

Tuesday 31 January 2012 – Morning

**GCSE GATEWAY SCIENCE
ADDITIONAL SCIENCE B**

B624/01 Unit 2 Modules B4 C4 P4 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

Duration: 1 hour

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **28** pages. Any blank pages are indicated.

EQUATIONS

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

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Question 1 begins on page 4.

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Answer **all** the questions.

Section A – Module B4

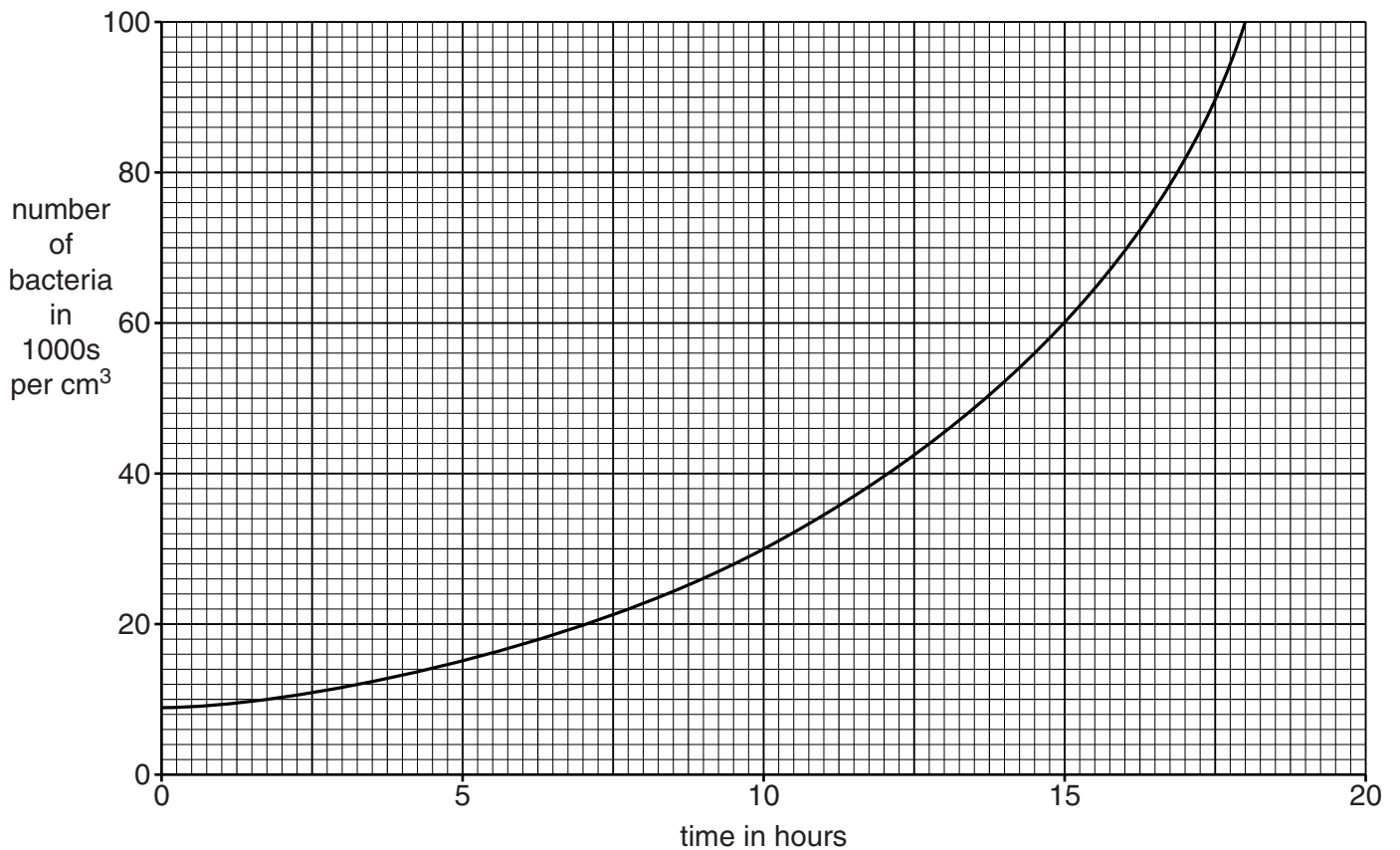
- 1 This question is about decay and food preservation.



Apricots are fruits.

Apricots decay when bacteria and fungi feed on them.

- (a) The graph shows the growth of bacteria at 25°C.



- (i) How many times bigger is the number of bacteria after 15 hours compared to the number of bacteria after 10 hours?

..... [1]

(ii) The temperature affects the rate of decay.

If the temperature was changed from 25°C to 30°C, would the new line plotted be

- **above**
- **below**
- **on the same line**

as the line already plotted?

answer [1]

(b) Apricots can be preserved by drying them.

Complete the sentences.

Drying apricots removes from the fruit.

This preserves the fruit by the rate of decay.

[2]

(c) Farmers can use pesticides to prevent apricots decaying.

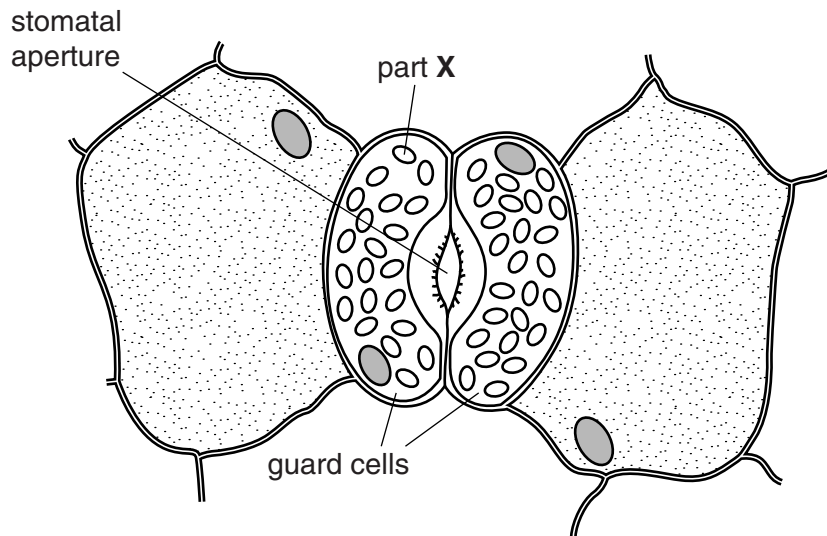
Put ticks (✓) in the boxes next to the **two** correct statements.

- | | |
|--|--------------------------|
| insecticides kill fungi that cause decay | <input type="checkbox"/> |
| fungicides kill fungi that cause decay | <input type="checkbox"/> |
| herbicides kill fungi that cause decay | <input type="checkbox"/> |
| pesticides are used in intensive farming | <input type="checkbox"/> |
| pesticides are used in organic farming | <input type="checkbox"/> |

[2]

[Total: 6]

2 Look at the diagram of cells found in a plant leaf.



(a) (i) Part X contains a green substance called chlorophyll.

Write down the name of part X.

..... [1]

(ii) The stomatal aperture is a hole in the leaf.

Why are stomata important for photosynthesis?

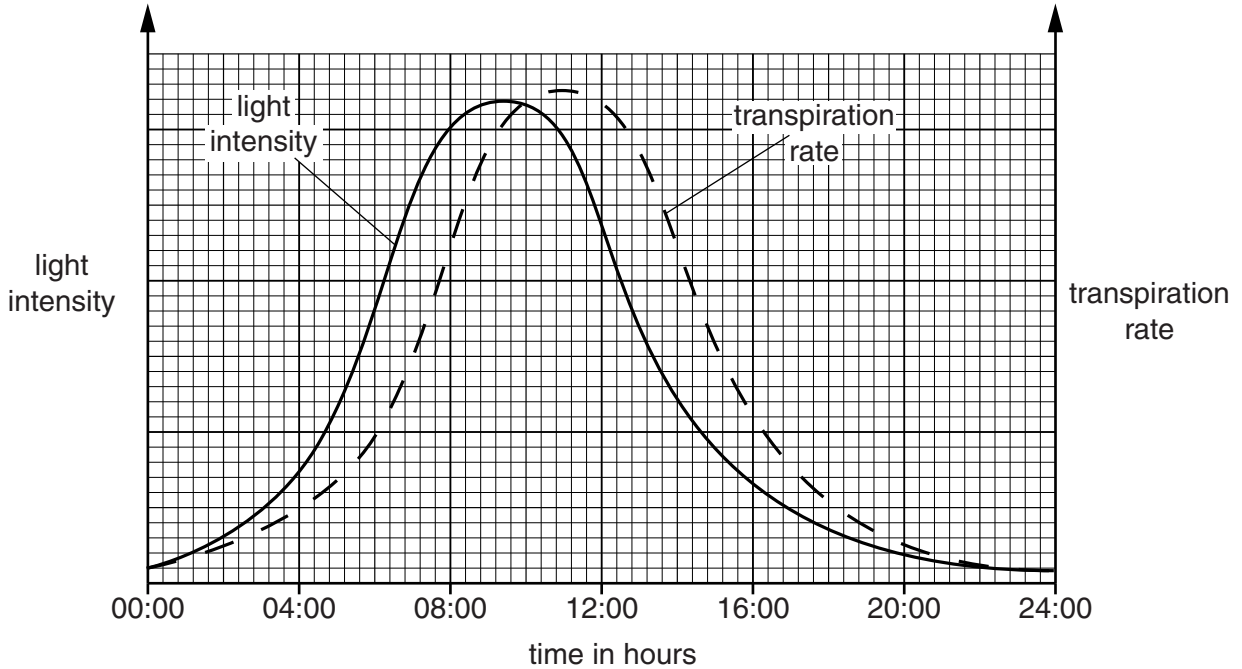
..... [1]

(b) (i) Water moves through the stomata during transpiration.

How does water pass through the stomata during transpiration?

..... [1]

(ii) Look at the graph.



Describe in detail how light intensity affects the rate of transpiration.

..... [1]

(iii) Transpiration moves water containing **phosphates** from the roots to the rest of the plant.

Explain why plants need phosphates.

..... [2]

(iv) When plants die they decay and important elements are recycled.

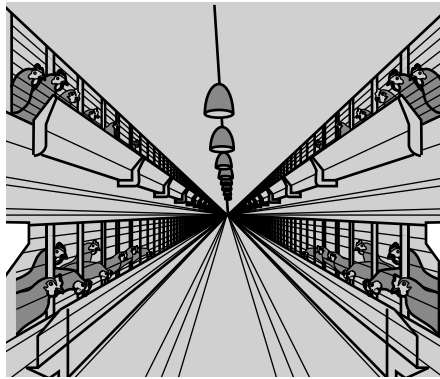
Nitrates contain an important element that is recycled.

Write down the name of this element.

..... [1]

[Total: 7]

3 Look at the picture. It shows one way of keeping chickens.



(a) What name is given to this type of farming?

..... [1]

(b) Look at the food chain.

It shows the biomass at each stage.

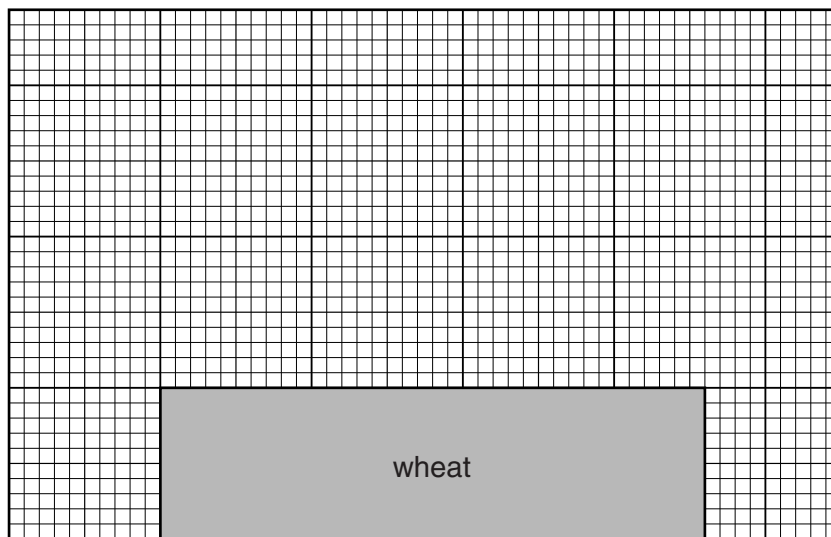
	wheat	→	chickens	→	humans
biomass in kg	360		120		60

A pyramid of biomass can be drawn to describe this food chain.

Finish the pyramid of biomass to include the chickens and the humans.

Make sure the bars are drawn **to scale** and **labelled**.

The bar for wheat has been drawn for you.



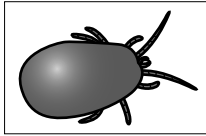
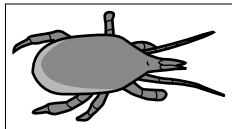
[2]

(c) Humans produce sewage.

What organisms break down sewage?

..... [1]

(d) Read the information.

	The poultry red mite, <i>Dermanyssus gallinae</i> , is currently a significant pest in the poultry industry.
A predator of poultry red mites is another mite called <i>Hypoaspis aculeifer</i> .	

Describe how the poultry red mite pest could be controlled using *Hypoaspis aculeifer*.

In your answer you need to write about

- the name for this type of pest control
- how the pest is controlled
- where it is best to use this type of pest control.

.....
.....
.....
.....
..... [3]

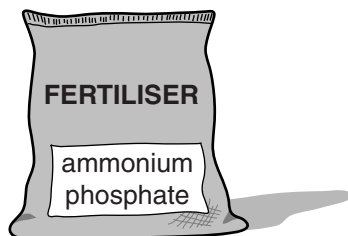
[Total: 7]

Section B – Module C4

4 Colin grows vegetables in his garden.

He uses fertiliser to increase his crop yield.

The fertiliser contains ammonium phosphate.



(a) (i) Ammonium phosphate has the formula $(\text{NH}_4)_3\text{PO}_4$.

Write down the **number** of **elements** in this formula.

The Periodic Table on the back page may help you.

..... [1]

(ii) What is the **total** number of **atoms** in the formula $(\text{NH}_4)_3\text{PO}_4$?

..... [1]

(b) Ammonium phosphate is made by reacting phosphoric acid with an alkali.

(i) Write down the name of this **alkali**.

..... [1]

(ii) What type of reaction happens when an acid reacts with an alkali?

Choose from the list.

chlorination

electrolysis

neutralisation

precipitation

answer [1]

[Total: 4]

5 Aspirin is a commonly used medicine.

Medicines are speciality chemicals.

One of the factors that affects the cost of making medicines is research and testing.

Write about **two** other factors that affect the cost of making a medicine.

.....

.....

..... [2]

[Total: 2]

6 This question is about ammonia.

(a) Jodie finds out that ammonia is made in a factory for 24 hours a day, 7 days a week.

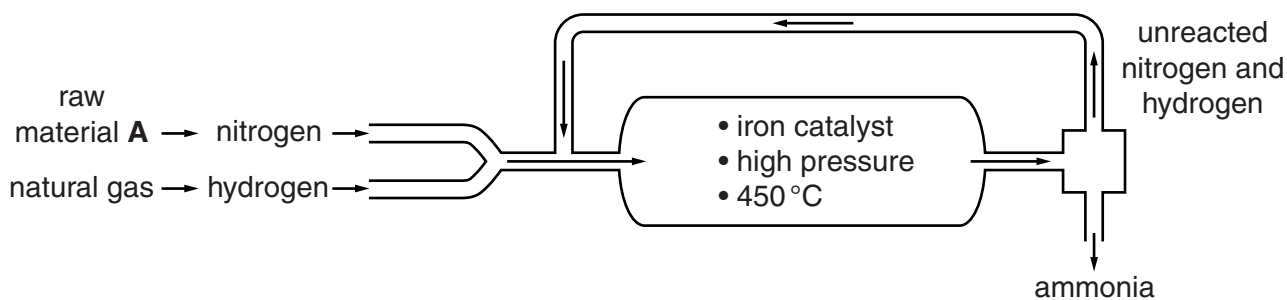
What is the name given to this type of process?

Choose from this list.

- batch
- continuous
- cracking
- neutralisation

answer [1]

(b) Ammonia is made in the Haber process.



The diagram shows how ammonia is made in the Haber process.

(i) Hydrogen comes from natural gas.

Nitrogen comes from raw material A.

Write down the name of raw material A.

..... [1]

(ii) Write down the **word** equation for the reaction in the Haber process.

..... [1]

(iii) This reaction is **reversible**.

Explain what is meant by a reversible reaction.

..... [1]

(iv) Calculate the relative formula mass, M_r , of ammonia, NH_3 .

The relative atomic mass, A_r , of H is 1 and of N is 14.

.....

answer [1]

(c) The table shows the percentage yield of ammonia made at different temperatures and pressures.

pressure in atmospheres	percentage yield at 350°C	percentage yield at 450°C	percentage yield at 550°C
100	16	12	6
200	30	22	12
300	40	28	16
400	50	36	20
500	56	42	24

How does the **percentage yield** of ammonia change as the **temperature increases**?

..... [1]

[Total: 6]

7 Look at the picture of a polluted river.



This river flows into a reservoir.

The water must be purified before being used as drinking water.

(a) (i) One of the purification processes is called **chlorination**.

Explain why drinking water is chlorinated.

..... [1]

(ii) The drinking water may still contain very small amounts of pollutants.

One of these pollutants is nitrate fertiliser.

Write down the name of another pollutant which may be found in drinking water.

..... [1]

(b) Cheryl analyses a sample of water to find the mass of chloride ions present.

(i) She mixes the water with silver nitrate solution.

A coloured precipitate of insoluble **silver chloride** forms.

Write down the colour of this precipitate.

Choose from this list.

- blue** **cream** **white** **yellow**

answer [1]

(ii) Cheryl predicts she should make 0.72 g of silver chloride.

She actually makes 0.24 g of silver chloride.

Calculate her percentage yield.

.....
.....
.....

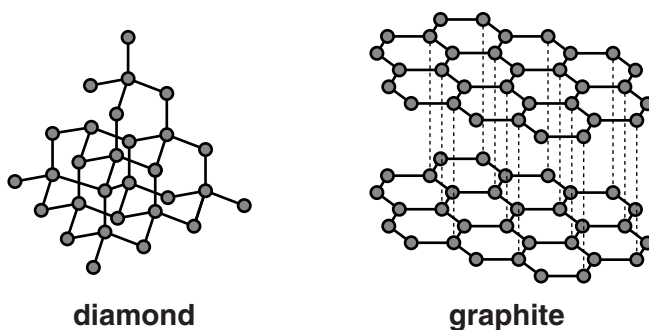
percentage yield =% [2]

[Total: 5]

16
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8 This question is about diamond and graphite.



(a) Diamond and graphite are two forms of the same element.

Write down the **name** of this element.

..... [1]

(b) Look at the table.

It lists some of the properties of diamond and graphite.

diamond	graphite
colourless	black
hard	soft
insoluble in water	insoluble in water
does not conduct electricity	conducts electricity
high melting point	high melting point

(i) Diamond has properties which make it suitable for use in cutting tools.

Write down **one** of these properties.

Choose from the table.

..... [1]

(ii) Graphite is soft and conducts electricity.

One use for graphite is as an electrode.

Write down **one other** use for graphite.

..... [1]

[Total: 3]

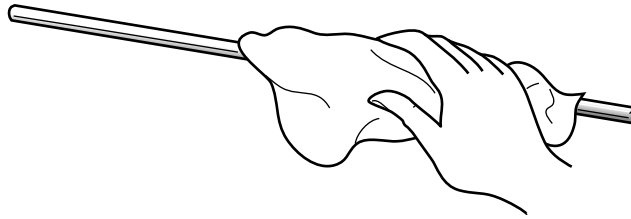
Section C – Module P4

9 This question is about static electricity.

(a) Amy rubs an insulating rod with a duster.

The rod becomes **positively charged**.

Look at the picture.



Which sentence correctly describes what happens?

- A Neutrons move from the duster to the rod.
- B Electrons move from the rod to the duster.
- C Protons move from the rod to the duster.
- D Protons move from the duster to the rod.

Choose from **A** **B** **C** **D**

answer

[1]

(b) Static electricity can be useful.

Write down **one** use of static electricity.

..... [1]

(c) Amy gets an electric shock when she takes off her sweatshirt.

Describe how.

In your answer write about

- the material the sweatshirt is made from
- how she becomes charged
- why she gets a shock.

.....

.....

.....

..... [3]

[Total: 5]

10 This question is about electricity.

(a) Ben has an electric toaster.

It has a metal case.



Cathy says that Ben must make sure that the metal case is earthed.

Why must the case be earthed?

.....
..... [1]

(b) Ben's toaster is connected to the 230V mains.

When the toaster is switched on, the current in the heating element is 4.6 A.

Calculate the resistance of the heating element.

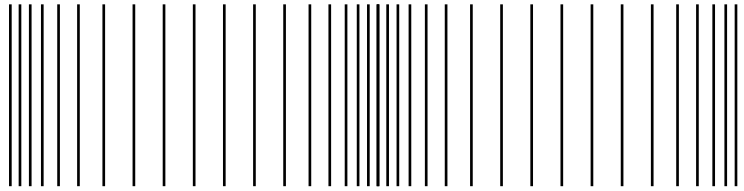
The equations on page 2 may help you.

.....
.....
.....

answer ohms [2]

[Total: 3]

11 The diagram shows a longitudinal wave.



(a) Longitudinal waves have certain features.

Complete the sentences by using the **best** words from this list.

The first one has been done for you.

amplitude

compression

frequency

rarefaction

wavelength

The maximum displacement of a particle in the wave is the **amplitude**.

The region of the wave where particles are close together is a

The number of waves produced each second is the [2]

(b) **Ultrasound** is a longitudinal wave.

Put ticks (✓) in the boxes next to the correct uses of ultrasound.

to break down kidney stones

to check people's hearing

to look inside the body by scanning

to measure the speed of blood flow in the body

to measure the temperature of the body

[2]

[Total: 4]

12 Alpha, beta and gamma are three types of radioactive emission.

(a) Write down the part of the atom that emits alpha, beta and gamma.

..... [1]

(b) Radioactive sources are used as tracers in the human body.

Look at the table of properties for different emitters.

type of emitter	typical range in air in cm	typical range in human soft tissue in cm
alpha	3.7	0.0005
beta	90	1.2
gamma	70 000	100

(i) Alpha emitters are **not** used as tracers in the human body, but gamma emitters are.

Explain why. Use the information in the table.

.....

 [2]

(ii) Write down **another** use for gamma radiation.

.....
 [1]

(c) X-rays are another type of radiation. They are used to take pictures of broken bones.



What do you call the person in a hospital who takes **X-rays**?

..... [1]

[Total: 5]

13 Radioisotopes are used in industry. They are radioactive elements.

(a) How can materials be made radioactive?

.....
..... [1]

(b) Industry uses radioisotopes as tracers.

Write down one example of how a tracer is used in **industry**.

.....
..... [1]

(c) There is also radiation that occurs naturally in the environment.

What do scientists call this radiation?

..... [1]

[Total: 3]

END OF QUESTION PAPER

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