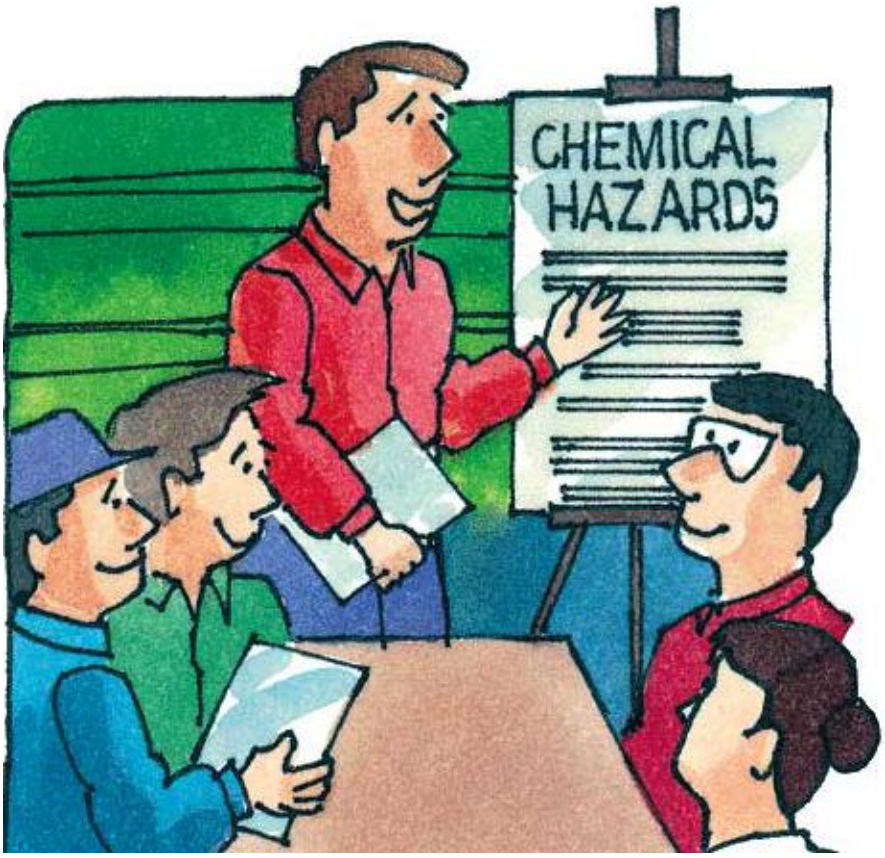
Section 2
Health and Safety Hazards, Risks and Controls



After completing this section, the learner will be able to:

- Identify existing and potential health hazards and safety hazard in a familiar work or learning environment including who could be affected by the hazard and how.
- Group hazards by type, including physical, electrical, mechanical, chemical, psychological and work related musculoskeletal disorders (WMSDs).

Health and safety hazards, risks and controls

Vocabulary

Look up explanations for the keywords below.

assessment	**categories**	**chemical**	**comply**
comprehensive	**comprehensive**	**controls**	**documentation**
electrical	**eliminate**	**ergonomic**	**health hazards**
inflammation	**mechanical,**	**occupational**	**physical**
potential	**prevent**	**prevention**	**probability**
psychological	**preventative measures**	**safeguard**	**work-related musculoskeletal disorders (WMSDs)**

Abbreviations
WMSDs = Work-related musculoskeletal disorders
WRULDs = Work-related neck and upper limb disorders

Health and safety hazards, risks and controls

In this section of the manual, we will look at the following topics:

- ✓ Hazards
- ✓ Risks
- ✓ Controls
- ✓ Risk assessments
- ✓ Safety statements

Some facts

Fact: More accidents occur around 11am than at any other time of the day.
Fact: 565 people died as a result of work-related accidents of the eight years 2000 to 2008.
Fact: The biggest cause of workplace deaths in 2008 was 'fall, collapse or breakage of materials.' (HSA, 2008)

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Hazards

What is a hazard? A hazard is anything that can cause harm.

Hazards can be categorised as follows.

- Physical
- Health
- Chemical
- Biological

Physical hazards

Physical hazards are the most common types of hazards. They occur in most workplaces at one time or another. They include unsafe conditions that can cause injury, illness and death. They are anything that can harm the body without necessarily touching it.

Some common physical hazards, often the causes of accidents, are:

- ✓ Manual handling (*for example, heavy, awkward or hard-to-reach loads, handling patients, or treating farm animals*)
- ✓ Slipping/tripping hazards (*for example, poorly maintained floors, passageways or stairs*)
- ✓ Falling from a height (*for example, from mezzanine floors or scaffolding*)
- ✓ Being struck by material falling from above
- ✓ Being caught or cut by machinery, especially moving parts of machinery (*for example, blades or rollers, power take-off shafts on tractors or farm machinery*)
- ✓ Equipment (*poorly-maintained or if guards have been disabled*)
- ✓ Being struck by internal transport (*fork-lifts*) or external transport (*delivery trucks at loading bays*)
- ✓ Introduction of new machinery or work systems
- ✓ Fire (*from flammable or combustible materials, hay, waste* material)
- ✓ Ejection of material (*for example, plastic moulding or woodworking machines)*
- ✓ Electricity (*poor wiring or not being protected by residual current devices*)
- ✓ Maintenance of equipment and the workplace itself (*for example, the roof, windows or gutters*)
- ✓ Injury by another person or an animal
- ✓ Hot substances or surfaces
- ✓ Hand tools (*can cause noise or eye injury, or electrocution*)
- ✓ Poor housekeeping
- ✓ Burial in trenches or by loose material such as grain or soil
- ✓ Suffocation by drowning or from exposure to carbon monoxide (*for example, from portable generators*)

Health hazards

Health hazards are hazards that result in the **development of disease**. They can include the following,

- ✓ Negative stress (*from, for example, poor work organisation or repetitive strain*)
- ✓ Noise (*for example, if people have to raise their voices to be heard*)
- ✓ Harmful dusts (*from, for example, grinding*)
- ✓ Unsuitable lighting levels
- ✓ Some types of light (*for example, over-exposure to ultra-violet light can cause skin cancer*)
- ✓ Vibration (*for example, from pneumatic rock or concrete breakers or drills*)
- ✓ Sources of radiation
- ✓ Temperature extremes
- ✓ Injury through poor design of tasks or machinery
- ✓ Radiation hazards including naturally occurring radon

Ergonomic hazards are a specific type of health hazard. Ergonomic hazards occur when the type of work, body position and working conditions put strain on the body. They are the hardest to spot since it's not always possible to notice the strain or the harm these hazards pose. Short-term exposure may result in 'sore muscles', but long-term exposure can result in serious long-term injuries.

Ergonomic hazards include the following:

- Poor lighting
- Improperly-adjusted workstations and chairs
- Frequent lifting
- Poor posture
- Awkward movements, especially if they are repetitive
- Repeating the same movements over and over
- Having to use too much force, especially on a frequent basis

Learn more about ergonomics in Section 4, **Ergonomics Made Simple.**

Chemical hazards

Chemical substances are used in nearly all organisations. The HSA Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 lists several hundred dangerous chemical agents. They range from common everyday products such as glues to industrial solvents, dyes, pesticides or acids.

Manufacturers and suppliers are legally required to provide material safety data sheets, which give information on the safety and health risks of any chemical substances. Regulations also require certain chemicals to be labeled according to their hazards.

To identify chemical hazards and assess their risks, data is required on at least the following.

- ✓ Immediate problems (*acute toxic effects or catching fire*)
- ✓ Long-term effects of exposure on health (*cancer-causing*)
- ✓ Likelihood of explosion
- ✓ Likelihood of skin problems (*skin irritation or dermatitis*)
- ✓ Likelihood of chest problems (*respiratory irritation or asthma*)

Special care needs to be given to the following-

- ✓ Liquids like cleaning products, paints, acids, solvents - especially chemicals in any unlabeled container
- ✓ Vapours and fumes, for instance those that come from welding or solvents
- ✓ Gases like acetylene, propane, carbon monoxide and helium
- ✓ Flammable materials like gasoline, solvents and explosive chemicals

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

There are different laws around the world on how to identify the hazardous properties of chemicals (*called 'classification'*). Different laws also exist on how information about these hazards is provided to users (*through labels, and safety data sheets for workers*).

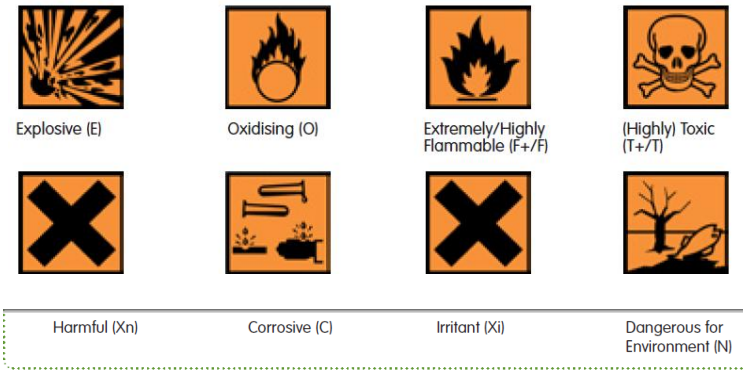
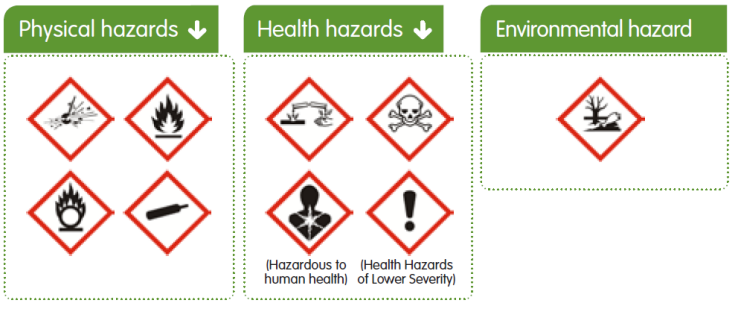
This can be confusing because the same chemical can have different hazard descriptions in different countries. For example, a chemical could be labelled as 'toxic' in one country, but not in another.

The UN brought together experts from different countries to create the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

The aim of the GHS is to have worldwide identical

- ✓ criteria for classifying chemicals according to their health, environmental and physical hazards
- ✓ hazard communication requirements for labelling and safety data sheets
- ✓ one label worldwide for the one chemical.

A new design has been created for the existing hazard symbols. This table displays a selection of the old symbols and a selection of the new versions.

	**Current EU hazard symbols**
	**New GHS symbols**

Activity

What is the new 'globally harmonised system'? List the advantages and disadvantages of the new system.

_____

_____

_____

_____

_____

_____

_____

Biological hazards

Biological hazards include:

- ✓ viruses and bacteria that can cause infection
- ✓ substances from plants or animals that can lead to other health problems.

These hazards are likely to occur in places such as laboratories, hospitals, farms or abattoirs. Possible results include the following.

- ✓ Tuberculosis from contact with infectious cases
- ✓ Brucellosis
- ✓ Farmer's lung, caused by spores from mouldy hay
- ✓ Hepatitis from unprotected handling of infected body fluids or waste

Spot the Hazard

There are several safety hazards in the three Activity boxes below. Clearly circle each one and complete the table.

Activity

Hospitality

No.	What is the hazard?	Possible harm
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Activity

Retail

No.	What is the hazard?	Possible harm
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Activity

Kitchen

No.	What is the hazard?	Possible harm
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Activity

Look at several other workplace photographs to check for health and safety hazards at:

http://www2.worksafebc.com/Publications/Multimedia/photos.asp.

Activity

Here is a list of hazards that can be present in the workplace. Arrange and list them in their appropriate categories in the table below.

- ✓ High noise levels
- ✓ Asbestos
- ✓ Fungi
- ✓ Wood dust
- ✓ Paint
- ✓ X-rays
- ✓ Bullying
- ✓ Alcohol
- ✓ Wet floor
- ✓ Hot oven
- ✓ Hair colouring
- ✓ Heavy boxes
- ✓ Stress
- ✓ Violence
- ✓ Working at a height
- ✓ Poorly-erected scaffolding
- ✓ Over-loaded electrical devices
- ✓ Detergents
- ✓ Trailing cables
- ✓ Chemicals
- ✓ Poor light

Physical hazard	Health hazard	Chemical hazard	Biological hazard

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Activity

Consider hazards that may exist in a workplace for the following.

- ✓ A pregnant worker
- ✓ A blind worker
- ✓ A student on work experience
- ✓ A family carer

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Activity

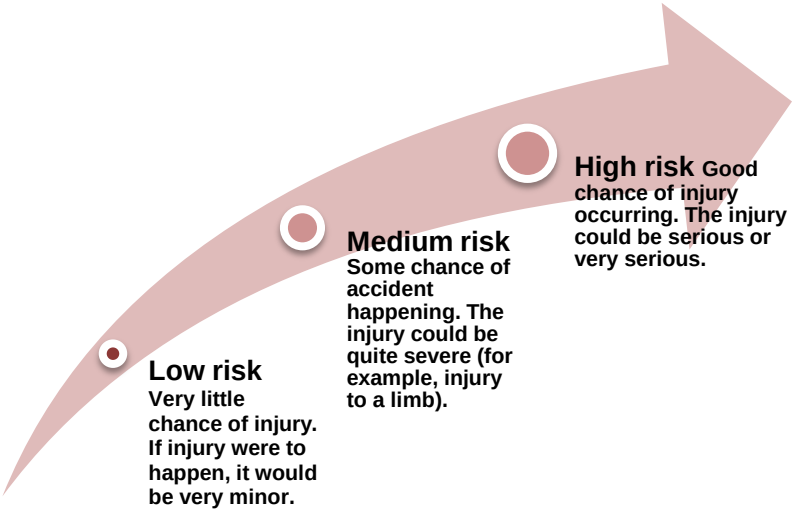
Identify who is responsible (*employer, employee (me) or nobody*) for creating the hazard in each of the cases listed in this table. Mark your choice with a check. In some cases, more than one person may be responsible.
The first line is completed.

Hazard	Who is responsible?		
	Me	Employer	No one
Untidy workplace	✓	✓	
Poor storage of equipment			
Violence at work			
Poor judgment leading to mistakes			
Not understanding instructions			
Not following instructions			
Poor Light			
Poor supervision			
Not concentrating			
Using faulty equipment			
Messing about			
Careless handling or lifting			
Unsuitable hair style, clothing or jewellery			
Too much noise			
Not enough training			
Poor health			
Not enough space to work			
Criminal damage/vandalism			
Personal Protective equipment or clothing (PPE) not used or not worn			

Risks
A risk is the likelihood of harm occurring.

Risk ratings
Risks can be divided into three categories.

- ✓ Low
- ✓ Medium
- ✓ High



Measuring risk

Risk refers to the likelihood of a hazard resulting in an actual injury. In the workplace it is necessary to consider the probability and possible seriousness (*severity*) of an injury occurring through exposure to a hazard. This helps in deciding which risks need immediate attention. Risks with the highest ratings need to be dealt with first.

Risk can be measured by using the following formula.

Risk = Likelihood X severity of the potential injury X number of people exposed

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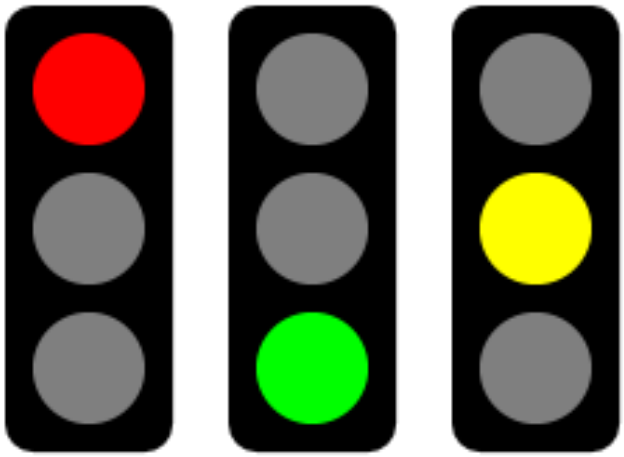
Some people like to measure risk numerically by using this formula.

	Unlikely	Likely	Very likely
Likelihood	**1**	**2**	**3**
Severity of the potential injury	**1**	**2**	**3**
Number of people exposed	**1**	**2**	**3**

Using this formula, you can see that answers will range from a minimum risk of 1 to a maximum of 27.

Other people measure risk by using the traffic light system.



High **Low** **Medium**

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Example
A catering company kitchen has a working team of 10 people. The kitchen has two meat-slicing machines that have sharp knives and blades. Most of the team use these machines at some point. An injury resulting from contact with these blades could be very severe.

In this case, the risk ratings would be as follows:

Likelihood = Likely = 2
Severity of the potential injury = Very likely = 3
Number of people exposed = Very likely = 3

The calculation is then:

Risk = 2 x 3 x 3 = 18 - This is a **medium** risk rating.

Activity

Calculate the risk in this scenario.

John is a roof repairs contractor. His work involves use of a ladder every day.

Likelihood =
Severity of the potential injury = Number of people exposed =

Calculation of risk in this situation =

Activity

List hazards that can occur in your workplace and the actions to take to prevent them occurring.

Hazards	Action to take

Controls

Having identified the hazards that exist in many workplaces and the risk of injury from these hazards, "**controlling risk"** will focus on reducing the risk of injury.

What are controls? Controls are measures put in place to remove or minimize a risk.

Control involves removing or avoiding hazards altogether. In many cases, however, it is not practical to remove a hazard: instead, measures have to be put in place to minimise the risk occurring.

There are five key steps to keep in mind when planning to reduce or eliminate a risk.

1. Remove the risk altogether, where possible
2. Calculate the level of risk that exists
3. Immediately, take corrective action that reduces the risk:

    a. Adapt the work to the individual
    b. Make changes to the work area
    c. Replace dangerous items
    d. Look after everyone and not just the individual

4. Develop a safe policy relating to the risk identified
5. Provide training or instruction and, where appropriate, provide personal protective equipment.

The logic is to take immediate action: first to remove or minimise the risk, then to consider the long-term solution.

Training is very important but comes last in the list, since all other controls must be put in place before time is spent training staff.

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Activity

In the table below, list activities you carry out in your workplace which have some risk of injury. List the associated hazard(s), the risk level and the controls. The table has two examples.

Activity	Hazard	Risk	Controls
Using a PC	✓ Eye trouble Muscular pain ✓ Electrocution ✓ Headaches Stress ✓ Obsession	✓ Low risk (minor discomfort likely, unless used excessively)	✓ Use for short period only ✓ Take frequent breaks ✓ Adjust chair, desk and VDU heights ✓ Wear glasses if required ✓ Adjust VDU controls ✓ Consider room lighting
Cutting meat on slicer	✓ Cuts ✓ Electrocution ✓ Eye injury	✓ Low risk	✓ Ensure guards are fitted ✓ Ensure electrics meet approved standards

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Risk assessment

All employers must carry out risk assessments for each activity that occurs on their premises. A risk assessment is a comprehensive examination of all aspects of a task or area of work.

To carry out a risk assessment, do the following.

- ✓ Identity all hazards *(that is, anything that has the potential to cause harm, in terms of human injury or ill-health)*
- ✓ Assess the risk that arises from each hazard
- ✓ Consider how to eliminate or reduce that risk
- ✓ Write a comprehensive plan of action to control the hazard.

For example, a risk assessment of a joinery workshop should include these questions.

Are workers trained to use all the machines and chemicals? ☐
Has each machine got adequate safeguards in place? ☐
Can the machine instructions be clearly seen? ☐
Are machines inspected on a routine basis? ☐
Are workers exposed to high levels of noise over long periods of time? ☐
Do machines vibrate to such an extent as may cause harm? ☐
Are workers trained in manual-handling techniques? ☐
Are all electrically-driven machines safely wired? ☐
Are electrical cords and cables in good condition and in a safe place? ☐
Is the dust-extraction system adequate? ☐
Are chemicals properly labelled and stored? ☐
Is all PPE available and in good condition? ☐

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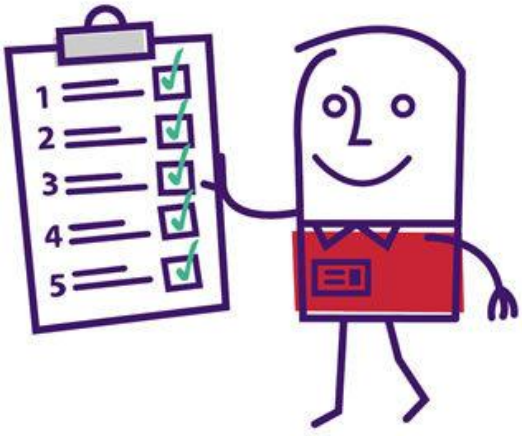


Activity

Divide into groups. Each group takes **one** of the scenarios below. Read your scenario, answer the risk assessment table and report to full group.

1. Identify what the hazard is and why

- Who was at risk?
- Who acted responsibly?
- What was the control/action required?

Scenario1

An employee tells her supervisor that there are exposed wires at the back of the microwave in the staff kitchen. The supervisor fails to report this to the manager. Two days later another employee receives an electric shock while using the microwave.

Scenario 2

An employee tells his boss about a slippery surface on the steps leading to the storeroom. The cause seems to be worn floor-tiles. The employer moves the employee to a different task in another area of the plant. The employer does not fix the problem.

Scenario 3

You are asked to collect a box containing 'some cleaning stuff' from the storeroom downstairs. You are told the containers are in unmarked boxes 'somewhere' on one of the top shelves. After much difficulty, you find the boxes and bring them back to the office.

Scenario 4

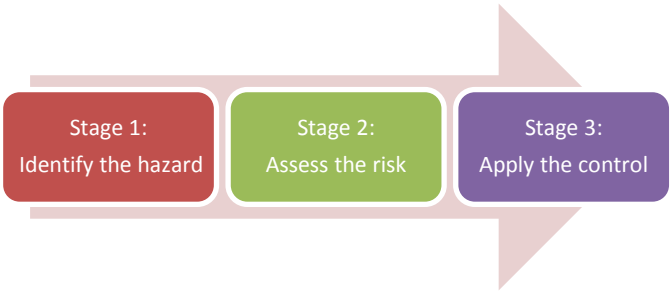
A student on work experience in a farm equipment store is asked to hop on to a forklift truck. He has to move it three metres out of the way before a delivery van arrives. The student is not trained to drive a forklift.

Scenario	Hazard	Who is at risk?	Who acted responsibly?	Action Required
1				
2				
3				
4				

Safety statements

*The Safety, Health and Welfare at Work Act 2005 state that all employers must complete **a safety statement**. A safety statement is a report of all the hazards and risks identified in the workplace, as well as the actions that the company intends to take to control risks. It is a record of what the company intends to do to provide a safe environment for its workers and all others in contact with the company*.

The stages involved in putting controls in place are illustrated here.



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It is most important that the safety statement is about ACTION. Writing the safety statement is not the key focus. What matters most are the actions taken, as detailed in the statement.

The following are the steps for writing up and acting on a safety statement.

- ✓ Consider the legislation that applies to the workplace
- ✓ Identify the hazards
- ✓ Assess the levels of risk
- ✓ Decide the controls to be taken
- ✓ Take action immediately to eliminate the risk
- ✓ Record in writing all observations, actions and decisions
- ✓ Review progress made
- ✓ Make further changes as the need arises

What should be in a safety statement?
A safety statement should:

- State the hazards and risks in the workplace and the safeguards to be taken
- State the duties of employees in relation to health and safety
- State the names and job titles of everyone responsible for a health and safety task
- State the procedures for appointing a safety representative
- State the procedures to follow if there is an emergency
- Show all emergency routes clearly
- Be written in a form, manner and language that will be understood by all
- Have regard to the relevant safety and health legislation

Activity

Go to www.hsa.ie. Look up the definition of a safety statement. Using your own words, give a description of a safety statement.

_____

_____

_____

_____

Activity

A. Go to: www.hsa.ie, enter 'Safety statement video' in the Search bar, and play the video clip called The Safety Statement.

   The video shows how to prepare a safety statement.

B. Go to: http://www.besmart.ie/ and register (*registration is free*).
   Use this online tool to generate a full safety statement for your workplace.

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Health and safety hazards, risks and controls – Worksheet 1 – Hazards and hazard ratings

A. In this scenario, you are working in an office. You sit at a computer for most of the day. Using the table below:

1. List all the hazards on and around your desk in the office.
2. Say whether each hazard is:

    a. Likely to cause injury (high risk)
    b. Could possibly cause injury (medium risk)
    c. Very unlikely to cause injury (low risk)

3. Calculate a numerical value for each risk.

Hazard	High risk	Medium risk	Low risk	Numerical value

B. You are working as a dental assistant. Using the table below:

1. List all the hazards on and around your desk in the office.
2. Say whether each hazard is:

    a. High risk - Likely to cause injury
    b. Medium risk - Could possibly cause injury
    c. Low risk - Very unlikely to cause injury

3. Calculate a numerical value for each risk.

Hazard	High risk	Medium risk	Low risk	Numerical value

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Health and safety hazards, risks and controls – Worksheet 2 – Calculating risk

Numerically calculate the risk for each of these activities.

1. **Rock climbing**

Your calculation:

2. **Chemical spillage on a busy road**

Your calculation:

Health and safety hazards, risks and controls – Worksheet 3 – True or false?

Are the following statements true or false? Tick the correct box for each statement.

		True	False
1	The most frequently injured part of the body (*in workplace accidents*) is the back.		
2	Slips, trips and falls are the least-common type of workplace accident.		
3	Most workplace accidents occur after dark.		
4	Workers in the 54-65 age groups have the highest injury rate in workplace accidents.		
5	Ireland does not have any laws that forces employers to provide a safe working environment for workers.		
6	Manual handling causes almost one-third of accidents in the workplace.		
7	Most fires occur in the home.		
8	Male workers suffer higher rates of injury in every sector of employment except education.		
9	In accidents involving fire, most deaths are from burns.		
10	Over half a million workdays are lost each year in Ireland due to workplace injuries or illnesses.		
11	Three sectors – construction, agriculture and fishing (including hunting and forestry) – accounted for over half of the annual number of work-related fatalities in 2008.		
12	The maximum penalty for breaches of health and safety law is €2m and/or one year in prison.		

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Health and safety hazards, risks and controls – Worksheet 4 – Vocabulary (*a*)

1. Fill in the missing words in the sentences below using the words in the box.

occupational	cause	injure	dangerous	hazard	problems

a. Lifting weights is a hazard because you can _____ your back.
b. Machinery is a _____ at work because you can lose control of it.
c. Working at a height can be _____ because falls can be very serious.
d. Wood dust and some types of spray paint can be an _____ hazard, leading to conditions like asthma.
e. Chemicals in certain products can cause skin _____ such as dermatitis.
f. High noise-levels can _____ hearing loss in people who work in sectors such as construction, in factories or in the entertainment industry.

Health and safety hazards, risks and controls – Worksheet 5 – Vocabulary (*b*)

1. Fill in the missing words in the paragraph below.

The Safety, Health and Welfare at Work Act 2005 states that all _____ must complete a safety statement. This is a report of all the _____ and _____ identified in the workplace, as well as the actions that the company intends to take to control risks. It is a _____ of what the company intends to do to provide a safe _____ for its workers and all others in contact with the company.

2. Explain the following terms.

Identify

_____

_____

Monitor

_____

_____

Consultation

_____

_____

Numerical

_____

_____

Occupational

_____

_____

Health and safety hazards, risks and controls – Worksheet 6 – Safety statement activity (*a*)

In a group, create your own safety statement for your workplace. Carry out a risk assessment and then complete the table below.

This safety statement highlights the importance of health and safety in _____ (*Name of your workplace*). We want to protect ourselves from accidents and injury while at work. We promise to be safety-conscious, act responsibly, follow instructions and accept directions when given. We will check and revise this statement regularly.

Examples of hazards	Injury risk	Actions/controls needed
Faulty socket	Electric shock	Report the fault
Horseplay		
Bullying		
Litter		

Signed: _____

Health and safety hazards, risks and controls – Worksheet 7 – Safety statement activity (*b*)

1. Whom does a safety statement protect?

_____

_____

2. What sort of activities does the safety statement cover?

_____

_____

3. List four things that should be in a safety statement.

_____

_____

_____

_____

4. Whose responsibility is it to complete a safety statement?

_____

_____

5. What is the difference between each of these pairs of words?

Risks and safeguards

_____

_____

Actions and procedures

_____

_____

Health and safety hazards, risks and controls – Worksheet 8 – Word search

Find the 11 words listed in this word search.

y	c	y	c	n	e	g	r	e	m	e	b	g	w
n	i	y	n	w	p	s	l	o	w	l	g	r	r
w	m	k	s	i	r	y	r	y	z	w	m	p	a
p	h	x	c	o	n	t	r	o	l	s	y	y	n
q	y	g	y	d	s	t	a	t	e	m	e	n	t
f	t	r	i	c	d	u	c	q	l	p	g	a	l
o	e	q	y	h	q	g	w	d	w	w	r	s	m
n	f	k	u	x	n	l	e	o	s	y	k	v	h
a	a	p	r	o	c	e	d	u	r	e	q	c	a
z	s	z	q	a	b	p	d	l	l	v	r	s	z
w	t	n	e	m	s	s	e	s	s	a	s	l	a
u	t	y	f	i	t	n	e	d	i	g	m	m	r
o	y	i	w	x	l	c	z	r	k	f	l	q	d
w	k	p	g	v	q	r	w	b	j	z	y	y	y

assessment
controls
emergency
hazard
high
identify
low
procedure
risk
safety
statement