

TWENTY FIRST CENTURY
science

Module P3

RADIOACTIVE MATERIALS

Practice test

FOUNDATION

Name:.....

Form/teaching set:.....

Answer all of the questions.

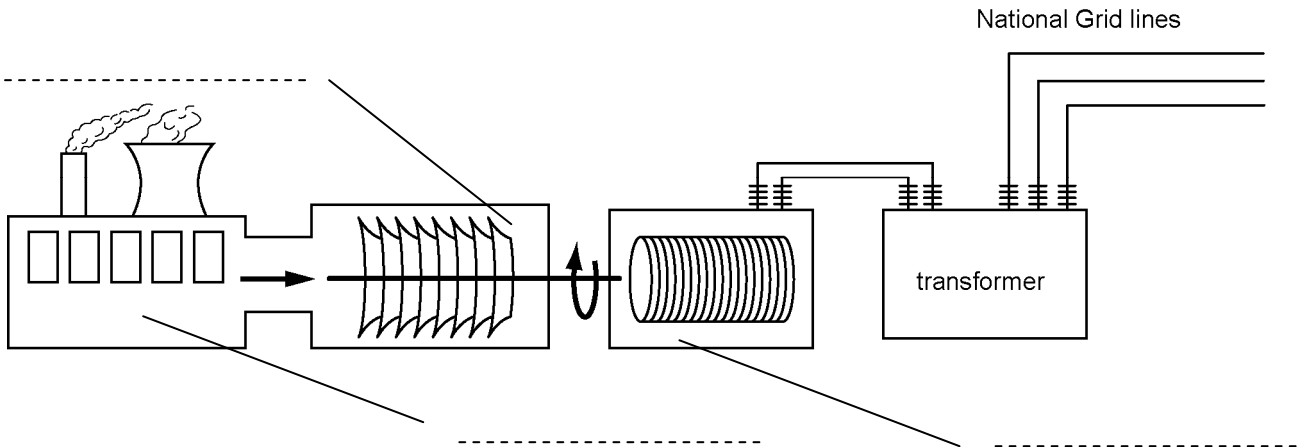
Write your answers in the spaces provided on this paper.

1 Many power stations use fuel to release energy.

(a) Finish labelling the block diagram of a power station to show how it generates electrical energy.

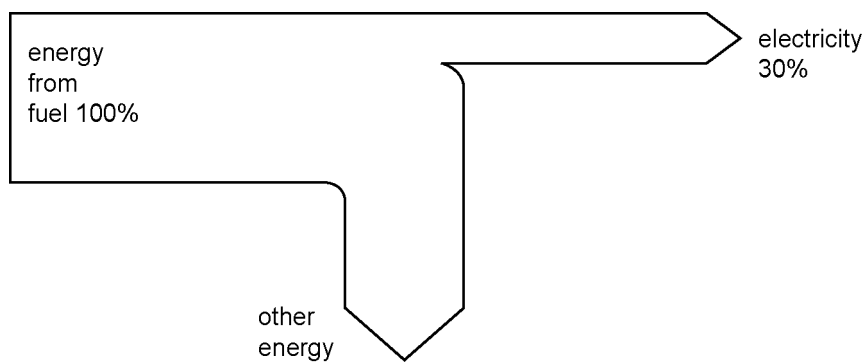
Choose words from this list.

boiler **generator** **motor** **turbine**



[3]

(b) The diagram below shows how some of the energy is wasted during these transfers.



(i) What percentage of energy is wasted?

[1]

(ii) Some power stations burn carbon fuels.

They produce a gas which causes to global warming.

What is the name of the gas?

.....

[1]

(c) Nuclear power stations use nuclear fuel.

Complete this sentence.

Choose the **best** word from the list.

boiler nucleus power station

A nuclear fuel releases energy because of changes in

the of the atom.

[1]

(d) Write down the names of two renewable sources of energy that can be used to generate electricity.

1

2

[2]

[Total marks: 8]

- 2 Read the passage below and use the information in it to help you answer the questions.

The UK Government discusses nuclear power

Some Members of Parliament (MPs) talk to the Secretary of State for Trade and Industry (SS).

MP1: This country should not rely on other countries for energy.
We need some new nuclear power stations.

SS: We may need to build some extra nuclear power stations in order to meet our carbon targets.

MP2: We cannot decide what to do about nuclear power until we have a reliable estimate for the cost of dealing with the radioactive waste.

SS: The committee on radioactive waste will tell us that.

MP3: The waste from a nuclear power station is processed. Did you know that in one place there was a leak of highly radioactive liquid when the waste was being processed?

SS: The leak was held safely inside a second container, which was specially designed for safety in case a leak occurred.

We think carefully about safety, waste, and cost before we decide to build new nuclear power stations. The public need good information about these important issues.

MP4: We still need to find a permanent site for radioactive waste.

- (a) (i) There is a risk of leakage when processing nuclear waste.

Put a **ring** around the phrase in the passage which describes how this risk was controlled.

[1]

- (ii) Which MP describes a risk from radioactive waste?

Put a **ring** around the one correct MP.

MP1 **MP2** **MP3** **MP4**

[1]

- (iii) Which MP talks about the country's energy needs?

Put a **ring** around the one correct MP.

MP1 **MP2** **MP3** **MP4**

[1]

(b) A nuclear power station has operated for 5 years with no accidents involving radioactive materials.

Put a tick (✓) in the box next to the correct statement.

It cannot be made completely safe.

It is due to have an accident very soon.

It will be another 5 years before it has an accident.

It will never have this type of accident.

[1]

(c) When a waste disposal site is found, some groups of people will benefit but others will face an extra risk.

(i) Put a tick (✓) in the one correct box for the group of people who will benefit.

Members of Parliament

people living near the site

power station engineers

the country's population

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

[1]

(ii) Put a tick (✓) in the one correct box for the group of people who will face an extra risk.

Members of Parliament

people living near the site

power station engineers

the country's population

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

[1]

[Total marks: 6]

3 (a) Anna's teacher is showing the class an experiment about radioactive materials.

Which word is used to describe the radiation given off by radioactive materials?

Put a tick (✓) in the box next to the correct word.

infrared

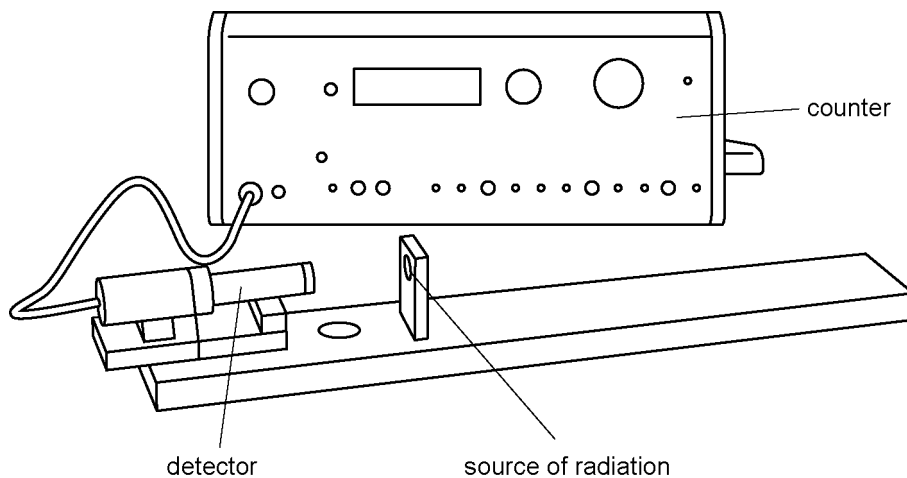
ionising

microwave

ultraviolet

[1]

(b) The diagram shows some equipment which counts the amount of ionizing radiation it detects.



The teacher switches it on. It starts to count **before** the radioactive source is brought near.

Put a tick (✓) in the box next to the **best** explanation.

The equipment is faulty.

There are radioactive elements in the environment.

The teacher had it on the wrong setting.

[1]

(c) The teacher shows the class some radioactive sources.

Each source can penetrate some materials but not others.

Join the boxes to show which materials can be penetrated by each type of radiation.

alpha

1 mm thick aluminium
but not 1 mm thick lead

beta

several cm of lead

gamma

thin paper but not 1 mm thick
aluminium

[2]

(d) The table shows the half-life value of some radioactive elements.

radioactive element	half-life
oxygen-15	2 minutes
fluorine-18	2 hours
iodine-131	8 days
cobalt-60	5 years
carbon-14	5000 years

(i) Which radioactive element loses its activity most quickly?

.....

[1]

(ii) Which radioactive element will be most radioactive in 1000 years time?

.....

[1]

[Total marks: 6]

[Total marks for test: 20]

TWENTY FIRST CENTURY
science

Module P3

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Practice test

HIGHER

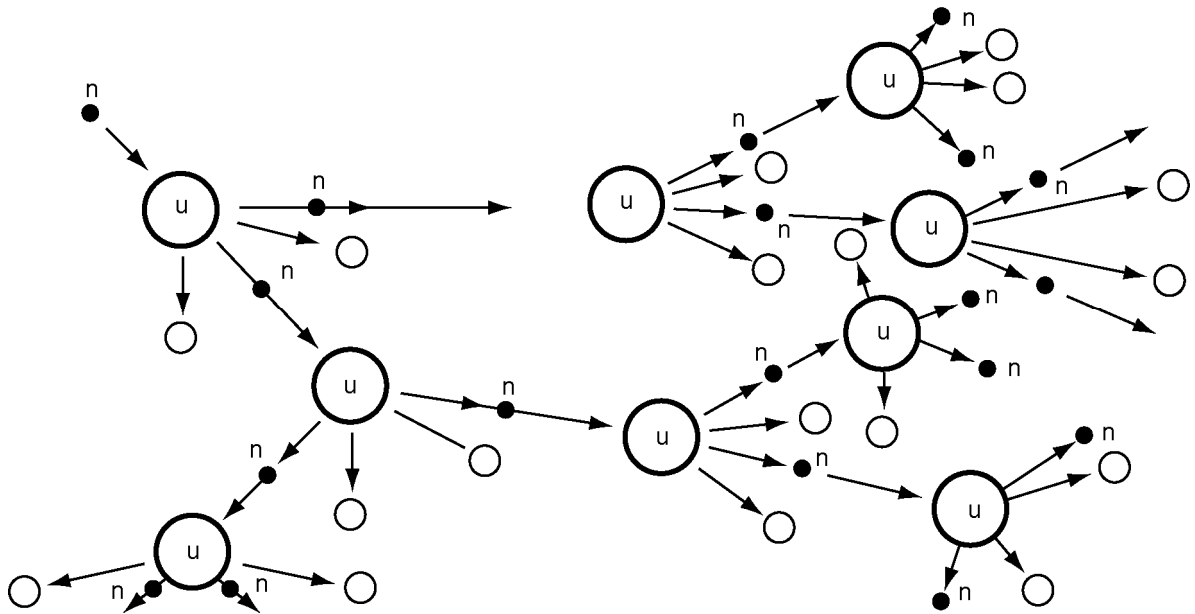
Name:.....

Form/teaching set:.....

Answer all of the questions.

Write your answers in the spaces provided on this paper.

1 (a) The diagram illustrates a chain reaction in a nuclear power station.



Complete the sentences to describe the process.

Choose the **best** words from the list.

- atoms energy fission fusion**
nucleus neutrons stable unstable

When a nuclear fuel releases energy, changes happen in the

The **uranium** nucleus is large and

It splits into two smaller parts and releases and

This process is called nuclear [5]

(b) Write down the names of two renewable sources of energy that can be used to generate electricity.

1

2 [2]

[Total marks: 7]

- 2 Read the passage below and use the information in it to help you answer the questions.

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Some Members of Parliament (MPs) talk to the Secretary of State for Trade and Industry (SS).

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We need some new nuclear power stations.

SS: We may need to build some extra nuclear power stations in order to meet our carbon targets.

MP2: We cannot decide what to do about nuclear power until we have a reliable estimate for the cost of dealing with the radioactive waste.

SS: The committee on radioactive waste will tell us that.

MP3: The waste from a nuclear power station is processed. Did you know that in one place there was a leak of highly radioactive liquid when the waste was being processed?

SS: The leak was held safely inside a second container, which was specially designed for safety in case a leak occurred.

We think carefully about safety, waste, and cost before we decide to build new nuclear power stations. The public need good information about these important issues.

MP4: We still need to find a permanent site for radioactive waste.

- (a) (i) There is a risk of leakage when processing nuclear waste.

Put a (ring) around the phrase in the passage which describes how this risk was controlled.

[1]

- (ii) Which MP describes a risk from radioactive waste?

Put a (ring) around the one correct MP.

MP1 **MP2** **MP3** **MP4**

[1]

- (iii) Which MP talks about the country's energy needs?

Put a (ring) around the one correct MP.

MP1 **MP2** **MP3** **MP4**

[1]

(b) A nuclear power station has operated for 5 years with no accidents involving radioactive materials.

Put a tick (✓) in the box next to the correct statement.

It cannot be made completely safe.

It is due to have an accident very soon.

It will be another 5 years before it has an accident.

It will never have this type of accident.

[1]

(c) When a waste disposal site is found, some groups of people will benefit but others will face an extra risk.

(i) Put a tick (✓) in the one correct box for the group of people who will benefit.

Members of Parliament	<input type="checkbox"/>
people living near the site	<input type="checkbox"/>
power station engineers	<input type="checkbox"/>
the country's population	<input type="checkbox"/>

[1]

(ii) Put a tick (✓) in the one correct box for the group of people who will face an extra risk.

Members of Parliament	<input type="checkbox"/>
people living near the site	<input type="checkbox"/>
power station engineers	<input type="checkbox"/>
the country's population	<input type="checkbox"/>

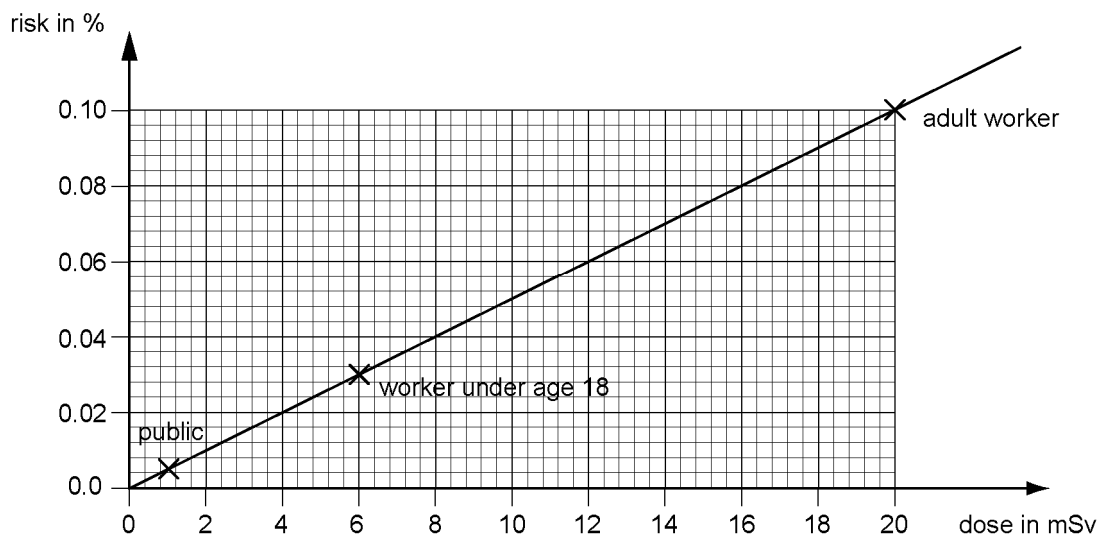
[1]

[Total marks: 6]

- 3 Chris is a health scientist in a nuclear power station. All the workers are monitored to check their radiation dose.

This chart shows how risk is related to radiation dose.

It also shows the **annual dose limits** in millisieverts (mSv) for different categories of people.



- (a) (i) Chris interviews some school-leavers aged 16 for a job in the power station.

What is the annual dose limit for someone aged 16?

..... mSv

[1]

- (ii) How does Chris know what radiation dose has been received by each worker?

Put a tick (✓) in the box next to the correct statement.

Each worker wears a monitoring device.

He asks each worker.

He uses a radiation detector tube.

The dose is estimated from the hours worked.

[1]

(b) At the interview Chris asks the teenagers about the risks due to the radioactive material.

Read each reply.

- (i) If the reply is about **actual risk**, write AR next to it.
- (ii) If the reply is about **perceived risk**, write PR next to it.
- (iii) If the reply is about a **Government regulations**, write GR next to it.
- (iv) If the reply is about the **precautionary principle**, write P next to it.

My Nan says it's too dangerous to come here every day. _____

Rachel

There are some rules that control the risk at an acceptable level. _____

Adam

In this country we could choose to use coal because the risk from nuclear fuel is too great. _____

Sohaib

Even the office workers are wearing monitoring devices. _____

Becky

[3]

(c) Chris explains that procedures are followed to reduce the risk to an acceptable level.

Who decides on the acceptable risk level?

Put a tick (✓) in the box next to the correct answer.

the government, based on scientific data

the management, based on recent costs and profits

the supervisor, based on which job needs doing

[1]

(d) What is meant by the ALARA principle?

Put a tick (✓) in the box next to the correct statement.

A risk assessment has to be done.

Risks must be reduced to the lowest level that allows the work to be done.

There must be some procedure to control risk.

The work must be made perfectly safe.

[1]

[Total marks: 7]

[Total marks for test: 20]