher training – maybe in the form of tool-box talks

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## PILLAR DRILL – REDUCING RISK OF INJURY TO USERS

A new pedestal (pillar) drill has been installed in an engineering workshop.

**Identify** the factors that should be considered before it is first used to reduce the risk of injury or ill-health to the operators.

There are a range of factors that should be considered before it is first used to reduce the risk of injury or ill-health to the operators, including |:

- Undertaking a risk assessment – ensuring protective devices were properly provided/in place
- Compliance with local health and safety legislation
- The machine"s suitability for the type of work it was to do;

- That it was CE marked;
- The availability of operating and maintenance instructions;
- Arranging for the commissioning and the provision of a practical demonstration by the machine suppliers;
- The correct siting of the machine with regard to its stability;
- The level of lighting;
- The space provided for operation and access;
- That controls were properly labelled and were tested to ensure they functioned correctly;
- Ensuring control measures were in place to counter the environmental effects of dust, noise and vibration;
- Providing personal protective equipment such as goggles;
- The selection of competent personnel to operate the machine
- The preparation of a schedule for its regular inspection and maintenance.

Reference to and relevant National/local legislation could gain additional marks.

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## MECHANICAL HAZARDS – PEDESTAL DRILL

(a) **Identify FOUR** mechanical hazards presented by pedestal drills and, in EACH case, outline how injury may occur.

(b) **Outline FOUR** control measures to reduce the risk of injury to operators of pedestal drills.

Part a)

1. Contact with the rotating drill bit – entanglement
2. Contact with the drill bit – stabbing and/or puncture
3. Hit by an unsecured work-piece – impact
4. Making contact with swarf – cutting / severing
5. Being hit by materials or a broken bit – Ejection
6. Being hit by a falling work-piece – crushing

Part b)

The control measures to be considered to include

1. Adequate information, instruction, training and supervision
2. Wearing of appropriate clothing to prevent entanglement – tight fitting cuffs, no rings, hair under a cap if long, no ties, no loose clothing
3. Prevention of stabbing or puncturing – keep hands away from drill bit, implement safe systems of work/safe operating procedures
4. Not being hit ejected work-piece – ensure adequate clamping/securing of the work-piece
5. Coming into contact with the swarf – instigate a swarf chip breaker being ground into the drill bit

6. Not being hit by a falling work-piece – adequate security of the work piece. If a radial drill ensure that the operator is aware of the drill arm path relative to his head height

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## HAZARDS – BENCH TOP GRINDER

(a) **Identify FOUR** hazards associated with the use of a bench top grinder.

(b) Other than a guard, **outline FOUR** control measures that could be introduced to reduce risk to a worker using a bench top grinder.

Part (a)

Four hazards associated with the use of a bench top grinder are:

1. Entanglement on the rotating wheel or spindle
2. Trapping between the wheel and the tool rest
3. Disintegration of the wheel
4. Friction and abrasion following contact with the revolving wheel
5. Being struck by material or sparks ejected from the wheel
6. Noise
7. Vibration
8. Inhalation of dust from the material being ground

Part (b)

Other than a guard, four control measures that could be introduced to reduce risk to a worker using a bench top grinder are:

1. Ensuring the grinder was permanently fixed and bolted in position
2. The installation of local exhaust ventilation
3. The provision and maintenance of correctly positioned stop, start and emergency stop controls
4. Ensuring an inspection of the equipment before use
5. The use of competent operators
6. The provision and use of personal protective equipment such as impact resistant goggles, face masks, overalls with tight fitting cuffs and hearing protection
7. Introducing a programme of regular maintenance.

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## HEALTH AND SAFETY RISKS TO AN OFFICE CLEANER

Identify **EIGHT** possible risks to the health and safety of a cleaner in an office.

There are a range of health and safety risks to which an office cleaner may be exposed, including:

1. Ergonomic risk arising from the manual handling of waste and heavy floor cleaning machines which could be inadequate for the task to be performed.
2. The cleaner may come in contact with hazardous substances such as cleaning materials, and sharps or broken glass in the waste and could be exposed to dust during the cleaning process.
3. Inhalation of dangerous fumes / vapours from cleaning chemicals
4. Slips, trips and/or falls on wet or slippery surfaces
5. Some equipment used could be electrically driven and this would involve electrical hazards particularly if the equipment was faulty, not subjected to regular maintenance and was not used in conjunction with a residual current device.
6. The cleaner may carry out some work at height to clean windows or high surfaces and there would be the danger of falling.
7. Risks arising from the working environment would include the temperature of the office particularly if the heating or air conditioning was turned off, and, if working alone and unsupervised, with little means of communication with a nominated person
8. If no security procedures in place there would always be the risk of him/her being subjected to violence from an intruder.
9. Risks could arise from the duration of the work and its timing, often involving early morning or night work.
10. Possible entanglement in rotating parts of equipment e.g. floor polisher
11. Bites and/or stings from vermin and insects

Those who tend NOT do so well only identify generic risk categories such as substances for example, without then linking them to a particular activity that the cleaner might carry out.

### 4.4 - CONTROL MEASURES FOR REDUCING RISK FROM MACHINERY HAZARDS

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## GUARD/SAFETY DEVICE SELECTION FOR A PIECE OF WORK EQUIPMENT

Outline the basic requirements that you would consider when selecting a guard or safety device for a piece of work equipment.

The basic requirements for the selection of a guard or safety device include:

- Its suitability for its intended purpose
- The robust nature of its construction which would withstand the forces of ejection

- Not increase the risk to operators through contact with rough or sharp edges
- Its location at an adequate distance from a danger zone
- No easy way to bypass it
- Not restricting the operator's view
- Its maintenance which should be able to be carried out easily and safely.

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## GUARDS AND SAFEGUARDS - TYPES

List the types of guards and safeguarding devices that may be used to minimise the risk of contact with dangerous machine parts

### Guards

- Fixed
- Interlocked
- Adjustable
- Self-adjusting
- Photoelectric

### Safeguards

- Two-handed
- Presence sensing
- Pullback
- Restraint
- Safety controls (e.g. tripwire cable or two-hand controls)
- Gates
- Push-sticks
- Jigs

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## FIXED GUARDS – PROTECTION AGAINST TYPES OF DANGER

Other than contact with dangerous parts, **identify FOUR** types of danger against which fixed guards on machines may provide protection

Read the question carefully - to identify hazards other than those caused by contact with dangerous parts.

A fixed guard might help to protect employees by for example:

- By reducing noise emissions
- By containing hazardous substances such as oil mist or dust
- By providing shielding against heat or electricity
- By protecting against the ejection of particles from the machine

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## MACHINE GUARD AND SAFEGUARDS – MAIN TYPES

**Outline FOUR** main types of guards and safeguarding devices that may be used to reduce the risk of contact with dangerous parts of machinery.

1. A fixed guard, being a physical barrier which was not linked to the machine operation and required a special tool for its removal.
2. An interlocked guard, which is linked to the machine operation and prevents access when the machine is in a dangerous condition while also preventing operation of the machine until the guard is in position.
3. A trip device such as a probe, pressure mat or light curtain, stops movement of the machine when approach is detected
4. An automatic or self-acting guard such as a push away guard, is linked to the machine mechanism and physically moves the operator away from the danger zone.
5. An adjustable or self-adjusting guard which covers dangerous parts of the machine while material passes through and allows for materials of different thickness such as for example that provided for a circular saw.

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## GUARDS – FIXED AND TRIP DEVICES

In relation to machinery safety, **outline** the principles of operation of

(a) A fixed Guard

(b) Trip Devices

Part (a),

An interlocked guard is one that is linked to the machine controls by mechanical, electrical, hydraulic or pneumatic means so that the machine will not operate until the guard is closed, and when the machine is in a dangerous condition; the guard is either prevented from opening or, if it is opened the dangerous parts of the machine are made safe.

Part (b)

A trip device operates when a person approaches a danger area / zone.

Typical examples of such devices are trip bars or probes, pressure mats and photo sensitive systems (light curtains).

Once the device is triggered it 'trips' the machine, which either stops or otherwise becomes safe.

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## MAIN TYPES OF GUARDS

**Outline FOUR** main types of guards and safeguarding devices that may be used to reduce the risk of contact with dangerous parts of machinery.

1. A fixed guard, outlining it as a physical barrier which was not linked to the machine operation and required a special tool for its removal.
2. An interlocked guard, which is linked to the machine operation and prevents access when the machine is in a dangerous condition while also preventing operation of the machine until the guard is in position.
3. A trip device such as a probe or pressure mat, stops movement of the machine when approach is detected
4. An automatic or self acting guard such as a push away guard, is linked to the machine mechanism and physically moves the operator away from the danger zone.

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## ADVANTAGES AND DISADVANTAGES OF INTERLOCK GUARDS AND TRIP DEVICES

**Outline the merits (advantages) AND limitations (disadvantages) of BOTH:**

(i) An interlocking guard;

(ii) A trip device.

Part (i)

The advantages of an interlocking guard are:

- That it allows regular access and since it is connected to a power source a machine
- Cannot be operated when the guard is in the open position.

Its disadvantages are:

- It can be overridden
- The dangerous parts of the machine may not stop automatically and before access is gained
- In certain cases, access can be gained perhaps over a fence or gate
- The machine can be started by a second operator
- The guard requires regular and frequent maintenance.

Part (ii)

The merits/benefits of a trip device are:

- It minimises the severity of an injury
- It can be used as an additional control measure.

Its limitations are

- It can be overridden
- It may not prevent harm from occurring
- It may cause production delays
- Can increase stress for users if it trips out regularly and frequently.



## ELECTRICAL SAFETY

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the principles, hazards and risks associated with the use of electricity in the workplace
- Outline the control measures that should be taken when working with electrical systems or using electrical equipment in normal workplace conditions.

### 5.1 - PRINCIPLES, HAZARDS AND RISKS ASSOCIATED WITH THE USE OF ELECTRICITY IN THE WORKPLACE

#### COMMON ELECTRICAL HAZARDS

List the common hazards from electricity

- Electrical Burns
- Electrical shock
- Electric Arc
- Electrical Fires and
- Electrical Explosion

A good way to remember this would be B-SAFE

#### PORTABLE ELECTRICAL APPLIANCES - ACCIDENTS

List the causes of accidents involving portable electrical appliances

- Being run over by vehicles
- Being dragged over rough surfaces
- Becoming trapped in machinery
- Coming in contact with hot, corrosive or chemicals or solvents
- Continuous flexing
- Connection lead get pulled out of cord rips etc
- The making of wrong connections in the plug or other fittings
- Poor earth connections
- No overload protection being provided
- Unsafe work practices- Modification by persons who are not competent,

#### ELECTRICAL FIRES

Outline how fires could be caused by electricity.

How fires might be caused by electricity – could be related to causes such as:

- Inadequate specification or poor design of electrical equipment and systems;
- Defective wiring such as damaged cables or loose connections;
- System faults such as short circuits;
- Ignition of flammable or combustible materials due to arcing, sparking from switches or motors and static electricity;
- Incorrect fuse rating;
- Coiled extension leads;
- Overloaded electrical sockets generally with multiple adaptors;
- Unsafe modifications to the system such as unauthorised wiring and fuse replacement;
- Poor or blocked ventilation on equipment leading to overheating and
- Lack of adequate maintenance both of fixed installations and portable appliances.

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## ELECTRICITY – USE OF PORTABLE APPLIANCES

**Outline** the practical measures to reduce the risk of injury from electricity when using a portable electrical appliance on a construction site.

- Use of reduced or low voltage equipment
- Use of a residual current circuit breaker
- Equipment should be visually inspected prior to use to ensure free of visible defects
- Apparatus and cables should be protected against overload by fuses and/or circuit breaker
- All cables should be insulated and protected against mechanical damage
- Correct types of sheathing to suite working conditions
- Sufficient sockets to minimise the need for trailing cables
- The use of a cable drum whenever possible
- Correct maintenance and repair of equipment
- Correct connections to be assured
- Regular inspections and checks to remove damaged equipment
- Properly trained and authorised operators of the equipment.

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## THE EFFECTS OF ELECTRICITY ON THE BODY

(a) **Identify** the possible effects of electricity on the body.

(b) **Identify** the emergency action to take if a person suffers a severe electric shock.

Part (a),

The effects of electricity on the body need to include reference to:

- The cardio-respiratory effects, in particular the risk of fatal injury due to disruption to heart rhythm;
- Muscular contraction resulting in an involuntary grip on the live conductor, thus prolonging current flow through the body;
- Tissue burns with the main sites of damage being the entry and exit points with the possibility of damage to internal organs and

- Fractures or dislocations caused by a resulting fall.

Part (b),

The emergency action necessary after someone receives an electric shock is dependant on the circumstances, action may include:

- Isolation of the victim from the supply (either by switching off or pushing him/her clear with a non-conductive implement),
- Summoning help,
- Administering first aid such as cardio-pulmonary resuscitation,
- Treatment of burns and other injuries,
- Placing the victim in the recovery position and
- Remaining with him/her until professional medical help arrives.

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## ELECTRICITY – SEVERITY OF AN ELECTRIC SHOCK

**Outline FOUR** factors that may affect the severity of injury from contact with electricity.

1. Current in amperes
2. Length of contact time
3. Current path through the body
4. Conductivity/resistance of the body
5. The voltage
6. Conductivity of the environment
7. The nature of the contact
8. Age, health status of the victim.

## 5.2 - CONTROL MEASURES

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### ELECTRICAL ISOLATION, EARTHING, REDUCED LOW VOLTAGE AND OVER CURRENT PROTECTION - TERMS

In relation electrical safety, **explain** the following terms:

(a) Isolation

(b) Earthing

(c) Reduced Low Voltage

(d) Over Current Protection

#### Part (a) - Isolation-

- Involves cutting off the electrical supply from all or a discrete section of the installation by separating the installation or section from every source of electrical energy.
- This is the normal practice so as to ensure the safety of persons working on or in the vicinity of electrical components which are normally live and where there is a risk of direct contact with live electricity.

#### Part (b) - Earthing

- Electrical equipment and conductive items are connected to earth by cable or other suitable means such that the route to earth provides the path of least resistance to a current flowing under fault condition.
- The purpose of earthing is to minimise the risk of receiving an electric shock if touching metal parts when a fault is present. This is achieved by providing a path for fault current to flow safely to earth, which would also cause the protective device (MCB, fuses) to disconnect the circuit removing the danger.

#### Part (c) – Reduced low voltage

- When the working conditions are relatively severe either due to wet conditions or heavy and frequent usage of equipment, reduced voltage systems should be used.
- All portable tools used on construction sites, vehicle washing stations or near swimming pools, should operate on 110 V or less, preferably with a centre tapped to earth at 55 V. This means that while the full 110 V are available to power the tool, only 55 V are available to shock the worker.
- At this level of voltage, the effect of any electric shock should not be severe. For lighting, even lower voltages can be used and are even safer. Another way to reduce the voltage is to use battery (cordless) operated hand tools.

#### Part (d) – Over Current Protection

- In electricity supply, over-current or excess current is a situation where a larger than intended electric current exists through a conductor, leading to excessive generation of heat and the risk of damaging infrastructure and equipment and causing fires.
- Possible causes for over-current include short circuit, excessive load, and incorrect design.
- Fuses, circuit breakers, temperature sensors and current limiters are commonly used protection mechanisms to control the risks of over-current.

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## EARTHING

### **Explain** how earthing can reduce the risk of receiving an electric shock

Provision of effective earthing, to protect against indirect contact, can be achieved in a number of ways, including connecting the extraneous conductive parts of premises (water pipe etc.) to the main earthing terminal of the electrical installation.

This would create an „equipotential“ zone and eliminate the risk of shock, if a person touched two different parts of the metalwork, liable to be charged at different voltages, under earth fault conditions.

It is crucial to ensure that in the event of earth fault, the electricity supply is automatically disconnected.

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## REDUCED LOW VOLTAGE AND DOUBLE INSULATION

**Describe** how the following two protective measures reduce the risk of electric shock AND, in EACH case, give an example of their application.

(a) Reduced low voltage.

(b) Double insulation.

Part (a)

“Reduced low voltage” commonly used for portable electrical hand tools on construction sites, involves the reduction of mains voltage by a transformer to a lower safer voltage – typically 110 volts.

Any shock voltage can be restricted to 55 volts by means of a transformer that is centre tapped to earth.

Additionally, Safety Extra Low Voltage (SELV) – a voltage less than 50 volts – is used in low power tools such as hand lamps or soldering irons.

Part (b)

In “double insulation”, internal live parts of a piece of equipment have two layers of insulation which prevent the exposure of live parts to exposed conductive parts such as the outer metal casing of the equipment.

Consequently, an internal fault condition cannot make any part of the casing live.

Double insulation is used on Class II appliances such as hand held portable appliances and non-hand held portable appliances such as desk fans and desk lamps.

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## PORTABLE APPLIANCE INSPECTION

**List** the items to include on an inspection checklist for portable electrical appliances e.g. portable electric drill.

- Appropriate equipment for the task and environment
- Equipment is tested on a periodic / routine basis
- Equipment, plugs, connectors and cables are free from damage
- Correct wiring and sound connections
- Fuses and other means of preventing excess current in place and correct rating
- Accessible and appropriate means of isolation
- System not overloaded
- Obvious damage to plug, socket, fittings, equipment
- Sensible siting
- Used in appropriate conditions
- Fit for purpose
- No patent defects

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## WORKPLACE ELECTRICAL EQUIPMENT CHECKS

**Outline** a range of checks that should be made for electrical safety in a workplace.

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- Visual inspections for damage to cables, plugs and sockets,
- The need to ensure that all fuses are of the correct rating,
- Checking that outlets are not overloaded and cables are not coiled or in vulnerable positions where they might suffer damage.
- The equipment itself should be checked to ensure that it is suitable and conforms with recognised standards such as CE marking and European standards,
- That it is properly sited to avoid damage,
- That it has been subject to appropriate and regular fixed installation and portable appliance testing,
- That it is provided with means of isolation after use and
- Records are kept of the maintenance that has been carried out.
- Checks should also be made to ensure there is an effective procedure for reporting defects or damage.

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## PORTABLE APPLIANCE INSPECTION – DETERMINING THE FREQUENCY OF INSPECTION

A portable electric drill for use on a construction site needs periodic inspection and testing to ensure it is safe to operate.

**Identify** the factors that would determine the frequency of the inspection and testing.

The factors that might affect the frequency of inspection and testing of the portable drill include but are not limited to the following:

- The nature of the work
- The environmental conditions in which the drill is to be used
- The frequency and duration of use
- The age of the equipment
- The intrinsic safety features of the equipment such as double insulation
- The use of low voltage
- User checks and the number of problems reported
- The number and competency of the users
- Manufacturers' recommendations and best practice guidance
- The results of previous tests and inspections.

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## ELECTRICAL HAZARDS – BRUSH CUTTER

A mains electricity powered brush-cutter (Strimmer) is to be used to clear undergrowth in the grounds of a workplace.

(a) **Identify** safety features of the brush-cutter that will reduce the risk of electric shock to the user.

(b) Other than electricity, **identify** additional hazards associated with the brush-cutter that the user could be exposed to.

(c) Other than electricity safety features, **outline** the control measures to reduce the risks to the user when operating the brush-cutter.

(d) **Outline** additional control measures to reduce risks to other employees who may be in the vicinity of this work.

Part (a),

Safety features of the brush-cutter could include:

- Its voltage, preferably 110 volts;
- It is class ii double insulated and has a waterproof casing;
- It is used in conjunction with a residual current device (RCD);
- It is properly earthed and provided with a mains cable of robust construction and is fitted with a fuse of the correct rating or connected to a circuit breaker.

Part (b)

Additional hazards faced by the user in clearing the undergrowth could include:

- Contact with the moving parts of the brush-cutter such as the rotating blade;
- The possibility of being struck by flying stones or other material;
- Slips, trips and falls for example caused by contact with the trailing cable;
- Manual handling hazards;
- Exposure to noise from the operation of the motor,
- Vibration through the handles of the machine
- Dust and biological hazards for instance coming into contact with animal waste.

Part (c),

The control measures to reduce the risks to the user of the brush-cutter include:

- The selection and maintenance of equipment to reduce to a minimum the levels of noise and vibration;
- Restricting the time spent on the operation;
- Ensuring the guards were correctly positioned before starting the work;
- The use of a hold to run switch;
- The provision and use of ear defenders, eye protection, dust mask, gloves, safety footwear, gaiters and high visibility clothing that also afforded protection against the weather; and
- The provision of information, instruction and training on the hazards associated with the equipment and the control measures to be observed.

Part (d)

Additional control measures necessary to reduce risks to other employees who might be in the vicinity include:

- Advising them that the work is to be carried out;
- Cordoning the area with barriers and/or tapes and erecting warning signs;
- Providing alternative means of access around the work area;
- Protecting the cable route;
- Carrying out the clearing operation if possible outside normal working hours
- Using a stand by person to deter other employees from entering the work area.

## FIRE SAFETY

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Describe the principles of fire initiation, classification and spread
- Outline the principles of fire risk assessment
- Describe the basic principles of fire prevention and the prevention of fire spread in buildings
- Identify the appropriate fire alarm system and fire-fighting equipment for a simple workplace
- Outline the factors which should be considered when implementing a successful evacuation of a workplace in the event of a fire.

### 6.1 - FIRE INITIATION, CLASSIFICATION AND SPREAD

#### COMMON CAUSES OF FIRE IN THE WORKPLACE

Identify **EIGHT** common causes of fires in a workplace.

1. Naked flames – from smoking materials, cooking appliances, heating appliances and process equipment
2. External sparks – from grinding metals, welding, impact tools, electrical switch gear
3. Internal sparking – from electrical equipment (faulty and normal), machinery, lighting
4. Hot surfaces – from lighting, cooking, heating appliances, process equipment, poorly ventilated equipment, faulty and/or badly lubricated equipment, hot bearings and drive belts
5. Static electricity – causing significant high voltage sparks from the separation of materials such as unwinding plastic, pouring highly flammable liquids, walking across insulated floors, or removing synthetic overalls.
6. Chemicals – the storage in close proximity of incompatible substances, and not following safe working procedures e.g. re-capping containers giving off flammable vapour when the container is not in actual use.
7. Housekeeping – allowing flammable materials to accumulate in areas where there is a risk of fire.
8. Waste storage and disposal – flammable waste not being placed in lidded containers and not emptied regularly.
9. Flammable gases – leaks – inappropriate controls that identify the presence of leaking cylinders, valves and/or associated fittings.
10. Maintenance – not having adequate maintenance procedures in place to ensure preventative measures against the generation of heat e.g. friction from bearings that are not properly lubricated, not clearing/cleaning ventilation holes on equipment that may cause heat to build up as it is unable to escape/ventilate properly.
11. Effects of strong sunlight – this may focus beams of light which can be excessively hot onto flammable materials and cause combustion – almost spontaneous combustion should sufficient flammable gases be given off.
12. Hot work activities not being properly controlled e.g. welding, cutting and grinding
13. Arson – setting fire to material by malicious intent.
14. People playing with fire in a foolish manner



15. Electrical – overloaded sockets, damaged equipment etc that may lead to overheating of electrical equipment and/or short circuits.
16. Discarded smoking materials e.g. cigarettes that are still lit.

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## THE FIRE TRIANGLE

(a) **Identify** the key components of the 'fire triangle'

(b) **Identify** sources of ignition that may cause a fire to occur, AND give a typical workplace example of EACH.

Part (a)

Each side of the fire triangle represents one of the three elements – namely, fuel, oxygen and a source of ignition, heat or energy – that must be present for combustion to occur.

Part (b)

Possible sources of ignition that could have been identified included:

- Electricity, such as arcing or overheating due to faulty wiring, poor connections or excess current;
- Chemical reactions such as spontaneous combustion or exothermic reaction;
- Hot work such as welding or cutting; naked flame or smoldering material perhaps from discarded smoking materials;
- Friction caused by, for instance, inadequate lubrication of machinery; and
- Hot surfaces such as those on cooking or heating appliances.

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## FIRE TRIANGLE – PRINCIPLES

**Outline** the principles of the fire triangle

The principles of the fire triangle is simply to identify if you remove any one of the three principle elements and the fire will eventually die e.g.

- Suffocation / smother – remove oxygen
- Starvation – remove fuel
- Cooling – remove heat

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## FIRE TRIANGLE, HEAT TRANSFER AND ELECTRICAL FIRES

(a) **Explain**, using a suitable sketch, the significance of the 'fire triangle'.

(b) **Identify THREE** methods of heat transfer and explain how EACH can cause the spread of fire.

(c) **Outline** measures that should be taken to minimise the risk of fire from electrical equipment.

(d) **Explain** why water should not be used on fires involving electrical equipment.

Part a)

If one or more of the three elements of the fire triangle is removed, the fire will be extinguished. This can be done by

- Cooling the fire to remove the heat
- Starving the fire of fuel, and
- Smothering the fire to limit the available oxygen

Part b)

1. Conduction – The movement of heat through a material (usually a solid)
2. Convection – The movement of hotter gases up through the air (a main cause of fire spread – the heated air is able to pass through gaps and cause a fire to start elsewhere)
3. Radiation – Transfer of heat through the air – the air or gas is not heated but solids or liquids in contact with the heat are.
4. Direct burning – Combustible materials in contact with naked flame – The materials can then cause the transfer of heat by conduction and/or convection and/or radiation.

Part c)

- Disconnection of equipment when not in use
- Pre-inspection of equipment visually by the users
- Use suitable equipment for the task being undertaken
- Frequent maintenance and inspection by competent persons
- Avoid misusing the equipment
- Prevent the overloading of circuits and fittings
- Correct design and fuse rating for the task/equipment
- Improve the means of protection e.g. RCD
- Good standards of housekeeping
- Staff awareness and training

Part d)

For fires involving live electrical equipment where the power can not be isolated there is a severe risk of electrical shock. Water is a conductor of electricity.

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## CLASSIFICATIONS OF FIRE AND FIRE EXTINGUISHERS

### Identify the types of fire and extinguishers

Class A – fires which involve solid materials such as wood, paper, cardboard, textiles, furniture and plastics where there are normally glowing embers during combustion.

Such fires are extinguished by cooling which is achieved using water

Class B – fires which involve liquids or liquefied solids such as paints, oils or fats. These can be further subdivided into:

Class B1 – fires which involve liquids that are soluble in water such as methanol.

They can be extinguished by carbon dioxide, dry powder, water spray, and light water and vaporizing liquids

Class B2 – fires which involve liquids not soluble in water, such as petrol and oil.

They can be extinguished by using foam, carbon dioxide, dry powder, light water and vaporizing liquid

Class C – fires which involve gases such as natural Methods of extinction gas or liquefied gases such as butane or propane.

They can be extinguished using foam or dry powder in conjunction with water to cool any containers involved or nearby

Class D – fires which involve metals such as aluminium or magnesium.

Special dry powder extinguishers are required to extinguish these fires, which may contain powdered graphite or talc

Class F – fires which involve high temperature cooking oils or fats in large catering establishments or restaurants

There are designated extinguishers for such fires

Electrical fires – fires involving electrical equipment or circuitry do not constitute a fire class on their own, as electricity is a source of ignition that will feed a fire until switched off or isolated. But there are some pieces of equipment that can store, within capacitors, lethal voltages even when isolated.

Extinguishers specifically designed for electrical use like carbon dioxide or dry powder should always be used for this type of fire hazard.

Fire extinguishers are usually designed to tackle one or more class of fire.

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## FIRE CLASSIFICATIONS

In relation to the classification of fires, give an **example** of a material (fuel) that fall within the classes A, B, C and D.

Class A fire - Fires in carbonaceous materials such as wood, paper etc.

Class B fire - Fires in Flammable liquids such as Petrol; Oil; Grease; Diesel etc.

Class C fire. - Fires in flammable gases such as LPG, Acetylene

Class D fire - Fires in flammable metals such as Sodium Potassium and Aluminium

### FIRE RISK ASSESSMENT – FACTORS TO BE CONSIDERED

**Outline** factors to be considered when carrying out fire risk assessment of a workplace

Identify the hazards - Hazards include:

- Anything that can start a fire, such as naked flames, heaters or commercial processes such as cookers or hot-air dryers
- Anything that can burn in a fire, including piles of waste, display materials, textiles or other flammable products
- Oxygen sources such as air conditioning, medical products or commercial oxygen supplies which might intensify a fire

Identify people at risk, these include:

- People who work close to or with fire hazards
- People who work alone, or in isolated areas such as storerooms
- Children or parents with babies
- Elderly people
- Disabled people
- Vulnerable people (e.g. hospitals – delivery rooms, ICU, etc)

Evaluate, remove or reduce the risk. You should:

- Where possible, get rid of the fire hazards you identified – e.g. remove build-ups of waste - and reduce any hazards you can't remove entirely
- Replace highly flammable materials with less flammable ones
- Keep anything that can start a fire away from flammable materials
- Have a safe-smoking policy for employees or customers who want to smoke in a designated area near your premises (smoking in enclosed spaces is banned)

Once you have reduced the risk as is far as practical, you need to look at any risk that can't be removed and decide what fire safety measures to provide.

### HAZARDS TO FIREMEN WHEN ATTENDING A FIRE

**Outline** the hazards to which workers in the fire and rescue service could be exposed while attending emergencies.

The hazards to which workers in the fire and rescue service could be exposed while attending emergencies include, but are not limited to:

- Exposure to fire, heat, smoke, fumes or toxic gases
- Falls from heights
- The collapse of structures or being struck by falling objects
- Contact with electricity
- Being involved in an explosion such as that of gas cylinders

- Exposure to chemicals, radiation or biohazards such as discarded syringes
- Hazards connected with the need to move or handle equipment in restricted spaces
- Being struck by moving road traffic
- Being attacked by members of the public or even by animals
- Stress arising from the very nature of the work they have to carry out.

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## FIRE PLAN

The manager of an industrial unit containing a number of offices and workshops has just completed a risk assessment and is to develop a fire plan.

**Identify** the factors that should be addressed in the fire plan.

Factors that should be addressed in the fire plan include:

- The action workers should take if they discover a fire;
- The system for raising the alarm
- The system of notifying the fire service;
- The escape routes and travel distances
- The provision of fire exit route signs;
- The provision of emergency lighting;
- The provision and siting of fire fighting equipment;
- The identification of an assembly point and the procedures for taking a roll call;
- The appointment of and delegation of specific responsibilities to marshals and wardens;
- The arrangements for workers with disabilities and for non-workers;
- The location of service shut down switches and valves
- The arrangements for stopping and isolating machinery and plant in the event of a fire;
- The training required for all workers and that for those with special responsibilities
- Coordination and cooperation with other employers who might be affected if a fire occurred.

## 6.3 - FIRE PREVENTION AND PREVENTION OF FIRE SPREAD

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### FIRE PREVENTION AND CONTROL

**List EIGHT** ways of reducing the risk of a fire starting in a workplace.

1. Apply the principles of the fire triangle – reduce or eliminate any one of the aspects (heat, fuel and oxygen) then the fire potential will be reduced
2. Ensure electrical equipment is properly vented and maintained
3. The regular inspection of electrical equipment
4. Eliminate or reduce the storage of flammable materials in the workplace
5. Suitable and sufficient controls over ignition sources
6. Proper control over smoking and smoking materials

7. Maintain a good standard of housekeeping in particular preventing the accumulation of debris
8. Ensure the appropriate maintenance of machinery and equipment to prevent friction
9. Suitable and sufficient controls over hot-work activities
10. Correct storage of flammable liquids
11. Correct storage and isolation of combustible gases
12. Appropriate segregation of incompatible chemicals
13. Adequate security measures to prevent arson
14. Regular inspections of the workplace to ensure controls are being maintained
15. Adequate levels of supervision
16. Appropriate training of all persons in the ways to prevent/minimise the risk of fire.

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## HIGHLY FLAMMABLE LIQUID STORAGE

**Outline** suitable control measures for the safe storage and use of highly flammable liquids in the workplace.

Precautions that should be considered when storing and handling highly flammable liquids in the workplace should include, but not be limited to:

- Their substitution with substances with less flammable properties;
- The selection of containers that are suitable for the purpose and labeling the containers clearly with information about their contents;
- Storing the containers away and at a safe distance from the process area and protected against sunlight or in a store constructed of fire resisting materials which should be clearly marked;
- Limiting the quantities in use in the process area and preventing vapour build up by the provision of a good standard of ventilation;
- Removing likely sources of ignition;
- Preventing or reducing the impact of spillages by using non-spill caps or bunding the area where the containers are held and providing spill kits and training workers in their use;
- Ensuring the segregation of full and empty containers;
- Ensuring the use of suitable electrical equipment whether flameproof or intrinsically safe;
- Providing workers with personal protective equipment such as flame retardant overalls;
- Ensuring the provision of appropriate fire fighting equipment for example powder filled fire extinguishers;
- Introducing safe systems of work for handling and storing the liquids and
- Providing training to the workers in the hazards involved and the control measures to be taken.

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## FIRE – FIRE SPREAD – HEAT TRANSFER

**Identify** the **FOUR** methods of heat transfer and explain how **EACH** can cause the spread of fire.

Heat Transfer:

This is by conduction, radiation, convection and direct contact

#### 1. Convection

Hot air becomes less dense and rises drawing in cold new air to fuel the fire with more oxygen.

The heat is transmitted upwards at sufficient intensity to ignite combustible materials in the path of the very hot products of combustion and flames.

This is particularly important inside buildings or other structures where the shape may effectively form a chimney for the fire.

#### 2. Conduction

This is the transmission of heat through a material with sufficient intensity to melt or destroy the material and ignite combustible materials which come into contact or close to a hot section.

Metals like copper, steel and aluminium are very effective or good conductors of heat.

Other materials like concrete, brickwork and insulation materials are very ineffective or poor conductors of heat.

Poor conductors or good insulators are used in fire protection arrangements. When a poor conductor is also incombustible it is ideal for fire protection.

Care is necessary to ensure that there are no other hazards like a health problem with such materials.

Asbestos is a very poor conductor of heat and is incombustible. Unfortunately, it has, of course, very severe health problems which now far outweigh its value as a fire protection material and it is banned in the UK, although still found in many buildings where it was used extensively for fire protection.

#### 3. Radiation

Often in a fire the direct transmission of heat through the emission of heat waves from a surface can be so intense that adjacent materials are heated sufficiently to ignite.

A metal surface glowing red-hot would be typical of a severe radiation hazard in a fire.

#### 4. Direct burning

This is the effect of combustible materials catching fire through direct contact with flames which causes fire to spread, in the same way that lighting an open fire, with a range of readily combustible fuels is spread within a grate.

### RAISING THE ALARM IN THE EVENT OF A FIRE AND SITING OF EXTINGUISHERS

(a) **Identify TWO** ways in which an alarm can be raised in the event of a fire.

(b) **Identify** the issues to consider in the selection and siting of portable fire extinguishers.

Part (a),

The ways of raising the alarm in the event of a fire can be:

- By automatic methods, for example smoke detectors,
- Manually operated devices such as break glass alarms,
- Visual alarms with the use of flashing lights, horns, klaxons and
- The human voice.

Part (b)

For selection, the relevant criteria would be:

- The type of extinguisher required relative to the fire class
- The number to be provided relative to the size of the premises
- The number of floors.

Issues to be considered in the siting of the extinguishers include

- Accessibility – is access unobstructed
- Visibility – can the equipment be easily seen and identified by signs of an appropriate standard
- Proximity to exits and escape routes
- Travel distances – is the distance one has to travel to get to such equipment reasonable i.e. under 25m
- Support of the equipment off the ground – are extinguishers located off the ground and on wall brackets, if they have to be mounted on the floor are they located on stands of a suitable construction
- Free from obstruction – is access easily available to such equipment
- Protection from the weather – with regards to extremes of temperature (heat and cold) as well as dusty conditions (sand in the desert environment) which may affect their operability
- Protection from other sources of damage – such as impact from passing vehicles



## 6.5 - EVACUATION OF A WORKPLACE

### FIRE – MEANS OF ESCAPE

(a) **Outline** the requirements for an adequate means of escape from inside a place of work to a final exit door.

(b) **Identify** the issues to consider for the location of an assembly point for use in a workplace evacuation.

Part (a)

Here the identification of requirements such as:

- An unobstructed escape route with consideration given to the needs of the disabled and with alternative routes available;
- Ensuring that travel distances were kept to a minimum;
- Protected corridors and stairways of sufficient width with internal self closing smoke doors;
- The provision of adequate directional signage
- The provision of emergency lighting;
- Exit doors fitted with simple catches and opening outwards.

Part (b)

Issues to be considered for the location of assembly points such as:

- Unenclosed positions in the open air at a safe distance from the building and large enough to accommodate all employees;
- Direct access from final exits to assembly points which should be accessible to all occupants of the premises; and
- Ensuring that the assembly points are marked and signposted, do not obstruct emergency services and do not put employees at risk from passing traffic.

### FIRE EVACUATION REQUIREMENTS

**Outline** the requirements to ensure the safe evacuation of persons from a building in the event of fire.

The requirements to ensure the safe evacuation of persons from a building in the event of fire are:

- Adequate fire identification system
- Means of raising the alarm quickly and effectively
- Warning devices
- Lighting and emergency lighting
- Signage of the appropriate standard and positioned in an effective manner
- Adequately protected routes
- Practice and Drills (ISIT)
- Adequate capacity of the exit routes
- Adequate capacity of the exit doors and final exit doors

- Unobstructed ways
- Fire marshals / wardens
- Fire protection systems
- Availability of extinguishers and correct siting
- Facilities / arrangements for persons with disabilities
- Realistic travel distance to a place of safety

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## EMERGENCY EXITS AND ROUTES

**State the normal requirements with regards to workplace emergency exits and routes.**

- The risk assessments undertaken to take into account
  - The dimensions of the escape route,
  - The length and width of the exit routes and doors, and
  - The expected number of persons to be evacuated.
  - The persons who may have to use exits / routes e.g. disabled
  - Travel distance
- Emergency exit doors must open easily and in the direction of escape
- Emergency signs and lighting to be provided and remain in a properly functioning condition
- All emergency escape routes must be kept clear of obstructions at all times
- Escape routes must lead directly to a place of safety.
- Emergency exit routes and exits must be clearly identifiable

## CHEMICAL AND BIOLOGICAL HEALTH HAZARDS AND RISK CONTROL

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the forms of, the classification of, and health risks from exposure to hazardous substances
- Explain the factors to be considered when undertaking an assessment of the health risks from substances commonly encountered in the workplace
- Describe the use and limitations of Workplace Exposure Limits including the purpose of long term and short term exposure limits
- Outline control measures that should be used to reduce the risk of ill-health from exposure to hazardous substances
- Outline the hazards, risks and controls associated with specific agents
- Outline the basic requirements related to the safe handling and storage of waste.

### 7.1 - FORMS OF, CLASSIFICATION OF, AND HEALTH RISKS FROM HAZARDOUS SUBSTANCES

#### CHEMICAL AGENTS – FORMS; CHRONIC AND ACUTE HEALTH EFFECTS

Employees can be exposed to chemical agents in the workplace.

(a) **Identify FOUR** forms that chemical agents can take.

(b) **Outline** the differences between the acute and chronic health effects from exposure to chemical agents.

Part (a)

Chemical agents can be present in many forms such as:

1. Dusts and fibres,
2. Fumes,
3. Gases,
4. Vapours,
5. Mists and aerosols,
6. Liquids and
7. Solids.

Part (b),

In the case of acute health effects, the adverse effects appear after a single or short term exposure to the agent, and the response is invariably rapid or immediate.

In most cases, acute effects recede on cessation of exposure.

Chronic health effects, on the other hand, usually result from prolonged or repeated exposure to the agent.

The response is normally gradual, may go unrecognised for long periods of time but is often progressive and irreversible.

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## BIOLOGICAL AGENTS TYPES

Identify types of biological agents

Fungus

- Fungi are small organisms that produce spores.
- It is the spores that may be inhaled or enter the body through the skin.

Bacteria

- Bacteria are very small single cell organisms, which invade and infect humans.
- Destroyed by the employment of antibiotics. However, antibiotic resistant bacteria are developing and are becoming increasingly difficult to treat.

Virus

- They are minute organisms which develop within the cells of the body e.g. the common cold, hepatitis, HIV.
- Recognised as a major source of illness, although usually of short duration.
- Viruses are microscopic organisms which multiply in the living cells of their hosts.
- They do not multiply in food, although food may be the vehicle that introduces the virus into the host.
- Some ten viral particles are sufficient to cause illness, thus it is highly infective.

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## HAZARDOUS SUBSTANCES – BIOLOGICAL ORGANISMS – REDUCING THE RISK OF INFECTION

**Outline** the control measures that could be used to reduce the risk of infection from biological organism

- Keeping numbers of persons likely to be exposed to a minimum
- Effective engineering controls
- Collective control measures - LEV
- Good personal hygiene
- PPE and RPE
- Effective containment – safe collection and storage
- Warning signage
- Emergency plans and practices
- Appropriate information being given to those concerned
- Effective supervision
- Suitable and sufficient instructions and training being issued / delivered and understood (e.g. safe systems of work) by those at risk
- Health surveillance
- Vaccinations where deemed necessary

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## FLAMMABLE SOLVENT – HEALTH EFFECTS AND PRECAUTIONS

A large item of process machinery is to be cleaned manually with a flammable solvent before being partially dismantled for repair.

(a) **Identify FOUR** possible health effects from exposure to the solvent.

(b) **Outline** the safety precautions that should be taken when using such flammable solvents.

(c) **Outline** further precautions that might be needed in order to ensure the health and safety of those carrying out the maintenance work.

Part a)

1. The vapours, if inhaled, enter the bloodstream and some can cause short-term effects (dizziness) and
2. Long-term effects (brain damage).
3. Many chemicals such as solvents are also irritants
4. If ingested they may also have toxic effects.
5. Organic solvents (trichloroethylene) are well-known neurotoxins.
6. Organic solvents (e.g. glycol ethers used in screen printing) can restrict the operation of the kidneys possibly leading to failure.
7. The most common industrial disease of the skin is dermatitis (non-infective dermatitis). It begins with a mild irritation on the skin and develops into blisters which can peel and weep becoming septic. It can be caused by various chemicals, mineral oils and solvents.
8. Occupational asthma

Part b)

- Store minimal quantities in the workplace
- Replace caps when they are not required to be removed
- Decant using a pump rather than pouring
- Have appropriate fire extinguishers available
- Have appropriate hot-work controls in place
- No smoking controls to be properly enforced
- Ensure electrical components in use in the work area are appropriate for such flammable atmospheres
- Waste materials stored in a lidded container and not allowed to overspill onto the floor
- Spillages to be addressed in a timely manner
- Ensure appropriate PPE is used
- Good hygiene practices to be observed

Part c)

1. Permit to work system (hot work and cold work) – need to properly consider rescue

2. Ventilation / adequate venting of confined spaces
3. Atmosphere monitoring
4. No lone working
5. Appropriate PPE
6. Good welfare arrangements to allow hand washing etc.
7. Monitor the workplace temperature – increase of vapour potential and maybe flammability

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### SPRAYING SOLVENT – FORMS, ROUTES OF ENTRY, MSDS AND CONTROL MEASURES

As part of a cleaning process, solvent is to be sprayed onto components before they are painted.

- (a) During the spraying process **identify** the forms the solvent could take.
- (b) **Outline** the possible routes of entry of the solvent into the human body.
- (c) **Identify** the information that could be obtained about the solvent from the material safety data sheet (MSDS).
- (d) **Outline** control measures that could be taken to reduce the risks from exposure to the solvent.

Part (a)

During the spraying process the forms the solvent could take are as

- A liquid
- A mist
- An aerosol or
- A vapour

Part (b)

The possible routes of entry of the solvent into the human body are

- Inhalation since mists, aerosols and vapours are airborne;
- Ingestion since there could be hand to mouth contact with contaminated hands;
- Injection following use of a high pressure spray gun; and
- Through the skin into the blood stream following entry through a cut or wound.

Part (c)

Information on the solvent that would be available on the safety data sheet includes:

- The manufacturer's name and contact details;
- The name and type of the solvent;
- Its physical and chemical properties;
- Its reactivity;
- The nature of the hazard it presents;

- Its health effects;
- Regulatory information such as risk and safety phrases;
- The work exposure limit occupational exposure limit;
- Control measures to be taken against exposure such as the wearing of personal protective equipment;
- Measures to be taken in the event of spillage;
- First aid and fire fighting measures;
- The precautions to be taken to ensure the safe disposal of the solvent taking into account environmental considerations.

Part (d),

An initial control measure that would need to be considered would be minimising the generation of solvent mist or vapour by brushing the components rather than by the use of spraying equipment.

If this was not possible, the spraying operation would need to be carried out in an isolated area, preferably a spray booth, provided with local exhaust ventilation.

It would also be advisable to reduce the number of employees exposed and to reduce the time of their exposure.

Those involved in the operation would need to be provided with personal protective equipment such as overalls and gloves and respiratory protective equipment if it were not possible to carry out the operation under local exhaust ventilation of a sufficiently high standard.

The operators would have to be given instruction and information on the hazards associated with the operation and the precautionary measures to be adopted and should have ready access to washing facilities.

Some candidates at times propose to eliminate the use of the solvent, not realising that this was not an option.

## 7.2 - ASSESSMENT OF HEALTH RISKS

### CELLULAR DEFENCE MECHANISMS

**Identify TWO** types of cellular defence mechanisms that the body has as a natural defence system.

Two types of cellular defence mechanisms that the body has as a natural defence system such as:

1. The scavenging action – that of phagocytes and /or macrophages;
2. The secretion of defensive substances;
3. The prevention of excessive blood loss and
4. The repair of damaged tissue.

### TARGET ORGAN

**Define** a target organ

A target organ is the part of the body that sustains an adverse effect when it is exposed or contaminated by a particular harmful substance or agent.

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## HAZARDOUS SUBSTANCE – RISK ASSESSMENT

**Outline FOUR** sources of information that might be consulted when assessing the risks of a new substance being introduced into a manufacturing process.

1. Manufacturers' or suppliers' product information (MSDS)
2. Recognised publications from reliable bodies e.g. EH40 from the UK HSE
3. Specialist textbooks, journals and research papers
4. Guidance from trade or professional bodies
5. Electronic health and safety databases, i.e. the internet,
6. ILO Databases based on the internet
7. Subscription related and reliable web based reference sources

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## HAZARDOUS SUBSTANCES, BIOLOGICAL ORGANISMS OR TOXIC SUBSTANCES - ROUTES OF ENTRY

**Identify** the possible routes of entry of biological organism to the body

An alternative question here may be – Identify FOUR possible routes of entry of toxic substances into the body.

The possible routes of entry into the body of biological organisms include:

Ingestion

- Hand to mouth

Injection

- Needle-stick

Inhalation

- Breathing

Absorption

- Through mucus membrane

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## HAZARDOUS SUBSTANCE INGESTION



**Outline** the personal hygiene practices that should be followed to reduce the risk of ingestion of a hazardous substance.

- The following should be achieved in conjunction with suitable and sufficient training and supported by effective supervision
- Restriction of eating in the vicinity of the work place, where hazardous substances are used or stored.
- Restriction of smoking in the workplace
- Regular washing of hand and exposed body
- Use of suitable Personal protective equipment“s such as goggles , face mask etc.
- Removal and cleaning of the contaminated cloth and work refuse, debris, etc.

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## HAZARDOUS SUBSTANCES – MSDS INFORMATION CONTAINED

**Identify** the information that should be included on a manufacturer's safety data sheet supplied with a hazardous substance.

The section headings for a sixteen section MSDS are as follows:

- Section 1 - Chemical Product and Company Identification
- Section 2 - Composition/Information on Ingredients
- Section 3 - Hazards Identification
- Section 4 - First Aid Measures
- Section 5 - Fire Fighting Measures
- Section 6 - Accidental Release Measures
- Section 7 - Handling and Storage
- Section 8 - Exposure Control/Personal Protection
- Section 9 - Physical and Chemical Properties
- Section 10 - Stability and Reactivity
- Section 11 - Toxicological Information
- Section 12 - Ecological Information
- Section 13 - Disposal Considerations
- Section 14 - Transport Information
- Section 15 - Regulatory Information
- Section 16 - Other Information

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## HAZARDOUS SUBSTANCE USE – INFORMATION TO USERS

**Outline** the information that should be given to employees when they could be exposed to a substance hazardous to health in the workplace.

- The nature of the substance and its possible effects on the person
- How the substance is to be used, transported and stored
- Ensuring the correct understanding of the provision and use of control measures
- The required use of personal protective equipment including information on its availability, storage, cleaning, maintenance and replacement
- The procedures relating to personal hygiene with regard to direct use and or exposure to the substance
- The monitoring undertaken to ensure correct / desired compliance with the safe use, etc of the substance

- The required / anticipated health surveillance requirements
- The procedures to adopt in the event of emergencies including first-aid, spillage, fire, etc.
- Access to the material safety data sheet
- Access and viewing of the related risk assessments for the substances concerned

### 7.3 - WORKPLACE EXPOSURE LIMITS

#### WORKPLACE EXPOSURE LIMITS (WEL)

Hazardous substances can be assigned a Workplace Exposure Limit (WEL).

(a) **Outline** control measures that could be considered to ensure that exposure to hazardous substances will not exceed the WEL.

(b) **Identify TWO** classifications of hazardous substances that require exposure to be reduced to as low a level as is reasonably practicable.

Part (a)

Control measures to ensure exposure to hazardous substances will not exceed the WEL include:

- Providing a total enclosure for the process where this is possible
- Limiting the need for persons to enter enclosed areas for example to carry out maintenance;
- Minimising emissions and generation of the hazardous substance for example, by temperature control or by applying the substance with a brush rather than spraying;
- Minimising the number of persons exposed and the length of their exposure by the use of job rotation and the provision of frequent breaks;
- Providing adequate dilution or local exhaust ventilation;
- Providing suitable respiratory protective equipment such as air fed or cartridge respirators and preventing skin contact during the use of substances that may be absorbed through the skin.

Part (b),

Here the identification of carcinogenic substances or those causing cancer which carry the risk phrase R45 or R49; respiratory sensitisers or asthmagens (R42 or R42/43) and mutagenic substances (R46).

Many who answer this type of question refer to specific hazardous substances rather than the classifications as required.

#### WORKPLACE EXPOSURE LIMITS (WEL) – MEANING AND POSSIBLE REASONS FOR AN INCREASE IN WORK RELATED ILL-HEALTH

A recent increase in work-related ill health has been noticed amongst the workers who use a solvent for which a workplace exposure limit (WEL) has been set.

(a) **Explain** the meaning of the term 'workplace exposure limit'.

(b) **Give** possible reasons for the increase in work-related ill health amongst the workers.

Part (a)

The term „workplace exposure limit“ is concerned with concentrations of hazardous substances in the air that people breathe averaged over a specified period of time and referred to as a time weighted average.

Two time periods are used: long term (8 hours) intended to control effects by restricting the total intake by inhalation on a daily basis and short term (usually 15 minutes) to control effects that may be seen after a brief exposure.

Part (b)

Possible reasons for the increase in work-related ill health amongst the workers could include:

- That an important reason for the increase in work related ill-health might have been the inadequacy of the original risk assessment carried out for the operation or a subsequent increase in the frequency and duration of the exposure of workers.
- The original solvent might have been replaced by a new solvent for which no risk assessment had been carried out.
- A failure to carry out health screening of new workers
- A failure to give them adequate training on the precautions to be observed
- An increase in the quantity or concentration of the solvent used
- An inadequate or poorly maintained local exhaust ventilation system
- A failure to carry out regular monitoring to ensure the work exposure limit was not being exceeded
- A failure to provide, or if provided, a failure to use personal protective equipment
- A poor standard of personal hygiene on the part of the workers.

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## WORKPLACE EXPOSURE LIMITS – DUST LAMP AND PERSONAL DUST SAMPLERS

Different methods can be used to monitor dust in a workplace to ensure that personal exposure levels do not exceed workplace exposure limits (WELs).

(a) **Explain** how a dust lamp can give an indication of airborne dust levels in a workplace

(b) **Outline** how a personal dust sampler is used to measure the levels of airborne dust.

Part (a),

Under normal lighting conditions, many particles of dust are too small to see with the naked eye.

Therefore, by passing a beam of strong light from a dust lamp through airborne dust, the particles become readily visible to the observer.

This is a qualitative rather than a quantitative method of dust measurement but it does help to indicate the movement and pattern of dust omitted by a work process.

Part (b)

Personal dust sampler - a pre-weighed filter is placed in a sampling head which would be a 7 hole head for measuring total inhalable dust and a cyclone head for respirable dust.

The sampling head is connected to a portable pump, which is normally belt mounted, and is positioned near the breathing zone of the employee.

Air is drawn through the filter at a pre-set rate (nominally two litres per minute) over a period of a shift or eight hours.

The filter is then re-weighed and the difference between the two filter weights divided by the volume of air sampled will give the daily exposure in mg/m<sup>3</sup>.

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## HAZARDOUS SUBSTANCE – RISK ASSESSMENT AND MAXIMUM ALLOWABLE CONCENTRATION

(a) **Outline** factors to consider when undertaking an assessment of health risks for a hazardous substance.

(b) **Give** the meaning of the term 'maximum allowable concentration'.

Part (a)

The factors to consider when undertaking an assessment of health risks for a hazardous substance should include, but not be limited to the following:

- Details of the process in which the substance is to be used;
- The hazardous nature of the substance whether for example toxic, corrosive or carcinogenic and its chemical, physical or bio-hazardous properties;
- The form in which it was to appear in the workplace, for example as a dust or fume; the possible routes of entry of the substance such as inhalation, absorption or injection;
- The possible ill-health effects of exposure to it; the frequency, duration and level of exposure and the number and type of persons who would be exposed;
- The existence of applicable standards such as work exposure limits and the suitability and adequacy of the control measures currently in place.

Part (c)

The meaning of the term „maximum allowable concentration“ could be considered as the concentration in air of a gas, vapour or substance which in general remains without harmful effects to both workers and their offspring albeit after repeated exposure and during the period of time up to an entire working life comprising 8 hours per day and 40 hours per week.

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## OCCUPATIONAL HEALTH SURVEYS – USE OF STAIN TUBE DETECTORS AND CONTINUAL GAS/DUST SAMPLERS

In relation to occupational health surveys which can be conducted to determine health risks to persons, **outline TWO** advantages AND **TWO** disadvantages of BOTH:

(a) Stain tube detectors;

(b) Continual gas / dust samplers.

Part (a)

The advantages of stain tube detectors are that:

1. They are quick and easy to use
2. They are normally inexpensive to buy
3. Their use does not require extensive training
4. They give an immediate reading without further analysis being required.

The disadvantages of using the detectors

1. Their accuracy varies
2. They are suitable only for gases and vapours and not dusts
3. They may be prone to operator error for example in counting the pump strokes or drawing up properly
4. They can be used only for grab sampling
5. The tubes are fragile
6. They have a limited shelf life.

Part (b)

The advantages of continual samplers are

1. They allow longer term monitoring
2. Are more accurate in determining a time weighted average (twa)
3. Have an approved methodology for testing.

Their disadvantages are

1. They will not identify a specific type of contaminant or multiple contaminants
2. They normally do not read peaks or troughs
3. If used as a static sampler they will not identify personal exposure
4. They are open to deliberate contamination or tampering
5. The users require considerable training
6. They are expensive to purchase or hire.

## 7.4 - CONTROL MEASURES

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## LOCAL EXHAUST VENTILATION (LEV)

**Outline** the factors that may reduce the effectiveness of a local exhaust ventilation (LEV) system.

There are a range of factors that might reduce the effectiveness of a local exhaust ventilation system including:

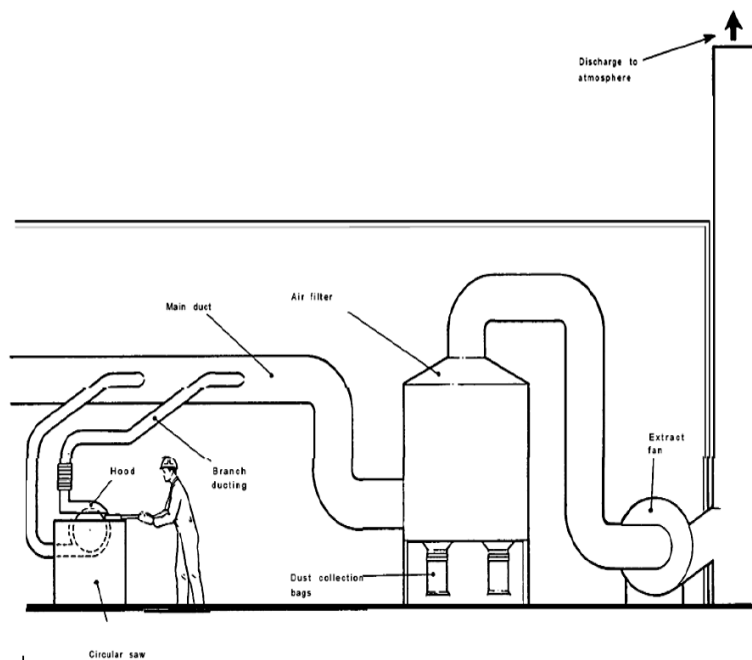
- Damage to the ducting;
- The distance the extraction head is away from the source;
- Blocked, damaged, unsuitable or incorrectly installed filters;
- Fan inefficiency perhaps through wear or corrosion of the blades;
- Inappropriate initial design which may be exacerbated by process changes;
- Unauthorised alterations such as increasing the number of outlets;
- Incorrect use such as a failure to position the hood close enough to the source of emission;
- Sharp bends in the ductwork structure may have a detrimental effect on extraction;
- A build up of contaminant in the ducting and a blocked or obstructed outlet;
- Incorrect settings for example of the dampers and
- A failure to provide a system of regular maintenance, inspection and testing.

Some candidates provided a drawing of a LEV system and while this was not required by the question, it does give them the opportunity to consider all aspects of the system and identify where deficiencies could occur.

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## LOCAL EXHAUST VENTILATION SYSTEM

**Sketch** the principal components of a LEV system



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## LOCAL EXHAUST VENTILATION SYSTEM EFFECTIVENESS REDUCTION

**Outline** factors that may reduce the effectiveness of a local exhaust ventilation system (LEV).

The factors that may reduce the effectiveness of a local exhaust ventilation system could include:

- Damage to the ducting;
- Blocked, damaged, unsuitable or incorrectly installed filters;
- Fan inefficiency perhaps through wear or corrosion of the blades;
- Inappropriate initial design which may be exacerbated by process changes;
- Unauthorised alterations such as increasing the number of inlets;
- Incorrect use including a failure to position the hood close enough to the source of emission;
- A build-up of contaminant in the ducting and a blocked or obstructed outlet;
- Scrubber saturation;
- Incorrect settings, for example of the dampers, and
- A failure to introduce procedures for the regular maintenance, inspection and testing of the system

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## LOCAL EXHAUST VENTILATION

Airborne measurements have identified that a local exhaust ventilation system (LEV) is no longer controlling employee exposure to airborne dust.

A risk assessment has identified that respiratory protective equipment (RPE) can be used as an interim measure to protect employees, whilst engineers repair the LEV system.

(a) **Identify** the main components of the LEV system.

(b) **Outline** factors that may reduce the effectiveness of the LEV system.

(c) **Outline** factors to be considered when selecting RPE to protect the employees whilst engineers are repairing the LEV system.

Part (a)

The main components of the LEV system are:

- A hood,
- Ducting,
- An air cleaning device such as a filter or bag filter,
- A fan and
- An exhaust outlet.

Part (b)

The factors that may reduce the effectiveness of the LEV system include:

- Damage to the ducting;
- Blocked, damaged, unsuitable or incorrectly installed filters;
- Fan inefficiency perhaps through wear or corrosion of the blades;

- Inappropriate initial design which may be exacerbated by process changes;
- Unauthorised alterations such as increasing the number of inlets;
- Incorrect use including a failure to position the hood close enough to the source of emission;
- A build-up of contaminant in the ducting and a blocked or obstructed outlet;
- Incorrect settings, for example of the dampers,
- A failure to introduce procedures for the regular maintenance, inspection and testing of the system.

Part (c)

Factors to be considered in the selection of respiratory protective equipment (RPE) include

- The type, duration and frequency of the work to be carried out;
- The type of rep to be used whether full face or half mask;
- The work exposure limit of the dust and the protection factor of the rep;
- The selection of the correct filter or cartridge for the equipment;
- Task related factors such as movement, work rate and the need for communication;
- Comfort for the wearers particularly if they have facial hair or wear spectacles;
- Compatibility of the RPE with other personal protective equipment;
- The initial cost of the equipment and that involved in its regular maintenance;
- The provision of adequate storage facilities for the equipment when it is not in use.

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## MINIMISING DUST LEVELS OTHER THAN USING LEV

**Describe** other methods of control to minimise levels of airborne dust except from LEV.

Working ones way through the hierarchy of controls is a good way of achieving a reasonable answer here, being:

- Eliminating the process causing the dust
- A change in process to reduce dust amounts
- Substitution of materials i.e. capsule form, pellets or liquid
- Segregation or enclosure of the dust creation process
- Damping down the dust for easier removal such as vacuuming
- Methods of cleaning so as not to disturb the dust i.e. vacuuming instead of sweeping

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## HEALTH SURVEILLANCE

**Identify** factors that may indicate a need for health surveillance of workers in a workplace.

Factors that might indicate the need for health surveillance of workers include:

The requirements of legislation, codes of practice and guidance;

- The work activity involving contact with, for example, lead or asbestos;
- Changes in the work activity;
- As a result of a risk assessment;
- Ill-health records including those of first aid treatments and absence records;
- The results of monitoring or workplace inspections;
- Job fitness standards



- Evidence of pre-existing conditions;
- Complaints from workers and as a result of consultation with the workforce.

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**HEALTH SURVEILLANCE MEANING, TYPES OF CHECKS AND THE MEANINGS OF STEL AND LTEL, LIMITATIONS OF EXPOURE LIMITS**

(a) **Give** the meaning of the term 'health surveillance'.

(b) **Identify** the types of checks that could be included in a health surveillance programme.

(c) **Give** the meaning of a short term exposure limit (STEL) AND a long term exposure limit (LTEL).

(d) **Outline** the limitations of exposure limits (EL's)

For part (a)

„Health surveillance“ is concerned with collecting and using information about a worker's health related to their work and systematically watching out for work related ill-health in workers exposed to certain health risks.

It could range from simple skin or hearing checks to medical examinations involving a doctor and/or nurse.

Part (b), here you would be expected to identify types of checks such as:

A health assessment by questionnaire;

- A clinical examination; diagnostic tests such as by x-ray or scan;
- Function measurements for example a lung function test;
- Biological tests as of the blood; skin checks for signs of rashes;
- Eye and hearing tests; and
- Self checks once the symptoms have been explained.

Part (c),

Here your answer needs to consider that both the short term and long term exposure limits are concerned with airborne concentrations of a substance over a specified period of time and are expressed as a time weighted average.

The short term exposure limit (STEL) is usually averaged over a fifteen minute reference period, and is aimed at avoiding acute effects from exposure to substances where there is evidence that such an effect may be present.

The long term exposure limit (LTEL) is concerned with the total intake averaged over a reference period of eight hours and is aimed at protecting against the known effects of long term exposure.

Few candidates demonstrate a good understanding of the exposure limits and some only repeat the wording of the question in response for example, STEL is the short term exposure limit and LTEL is the long term exposure limit.

Part (d)

The limitations of workplace exposure limits include the fact that they relate to inhalation only and not to other routes of entry such as skin absorption and do not therefore account for circumstances where both routes may be possible.

Additionally, they do not account for personal susceptibility since the majority of the work carried out in their development has been carried out in the developed countries such as Europe and the USA and is based mainly on the average male physiology.

It has also to be recognised that variations may exist in controlled conditions where local exhaust ventilation may not always work consistently because of lack of maintenance and excessive levels of contamination.

Similarly lack of maintenance and misuse can lead to inaccuracies in monitoring since measuring microscopic amounts of contamination require very accurate and sensitive equipment.

There are, also, synergistic effects since the standards that are available relate to a single substance and often the effects of exposure to multiple substances in the workplace need to be considered.

Finally some exposure limits are guidelines only and not requirements while others do not assess all health effects of a particular substance.

## 7.5 - SPECIFIC AGENTS

### DUST MONITORING – DUST LAMP AND PERSONAL DUST SAMPLER

Different methods can be used to monitor dust in a workplace to ensure that personal exposure levels do not exceed workplace exposure limits (WELs).

(a) **Explain** how a dust lamp can give an indication of airborne dust levels in a workplace.

(b) **Outline** how a personal dust sampler is used to measure the levels of airborne dust.

Part (a),

Under normal lighting conditions, many particles of dust are too small to see with the naked eye.

Therefore, by passing a beam of strong light from a dust lamp through airborne dust, the particles become readily visible to the observer.

This is a qualitative rather than a quantitative method of dust measurement but it does help to indicate the movement and pattern of dust omitted by a work process.

Part (b)

A personal dust sampler is used to measure the levels of airborne dust its use is as:

A pre-weighed filter is placed in a sampling head which would be a 7 hole head for measuring total inhalable dust and a cyclone head for respirable dust.

The sampling head is connected to a portable pump, which is normally belt mounted, and is positioned near the breathing zone of the employee.

Air is drawn through the filter at a pre-set rate (nominally two litres per minute) over a period of a shift or eight hours.

The filter is then re-weighed and the difference between the two filter weights divided by the volume of air sampled will give the daily exposure in mg/m<sup>3</sup>.

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## DUST EMISSION PREVENTION

### Outline four methods of dust emissions prevention

Dust emissions can be prevented or reduced in four basic ways:

1. Limiting the creation or presence of dust-sized particles.
2. Reducing wind speed at ground level.
3. Binding dust particles together.
4. Capturing and removing dust from its sources.

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## WOOD DUST – RESPIRATORY DEFENCES AND CONTROL MEASURES

Employees have been exposed to high levels of inhalable wood dust.

(a) **Identify** the body's respiratory defences against the inhalation of the wood dust.

(b) **Outline** control measures to reduce the risk to employees from exposure to wood dust.

Part (a)

The body's respiratory defences against the inhalation of the wood dust is achieved by:

- The filtering effect of nasal hairs,
- The role of coughing and sneezing
- The part played by mucus in the respiratory tract and bronchi which allows dust particles to be trapped and then carried upwards by tiny hairs (the cilia).

Part (b)

The control measures to reduce the risk to employees from exposure to wood dust include:

- The hierarchy of control and measures such as the enclosure and/or segregation of the process or if this was not possible the use of engineering controls such as the provision of local exhaust ventilation which would need to be regularly inspected and maintained.
- The provision and use of respiratory protective equipment which again would require regular maintenance.
- A high standard of housekeeping including the use of a vacuum cleaner would have to be maintained and employees issued with personal protective equipment such as overalls and gloves.
- Employees would need to practise a high standard of personal hygiene by changing overalls and washing hands before eating or drinking.

- A check on the effectiveness of the control measures which had been introduced,
- A periodic check should be carried out on the quality of the breathing air in the workplace.

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## DUST ENTERING THE BODY AND RESPIRABLE DUST

(a) **Explain** how the body prevents dust from entering the body and

(b) **Outline** the meaning of respirable dust

Part (a)

This comprises the lungs and associated organs (e.g. the nose). Air is breathed in through the nose, passes through the trachea (windpipe) and the bronchi into the two lungs. Within the lungs, the air enters many smaller passageways (bronchioli) and thence to one of 300 000 terminal sacs called alveoli.

The alveoli are approximately 0.1 mm across, although the entrance is much smaller.

On arrival in the alveoli, there is a diffusion of oxygen into the bloodstream through blood capillaries and an effusion of carbon dioxide from the bloodstream. While soluble dust which enters the alveoli will be absorbed into the bloodstream, insoluble dust (respirable dust) will remain permanently, leading to possible chronic illness.

The whole of the bronchial system is lined with hairs, known as cilia. The cilia offer some protection against insoluble dusts.

These hairs will arrest all non-respirable dust (above 5  $\mu\text{m}$ ) and, with the aid of mucus, pass the dust from one hair to a higher one and thus bring the dust back to the throat. (This is known as the ciliary escalator).

It has been shown that smoking damages this action.

The nose will normally trap large particles (greater than 20  $\mu\text{m}$ ) before they enter the trachea.

Part (b)

Respirable dust tends to be long thin particles with sharp edges which puncture the alveoli walls. The puncture heals producing scar tissues which are less flexible than the original walls – this can lead to fibrosis.

Such dusts include asbestos, coal, silica, some plastics and talc

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## ASBESTOS – TYPES AND WHERE IT CAN BE FOUND

(a) **Identify TWO** types of asbestos to which workers in the construction industry may be exposed.

(b) **Give** examples of where workers might find asbestos while undertaking maintenance or refurbishment work on a building.

Part (a)

Types of asbestos such as

- Crocidolite or blue asbestos,
- Chrysotile or white asbestos and
- Amosite or brown asbestos.

Part (b),

Examples of where asbestos was likely to be encountered during renovation work on a building would have referred to:

- Pipe lagging;
- Asbestos cement products such as roofing sheets;
- Loose asbestos packing used as fire breaks in ceiling voids;
- Sprayed asbestos coatings on steel members to provide an element of fire resistance;
- Asbestos wool used as loft or wall insulation;
- Asbestos rope;
- Certain textured coatings or decorative plasters; and
- Gaskets on boilers and cookers.

Many tended to refer to locations such as „roof“ or „ceilings“ without specifying the type of material that might be found there or what form the asbestos might take.

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## ASBESTOS REMOVAL – CHRONIC HEALTH EFFECTS

Asbestos is to be removed from a building used as a workplace.

(a) **Identify** the possible chronic health risks from exposure to asbestos.

(b) **Outline** control measures that should be considered before and during the removal of asbestos.

Part (a),

Possible chronic health risks from exposure to asbestos include:

- Plural plaques,
- Asbestosis,
- Mesothelioma and
- Lung cancer.

Part (b)

The control measures that should be considered before and during the removal of asbestos include:

- Segregation of the area where the work is to be done and restricting access to the area;
- The appointment of a licensed contractor for the removal of the asbestos;
- Erecting a sheeted enclosure around the area and keeping it under negative pressure;
- A restriction on the use of power tools for the removal operation;
- Monitoring airborne fibre levels during the operation;
- Providing the employees involved in the operation with personal protective equipment such as hooded overalls and gloves and respiratory protective equipment;

- The provision and siting of decontamination and welfare facilities;
- Arrangements for cleaning the site when the removal work has been completed and for carrying out an air clearance test;
- Ensuring that the employees are made fully aware both of the risks involved in the removal operation and the precautions to be taken.

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**INDICATIONS OF A DUST PROBLEM, BODY DEFENCES AGAINST DUST AND CONTROL MEASURES TO REDUCE DUST IN THE WORK ENVIRONMENT**

(a) **Identify** the possible indications of a dust problem in a workplace.

(b) **Describe** how the body may defend itself against the harmful effects of airborne dust.

(c) **Outline**, with practical examples where appropriate, the control measures that may be used to reduce levels of dust in a work environment.

Part a)

The possible indications of a dust problem in the workplace could be:

- Visible signs
- Complaints by employees
- Monitoring
- Equipment problems
- Blocked filters

Part b)

1. Nasal hairs – on inhalation many substances and minor organisms are successfully trapped by nasal hairs.
2. Respiratory tract containing hair cells
3. Coughing and sneezing – on detecting harmful substances a series of reflexes activate the coughing and sneezing mechanisms to expel the substance
4. The change of direction of the larynx
5. Eye watering – effectively washing out small particles of dust by a combination of blinking and tears
6. The ciliary escalator - lined with mucus and fine hairs which sweep towards the outside and pass along the large particles

Part c)

- Eliminate the source of the dust
- Substitute the dusty substance with say pellets
- Change the process
- Use a liquid instead of a powder/dry process
- Enclose the complete process
- Adequate ventilation

- Control by suppression
- Adequate housekeeping arrangements
- Maintenance issues to be suitably addressed

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## CONTACT DERMATITIS IN CONSTRUCTION

The construction industry has a high incidence of contact dermatitis.

(a) **Identify FOUR** substances used in construction that could cause contact dermatitis.

(b) **Outline** control measures that could be used to reduce the risk of contact dermatitis.

Part (a)

Substances in use in the construction industry that could cause contact dermatitis include:

1. Degreasers,
2. De-scalers
3. Detergents;
4. Epoxy resins and hardeners;
5. Sealants such as acrylic silicone;
6. Bitumen, asphalt and tar;
7. Solvents used in connection with paints, glues and other surface coatings;
8. Petrol, diesel, oil and greases;
9. Cement and lime and
10. Insulation materials such as mineral wool.

Be mindful that some candidates tend to give a list of products rather than substances.

Part (b)

In outlining control measures that could be used to reduce the risk of contact dermatitis, you can refer to:

- The use of alternative substances where this is possible;
- Using gloves to protect skin on the hands and minimising contact with the use of hand tools;
- Providing washing facilities so that contaminants can be removed from the skin as soon as possible; using barrier and moisturising creams;
- Providing information to workers on the hazards involved and the precautions to be taken; encouraging them to report skin problems and
- Arranging for supervisors to undertake skin inspections.

The big problem experienced here is that answers are generally concerned only with the use of gloves and barrier creams and the provision of training.

Some candidates refer to the hierarchy of control but then do not apply it to the scenario.

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## AMMONIA RELEASE – HEALTH EFFECTS AND AIR MONITORING

Ammonia has been released into the atmosphere of a workplace.

(a) **Outline** typical health effects resulting from exposure to ammonia

(b) **Give** the meaning of the term 'acute health effect'

(c) **Identify** suitable air monitoring methods for ammonia

Part (a)

The typical health effects resulting from exposure to ammonia include irritation and possibly burning of the respiratory system; pulmonary oedema; coughing and sneezing; eye irritation together with running eyes and nose and irritation and burning of the skin

Ammonia, in both its gaseous and liquid form, can be irritating to the eyes, respiratory tract and skin due to its alkaline nature.

The biological effects of ammonia in humans after acute exposures are dose-related – they depend on the ambient concentration, the amount taken in by the body and the duration of exposure.

Ammonia leaks can be very dangerous. Ammonia is extremely irritating, and may severely burn your skin and eyes upon contact. During a leak, a cloud of ammonia gas causes burning and swelling of the air passages of the nose, throat and lungs. Workers exposed to very serious leaks may survive the accident, but may die later from pulmonary oedema, a build-up of fluid in the lungs caused by the damaging effect of the gas. Workers may suffer permanent lung and eye problems as a result of exposure to high levels of ammonia.

Nausea and watering eyes from ammonia fumes pose an additional safety hazard to workers who must work with sharp knives and precision cutting equipment.

Not much is known about the long-term effects of ammonia. Frequent exposure to small amounts of other irritating gases can lead to bronchitis, persistent cough, and excess mucus production. It may also decrease your body's ability to get rid of foreign substances, like dusts, from your airways. Chronic (long-term) exposure to ammonia may, therefore, harm you by itself or in combination with other occupational hazards and infectious diseases.

Part (b)

In the case of acute health effects, the adverse effects appear after a single or short term exposure to the agent, and the response is invariably rapid or immediate.

In most cases, acute effects recede on cessation of exposure.



Part (c)

Suitable air monitoring methods for ammonia include

- A stain tube,
- A passive or active sampling device and an
- Electrochemical detection device such as a pulsed amplified detector.

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## SOLVENT EXPOSURE – MINIMISE EXPOSURE

**Identify** the precautions that could be taken to minimise and reduce exposure to solvents.

Precautionary measures that could be taken to reduce and minimise exposure to solvents include

- Their use in a well-ventilated areas with the installation of local exhaust ventilation if this is thought to be necessary
- The prohibition of hot work in solvent laden vapour areas
- Keeping minimal quantities in the workplace
- Keeping them stored in lidded and sealed containers
- Using a safe decanting method
- Limiting the exposure time of workers
- Ensuring a good standard of housekeeping so that solvent laden rags and waste are not left in open bins
- Refraining from using solvent for the removal of paint and grease from the skin
- The provision and use of suitable personal protective equipment such as gloves, goggles, face shield and apron and respiratory protective equipment where this is found to be necessary
- Prohibiting eating, drinking and smoking in areas where solvents are used
- Advising the workers on the hazards of solvent use and the precautions to be followed and
- Encouraging them to adopt a good standard of personal hygiene such as washing hands before consumption of food or drink.

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## LEGIONELLA – HEALTH RISKS, WHAT COULD CAUSE THE BACTERIA TO BE PRESENT IN A WATER SYSTEM, WHO CAN BE EXPOSED

(a) **Identify** the health risks associated with exposure to legionella bacteria.

(b) **Outline** the circumstances that could cause legionella bacteria to be present in a water system.

(c) **Identify** ways in which persons can be exposed to legionella bacteria.

Part (a)

Health risks associated with exposure to legionella bacteria include

- Legionnaires disease, a flu like condition and a potentially fatal form of pneumonia, and
- Other conditions less serious including Pontiac fever.

Part (b)

Circumstances that could cause legionella bacteria to be present in a water system include:

- Stagnant and untreated water;
- Water kept at a temperature between 20 and 45°C;
- Dead ends
- The presence of sludge and other deposits

Part (c),

A person might be exposed to legionella bacteria by inhaling airborne droplets which could emanate from water systems such as cooling towers, showers or fountains.

## 7.6 - SAFE HANDLING AND STORAGE OF WASTE

### COLLECTION AND DISPOSAL OF WASTE

Outline the issues that should be considered by an organisation when developing a system for the safe collection and disposal of its waste.

- The area assigned to hold the waste prior to collection should be of sufficient size
- Storage should be suitably located away from drains, etc
- The storage area should be properly identified and labelled
- Individual containers should be clearly identified as to their contents
- Different types of waste should be stored separately
- Incompatible wastes should never be stored in close proximity
- The waste containers must be of a suitable and sufficient construction for the waste that they are to hold
- Waste, if necessary should be protected from the weather elements
- Bunding arrangements, if applicable should be instigated
- Hazardous waste not to be disposed of via the general waste route
- Storage area to be properly secure
- Persons handling the waste must be trained in the applicable safety precautions and procedures
- Persons collecting waste (if a contractor) must be approved and properly authorised to do so.
- Vehicles used for the transportation of the waste must be suitable for the purpose, be operated by a trained and authorised person, have the appropriate safety equipments available on board in case of an emergency, be properly placarded (signed) to identify what is being transported.
- Appropriate paperwork should be completed, retained and kept available for inspection should the need arise
- The disposal site must be authorised by the appropriate environmental authority for the disposal of the waste stream.
- All persons involved in the collection, storage and disposal of the waste must be suitably trained and be competent in the work expected of them.

### HAZARDOUS AND NON HAZARDOUS WASTE AND BUNDS

(a) Give the meaning of:

I. 'Hazardous waste'

II. 'Non-Hazardous waste'

(b) **Outline** the key design features of a permanent spill protected / bunded area in order to protect against accidental releases and pollution.

Here candidates were expected to differentiate between hazardous waste which is harmful and/or dangerous to health and the environment and non-hazardous waste which is not harmful either to health or the environment and does not decompose and result in the formation of harmful products.

Part a i)

A hazardous waste is waste that poses substantial or potential threats to public health or the environment. There are four factors that determine whether or not a substance is hazardous:

1. Ignitability (i.e., flammable)
2. Reactivity
3. Corrosivity
4. Toxicity

Special waste or hazardous waste is waste which meets the hazard criteria defined in the UK „Special Waste Regulations 1996“.

These are sometimes substances which are life threatening (toxic, corrosive or carcinogenic) or highly flammable. Clinical waste falls within this category.

Because of the hazards of special waste the Regulations require that movement of such waste is tracked from source to final disposal by means of a consignment note system.

Examples of Special Waste are asbestos, waste from a laboratory or waste from a hospital.

Part a ii)

Non-hazardous waste is waste that is not specifically designated as hazardous by, or having hazardous properties described in, the Hazardous Waste Directive

Non-hazardous waste mainly includes the following, where they do not contain any hazardous substances or articles:

- General office waste
- Catering waste
- Construction and demolition wastes
- Scrap timber, metal, glass, etc
- Wastes segregated for recycling such as office paper, glass, cans, cardboard, pallets etc.

Part b)

Bunding, also called a bund wall, is the area within a structure designed to prevent inundation or breaches of various types.

One of the most common designs for large tanks is a concrete or masonry wall around the tank with a concrete floor. The outside of the wall may be reinforced with an earth berm. Concrete works very well for many liquids, but it is unsuitable for some applications like containing strong acids.

The bund may have a roof to prevent precipitation from getting in, but steps must be taken to provide adequate ventilation when storing flammable liquids.

If the wall is over a meter high, it may require a ladder or steps to allow people to escape quickly. Another design uses a channel that drains the liquid to a secondary container.

When the risk of tank failure is not as likely or when it would not cause extensive damage, the bunding may be designed to merely contain small leaks from hoses and valves. This bunding may not be able to contain the entire volume of the tank.

If built properly, bunding is large enough (110% of the capacity of the largest storage vessel within the bund) and strong enough to contain the contents of an entire tank. When multiple tanks share a bund, the capacity is based on the largest tank.

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## HIERARCHY OF CONTROL – MINIMISE POLLUTION FROM WASTE AND REDUCING RISK OF ENVIRONMENTAL DAMAGE FROM AN OIL SPILLAGE

(a) **Identify** the elements of a hierarchy of control to minimise pollution from waste. (4)

(b) **Outline** techniques which can be used to reduce the risk of environmental damage from spillage and leakage of liquid waste.

Part (a)

The elements of a hierarchy of control to minimise pollution from waste include:

- Reducing the amount of raw materials and energy involved in the processes;
- Re-using materials or recovering energy;
- Recycling materials by using them for a different purpose if they cannot be used again in the original process;
- Converting the waste to energy by incineration and using the heat produced for example for the generation of electricity and finally
- Responsible disposal for example in a landfill site.

Part (b),

The techniques which can be used to reduce the risk of environmental damage from spillage and leakage of liquid waste include:

- The use of double skinned containers;
- The erection of bunding round tank storage;
- The positioning of drip trays at decanting points;
- The use of absorbent granules or pads;
- Booms and
- Providing covers for drains.

## PHYSICAL AND PSYCHOLOGICAL HEALTH HAZARDS AND RISK CONTROL

### LEARNING OUTCOMES

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the health effects associated with exposure to noise and appropriate control measures
- Outline the health effects associated with exposure to vibration and appropriate control measures
- Outline the principal health effects associated with heat, ionising and non-ionising radiation and basic protection techniques
- Outline the causes and effects of stress at work and appropriate control actions.

### 8.1 - NOISE

#### HEARING PROTECTION – PLUGS AND MUFFS

A noise survey has been conducted in a factory which has resulted in the need for provision of hearing protection.

**Outline** the advantages AND disadvantages of:

(a) Earmuffs;

(b) Ear plugs.

Part (a),

The advantages of ear muffs are:

- That they provide a good reduction of all sound frequencies;
- They can be integrated with other personal protective equipment such as a hard hat;
- They are visible and thus provide a good monitor of their usage;
- They are reusable and have a low risk of infection.

The disadvantages are:

- There is the possibility that they could be incompatible with other forms of personal protective equipment
- Their reliability might be affected by the presence of long hair, glasses or ear rings;
- They might become uncomfortable when worn for long periods or during hot weather and
- They need to be regularly maintained and provided with dedicated storage facilities.

Part b)

Advantages of ear plugs are:

- They are easy to use, comfortable,

- Are available in a range of designs and types
- They are disposable and thus do not need to be stored after use.

Disadvantages,

- They do need to be correctly sized to fit the individual,
- Their effectiveness decreases with usage,
- They interfere with communication
- They may cause hygiene problems if they are not kept clean or the user has an existing ear infection.

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## NOISE – CONTROLS IN A ENGINEERING FACTORY

**Outline** with practical examples, the engineering means by which noise levels in the factory might be reduced

Maintenance:

- Replacement or adjustment of worn or loose parts;
- Balancing of unbalanced equipment;
- Lubrication of moving parts;

Substitution of materials

- (e.g., plastic for metal), a good example being the replacement of steel sprockets in chain drives with sprockets made from flexible polyamide plastics.

Substitution of equipment:

- Electric for pneumatic (e.g. Hand tools);
- Belt conveyors rather than roller conveyors.

Specification of quiet equipment.

Substitution of parts of equipment:

- Modification of gear teeth, by replacing spur gears with helical gears;
- Replace straight edged cutters with spiral cutters (e.g. wood working machines);
- Replace gear drives with belt drives;
- Replace steel or solid wheels with pneumatic tyres.

Change of work methods

- Replace pneumatic tools by changing manufacturing methods, such as moulding holes in concrete rather than cutting after production of concrete component;
- Select slowest machine speed appropriate for a job - also select large, slow machines rather than smaller faster ones;

Substitution of processes.

- Mechanical ejectors for pneumatic ejectors;
- Hot for cold working;

- Welding for riveting;

Substitution of mechanical power generation and transmission equipment

- Electric motors for internal combustion engines or gas turbines;

Replacement of worn moving parts

Minimising the number of noisy machines running at any one time

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## NOISE – CONTROLS

An employer has been advised to implement control measures to protect the hearing of workers exposed to excessively high noise levels.

**Outline** control measures to reduce the noise exposure to the workers.

The control measures to reduce the noise exposure to the workers include:

- The introduction of engineering controls such as the use of acoustic absorbent materials to aid sound proofing;
- Increasing the noise travel distance by the use of baffles;
- Fitting silencers for example on exhaust pipes and pneumatic equipment;
- Fitting anti-vibration mounts and replacing metal gears or bushes with those made of plastic;
- The provision of sound proof enclosures for particularly noisy equipment;
- Introducing a programme of regular maintenance and lubrication of the equipment;
- Switching machinery off when not in use.
- Limiting exposure by the use of job rotation or reducing the time of exposure of the workers;
- Providing and wearing personal protective equipment such as ear defenders and
- Introducing a regular programme of audiometry screening and checks.

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## NOISE – HEALTH EFFECTS FROM HIGH LEVELS OF NOISE

**Outline** the possible health effects due to the exposure to high noise level

The main auditory effects include:

Acoustic trauma:

Sudden hearing damage caused by short burst of extremely loud noise such as a gunshot.

Tinnitus:

Ringling or buzzing in the ear.

Temporary hearing loss:

Also known as temporary threshold shift (TTS) which occurs immediately after exposure to a high level of noise.

There is gradual recovery when the affected person spends time in a quiet place. Complete recovery may take several hours.

Permanent hearing loss:

Permanent hearing loss, also known as permanent threshold shift (PTS), progresses constantly as noise exposure continues month after month and year after year.

The hearing impairment is noticeable only when it is substantial enough to interfere with routine activities. At this stage, a permanent and irreversible hearing damage has occurred.

Noise-induced hearing damage cannot be cured by medical treatment and worsens as noise exposure continues.

When noise exposure stops, the person does not regain the lost hearing sensitivity. As the employee ages, hearing may worsen as "age-related hearing loss" adds to the existing noise-induced hearing loss.

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## NOISE – ENGINEERING CONTROLS

**Identify FOUR** types of engineering control that may be used to reduce noise in the workplace AND give a practical example of EACH.

In answering this question, you are really expected to identify types of engineering control that might be used to reduce noise in the workplace such as:

- Changing the process for example using screws instead of rivets or substituting a machine with a Diesel engine with one which was electrically driven;
- Providing sound proof enclosures such as a hood for a printer;
- Controlling vibration by the use of resilient machinery mounts and flexible pipes;
- Damping by changing a material being used such as plastic instead of glass;
- Noise absorption by the use of acoustic absorbing ceiling baffles and screens;
- Using silencers to reduce sound energy emitted from exhaust pipes; and
- Introducing a programme of planned maintenance which would include lubrication of moving parts of machinery.

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## NOISE – REDUCTION TECHNIQUES

**Outline FOUR** types of engineering control that may be used to reduce noise in the workplace, giving a practical example of EACH.

1. Silencing

- Suppression of noise operated by the flow of air / gas /steam in ducts pipes by the inclusions of either absorptive materials or baffles

2. Absorption

- Is used to reduce the amount of noise by using materials such as foam or mineral wool



### 3. Damping

- Is used primarily to reduce primarily the amount of noise radiating from large panels and is achieved by increasing the stiffness of the panels

### 4. Isolation –

- The physical separation of people from the noise source or the reduction in structure borne noise by vibration isolation, like flexible pipe, snit vibration machine, etc.

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## FREQUENCY, DECIBEL AND „A“ WEIGHTING; NOISE MEASUREMENT TECHNIQUES

(a) An organisation has identified it must measure noise levels in their workplace.

**Give** the meaning of the following terms:

(i) Frequency;

(ii) Decibel (dB);

(iii) 'A' Weighting.

(b) **Identify TWO** types of noise measurement techniques.

Part (a)(i)

Frequency is the pitch of the sound or the way it sounds, is measured in the number of cycles per second and expressed in Hertz (Hz).

Part (a) (ii)

A decibel is a unit of measurement of the intensity of sound, measured on a logarithmic rather than a linear scale.

For (a)(iii),

The „A“ weighting scale is a method of measurement used to match the characteristics of the human ear. The measured sound is filtered so that the sound level meter is less sensitive to very high and very low frequencies.

Part (b),

Noise measurement techniques could include:

1. The use of a hand held meter to carry out spot checks;
2. The use of personal noise dosimeters to give a time weighted average;
3. The use of an octave band or frequency analyser and
4. The use of a pressure meter to measure static sound levels.

## 8.2 - VIBRATION

### VIBRATING HAND HELD TOOLS – HAND HELD GRINDER – HEALTH EFFECTS; CONTROL MEASURES AND SYMPTOMS

In relation to the ill-health effects from the use of vibrating hand-held tools:

(a) **Identify** the health effects associated with exposure to vibration;

An alternative question here may be – Identify the symptoms that the workers may experience due to exposure to the regular use of a hand held grinder.

(b) **Outline** the control measures that may be used to minimise the risk of such effects.

(c) **Identify** the typical symptoms that might be shown by affected individuals

Part (a)

Here you should be able to identify effects such as

- Numbness and blanching of the fingers;
- Swollen and painful joints;
- A reduction in strength, grip and dexterity and in sensory perception;
- Involuntary muscular movement and
- Carpal tunnel syndrome.

Part (b),

A hierarchy of control measures should include such things as:

- Elimination by mechanisation or automation;
- Substituting the tools with lower vibration equipment;
- Reducing the time of exposure of the operatives by providing frequent breaks and/or job rotation; modifying the equipment to improve the grip on the tools;
- Introducing a planned maintenance programme for the tools; providing appropriate personal protective equipment such as gloves to keep the hands warm;
- Introducing a programme of health surveillance
- Providing the employees with information, instruction and training on the hazards associated with the use of the tools and
- The control measures that should be taken.

Part (c)

Typical symptoms which may be experienced can include:

- Numbness and blanching of the fingers
- Swollen and painful joints

- A reduction in strength, grip and dexterity
- Reduction in sensory perception.

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## WHOLE BODY VIBRATION

Drivers of vehicles can be exposed to whole body vibration (WBV).

(a) **Explain** the meaning of WBV.

(b) **Describe** the physical effects of WBV.

(c) **Outline** the control measures that can be taken to reduce the risks from WBV.

Part (a)

Whole body vibration is vibration transmitted to the worker through a contacting or supporting structure such as a seat or floor which is itself vibrating.

Part (b),

The physical effects of whole body vibration would be:

- Fatigue and headache,
- Stomach problems and/or motion sickness,
- Back pain which may result in permanent injury,
- Shakiness shortly after exposure has taken place and
- Insomnia.

Part (c)

The initial measure that should be taken would be to assess the level of exposure and then to consider the appropriate risk controls such as:

- The selection of low vibration vehicles;
- Ensuring good seat design which should be sprung or damped and adjustable;
- The provision, where possible, of level routes for vehicles and ensuring they are kept in good condition;
- Instructing drivers to keep to identified vehicle routes to avoid rough ground
- To adjust the speed of the vehicle to suit ground conditions;
- The provision of a suitable floor surface and footwear;
- Ensuring that vehicles are subjected to regular maintenance
- Their tyres inflated to the correct pressure;
- Limiting exposure of employees by enabling them to take regular breaks and by job rotation;
- Providing information to employees on the risks involved and the precautions to be taken and
- Introducing a programme of regular health surveillance.

## 8.3 - RADIATION

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### RADIATION – DIFFERENCE BETWEEN IONISING AND NON-IONISING

**Identify** the difference between the terms ionising and non-ionising radiation

Ionising radiation is emitted from radioactive materials, either in the form of directly ionising alpha and beta particles or indirectly ionising X- and gamma rays or neutrons. It has a high energy potential and an ability to penetrate, ionise and damage body tissue and organs.

Non-ionising radiation includes ultraviolet, visible light (this includes lasers which focus or concentrate visible light), infrared and microwave radiations. Since the wavelength is relatively long, the energy present is too low to ionise atoms which make up matter.

The action of non-ionising radiation is to heat cells rather than change their chemical composition.

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### IONISING RADIATION - MEANS OF CONTROLLING EXPOSURE

**Outline** the means of controlling exposure to ionising radiation

Time:

- The exposure time of person involved in radiation works shall be kept minimum
- There should be provision for continuous monitoring of the exposure limit and time.

Distance:

- The form of radiation used in industry travel only short distance. People can be kept away by providing barriers, restricted areas and warning signs.
- Other means of control measures are the use of forceps and tweezers to maintain a safe distance

Shielding:

- Most forms of radiation can be stopped by providing a shield appropriate to the radiation type e.g. Alpha particles by a thin paper shield, Beta particles by an aluminium sheet and Gamma rays by thick lead or a concrete wall

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### NON-IONISING RADIATION – OCCUPATIONAL SOURCES AND HEALTH EFFECTS

(a) **Identify TWO** types of non-ionising radiation AND Give an occupational source of each

(b) **Outline** the health effects associated with exposure to non-ionising radiation.

Part a)

- Ultraviolet light (welding or excessive exposure to the sun),
- Visible light (artificial lighting or display screens),
- Infra-red (lasers),

- Microwave (cookers, radar or mobile phones),
- Radio wave (communications transmitter) and
- Electromagnetic radiation (high voltage sources).

Part b)

The health effects associated with exposure to non-ionising radiation will depend on the particular type of radiation.

- Photo-keratitis or arc eye from welding via ultraviolet radiation;
- Retinal burns, corneal damage and cataracts from exposure to infra-red radiation;
- Burns to the skin from exposure to ultra violet or infra-red radiation;
- The heating of, and damage to, skin and internal organs by radio frequencies, particularly microwaves and
- Premature skin ageing and the possibility of skin cancer.

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## IONISING RADIATION –HEALTH EFFECTS

**Identify** the health effects that may be caused by ionising radiation.

The health effects that may be caused by ionising radiation could include:

- Blistering and ulceration of the skin;
- Dermatitis;
- Cataracts;
- Loss of hair;
- Infertility;
- Radiation sickness typically nausea, vomiting and diarrhea;
- Cell damage including genetic mutation;
- Anaemia; and
- Cancer affecting the skin, body organs, and white blood cells (leukaemia).

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## X-RAY FACILITY IN A DENTISTS SURGERY – HEALTH EFFECTS OF EXPOSURE AND PRECAUTIONS

A dental surgery has installed an X-ray facility.

(a) **Identify** the principal health effects associated with exposure to X-ray radiation.

(b) **Outline** the precautions that could be taken to reduce the risks to the operator from exposure to X-ray radiation.

Part (a)

The principal health effects associated with exposure to X-ray radiation include:

- Skin burns,
- Radiation sickness,
- Hair loss,

- Sterility,
- Cataracts,
- Genetic cell damage
- Foetal
- Defects and
- Cancer.

Part (b),

The precautions that might be taken include:

- Operating the machine from a remote location or from behind a screen;
- Reducing the exposure time of the operators;
- Wearing a protective apron;
- Monitoring dose rates together
- Introducing a programme of health surveillance
- Providing information to the operators on the hazards associated with x-ray radiation and the precautions that should be taken.

Any relevant reference to National or Local Ionising Radiation Regulations could assist in gaining additional marks.

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## IONISING RADIATION – TYPES AND CONTROL MEASURES

(a) **Identify FOUR** types of ionising radiation.

(b) **Outline** the main control measures for ionising radiation.

Part (a),

1. Alpha particles,
2. Beta particles,
3. Gamma radiation,
4. X-ray and
5. Bremsstrahlung.

Few candidates mention Bremsstrahlung

Part (b),

The main control measures being:

- Shielding, for example with lead or perspex;
- Segregation by increasing the distance between the source and the person;
- Reducing the duration of exposure by worker rotation;
- Reducing the strength of the source;
- The use of a glove box provided with local exhaust ventilation;

- The use of appropriate personal protective equipment such as an apron; and
- The introduction of procedures for monitoring and health surveillance.

## 8.4 - STRESS

### FACTORS THAT CAN LEAD TO OCCUPATIONAL STRESS

**Outline** the factors that may lead to occupational stress amongst workers.

The basic workplace stressors are:

- The job itself – boring or repetitive, unrealistic performance targets or insufficient training, job insecurity or fear of redundancy
- Individual responsibility – ill-defined roles and too much responsibility with too little power to influence the job outputs
- Working conditions – cramped, dirty and untidy workplace; unsafe practices; lack of privacy or security; inadequate welfare facilities; threat of violence; excessive noise, vibration or heat; poor lighting; lack of flexibility in working hours to meet domestic requirements and adverse weather conditions for those working outside
- Management attitudes – poor communication, consultation or supervision, negative health and safety culture, lack of support in a crisis
- Relationships – unhappy relationship between workers, bullying, sexual and racial harassment.

### STRESS – WORK RELATED CAUSES

Other than those associated with the physical environment, outline EIGHT possible work-related causes of increased stress levels amongst employees.

The possible causes of increased stress levels can be divided into those relating to the job or task, those relating to workplace interactions and those which might be classed as external.

Job factors include:

- Work load or patterns such as shift work, unsocial hours or excessive overtime; repetitive or monotonous work;
- Lack of control either over the way the work is done or when breaks might be taken;
- A lack of understanding of the requirements of the job with no information or training given to employees and no indication of where they should go for help or support;
- Job insecurity and the fear of redundancy particularly at times of organisational change.

Workplace interactions involve such issues as:

- The level of supervision provided which might be oppressive or insufficient, harassment,
- Bullying,
- Discrimination,
- Fear of violence,
- Poor communication with work colleagues.

There are also a range of external personal and social factors such as:

- Illness,
- Financial worries,
- Family commitments

These could increase an employee's level of stress at work, even if some may not be directly work related.

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## NIGHT WORKING – FACTORS TO BE CONSIDERED

**Outline** the specific factors that should be considered when assessing risks to employees working on night shifts

There are a range of specific factors that need to be taken into consideration when looking at persons expected to work on a night shift including:

- Frequency of shift changes – what is the shift pattern
- Level of supervision
- The fitness of persons expected to work during such periods
- Adequate time between shift changes (if on rotating shifts)
- Availability of first aid arrangements and other emergency contingencies
- Temperature control
- Security arrangements are suitable and sufficient as the risk of crime may be higher
- Access to specialist advice and guidance
- Transportation to and from the place of work