

GENERAL CERTIFICATE OF SECONDARY EDUCATION
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

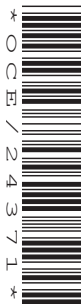
OCR Supplied Materials:
None

Other Materials Required:

- Pencil
- Ruler (cm/mm)

Monday 25 January 2010
Afternoon

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

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 **20** pages. Any blank pages are indicated.

2

EQUATIONS

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

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

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

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

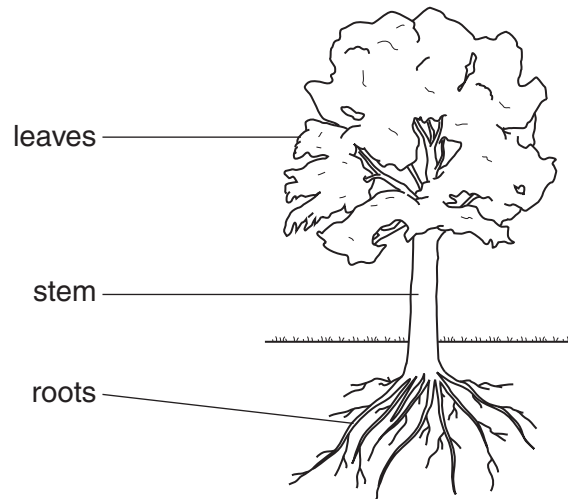
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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

3

Answer **all** the questions.**Section A – Module B4**

1 Look at the tree.



(a) (i) Where does water enter a tree?

..... [1]

(ii) Where does carbon dioxide enter a tree?

..... [1]

(b) Water and carbon dioxide are used in photosynthesis.

Write down **one** substance that is **made** in photosynthesis.

..... [1]

(c) Different parts of plants have different jobs.

Draw a line to match each job with the correct part of a plant.

Draw **three** lines only.**job**

anchorage

photosynthesis

reproduction

part of plant

flower

leaf

root

[2]

[Total: 5]

Turn over

4

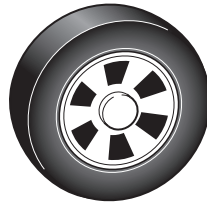
- 2 (a) Look at some objects left at a rubbish tip.



tree branch



tin can



car tyre



piece of fruit



glass bottle

Which object will decay the quickest?

Choose your answer from the list.

..... [1]

- (b) If bread is left for a few days it can become mouldy. This is an example of decay.

Roy notices that sometimes bread goes mouldy more quickly than at other times.

Write about the factors that affect how quickly bread goes mouldy.

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

[Total: 4]

5

- 3 Ann is in the supermarket. She wants to buy carrots.

She finds two types of carrots.

One type is grown using organic farming methods.

The other type is grown using intensive farming methods.



- (a) The organic carrots are grown without using any artificial fertilisers.

Only natural fertilisers such as compost are used.

Describe **two other** ways organic farming methods are different from intensive farming methods.

- 1
-
- 2
- [2]

- (b) (i) How might carrots be different if they are grown without any fertiliser at all?

..... [1]

- (ii) Natural fertilisers and artificial fertilisers both provide minerals.

How do minerals get into plants?

..... [1]

- (c) Some people think organic farming is better for the environment than intensive farming.

Write down **one disadvantage** of organic farming.

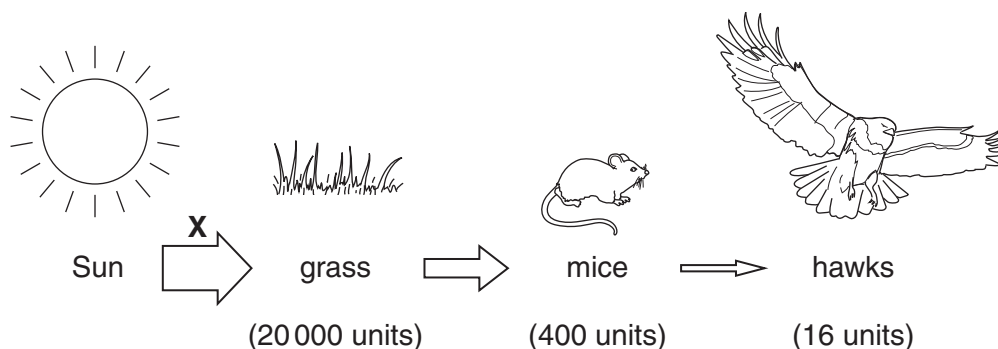
.....

..... [1]

[Total: 5]

- 4 Look at the diagram of a food chain.

The numbers show the amount of energy used for growth at each stage of the food chain.



- (a) Process **X** transfers energy from the Sun to the grass.

What is process **X**?

..... [1]

- (b) 2% of the energy in the grass is transferred to the mice.

This is a lower figure than the percentage of energy transferred from the mice to the hawks.

- (i) What percentage of the energy in the mice is transferred to the hawks?

answer% [2]

- (ii) **Not** all the energy at one stage of a food chain is transferred to the next stage.

Write down **one** reason why.

..... [1]

- (iii) The percentage of the energy transferred from the mice to the hawks is **more** than that transferred from the grass to the mice.

Suggest why.

.....
 [1]

7

(c) Look again at the diagram of a food chain.

A disease reduces the number of hawks.

What is likely to happen to the amount of grass?

Explain your answer.

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

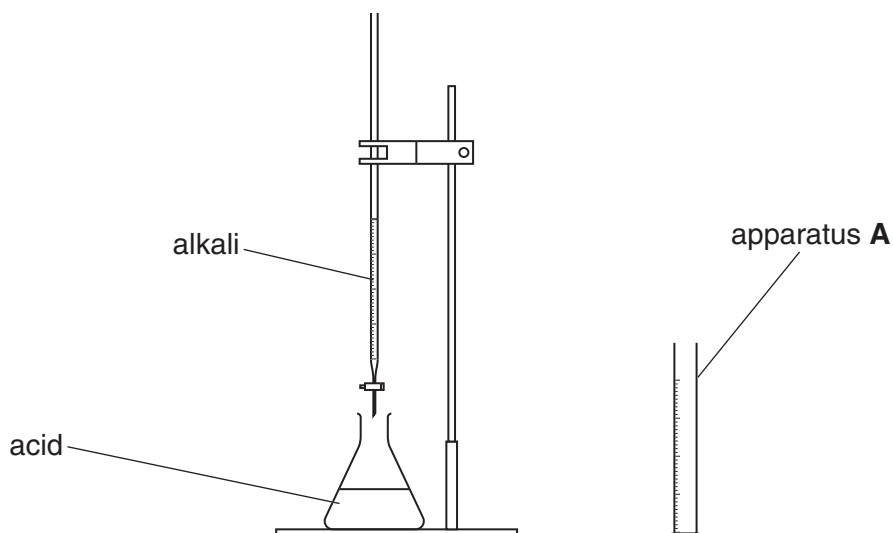
[Total: 6]

Section B – Module C4

- 5 This question is about fertilisers.

Fertilisers can be made by **neutralisation**.

Look at the diagram. It shows the equipment used.



- (a) What is apparatus A?

..... [1]

- (b) Complete the word equation to show what happens during neutralisation.

acid + base $\rightarrow$ + [2]

- (c) Potassium hydroxide is an alkali.

What is the pH of potassium hydroxide solution?

Choose from:

1 4 7 13

answer [1]

- (d) Nitric acid is an acid.

What is the pH of nitric acid?

Choose from:

2 7 9 13

answer [1]

9

- (e) Potassium hydroxide reacts with nitric acid.

What is the name of the fertiliser made?

..... [1]

- (f) Fertilisers provide essential elements needed for healthy plant growth.

Two of these essential elements are nitrogen and potassium.

Write down the name of the third essential element.

..... [1]

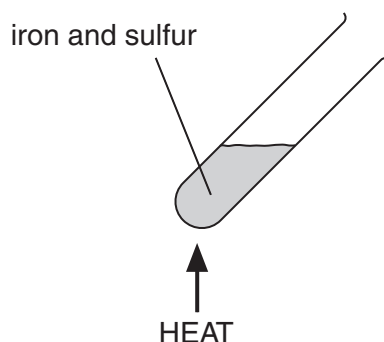
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10

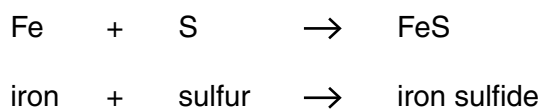
- 6 This question is about chemical calculations.

Jake and Monty make iron sulfide.

They heat a mixture of iron and sulfur.



Look at the equation for the reaction.



- (a) Calculate the relative formula mass, M_r , of iron sulfide.

The relative atomic mass of iron is 56 and of sulfur is 32.

.....

answer [1]

- (b) Jake and Monty start with 5.6g of iron and 3.2g of sulfur.

What mass of iron sulfide will they make?

..... [1]

- (c) They make another sample of iron sulfide.

They predict that they will make 9.0g.

They actually make 7.2g.

Calculate their percentage yield.

.....

answer% [2]

[Total: 4]

7 This question is about chemical processes.

Ammonia is made 24 hours a day, 7 days a week.

(a) What is the name of this **type** of process?

..... [1]

(b) Some medicines are made on demand when they are needed.

What is the name of this **type** of process?

..... [1]

(c) One of the costs of making medicines is the cost of paying the workers in the factory.

Write about **other** costs of making medicines.

.....
.....
..... [2]

[Total: 4]

12

- 8 Washing up liquid is used to clean plates.

Washing up liquid contains several ingredients.

Draw a straight line to match each **ingredient** to its **use**.

ingredient

active detergent

rinse agent

water softener

water

use

thins out the detergent

helps water drain off dishes

softens hard water

cleans dishes

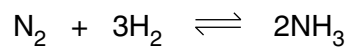
[3]

[Total: 3]

13

- 9 Ammonia is made in the Haber process.

Look at the equation.



- (a) Write down the **formula** of one **reactant**.

..... [1]

- (b) One condition used in the Haber process is an iron catalyst.

Write down one **other** condition used.

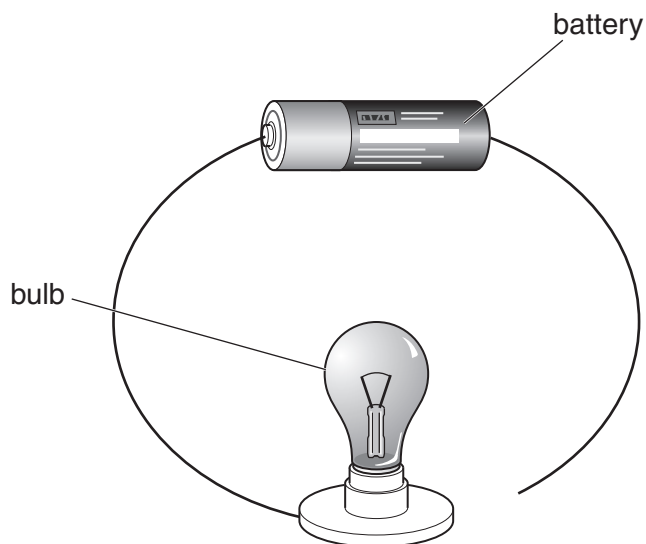
..... [1]

[Total: 2]

Section C – Module P4

- 10 Mike sets up the following circuit.

Look at the circuit.



- (a) The bulb does **not** light.

Why does the bulb **not** light?

..... [1]

- (b) Mike changes his circuit and the bulb lights.

He adds a resistor to the circuit between the battery and the bulb.

- (i) What happens to the **current** in the circuit?

..... [1]

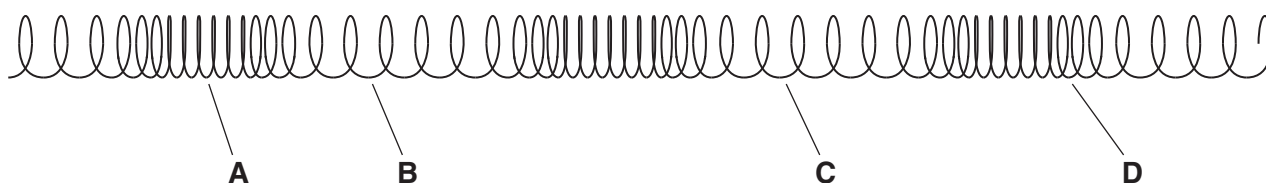
- (ii) What happens to the **brightness** of the bulb?

..... [1]

[Total: 3]

15

11 (a) Look at the longitudinal wave in a slinky spring.



(i) Which letter represents the centre of a compression?

.....

[1]

(ii) Finish the sentence.

One wavelength is the distance between letters and [1]

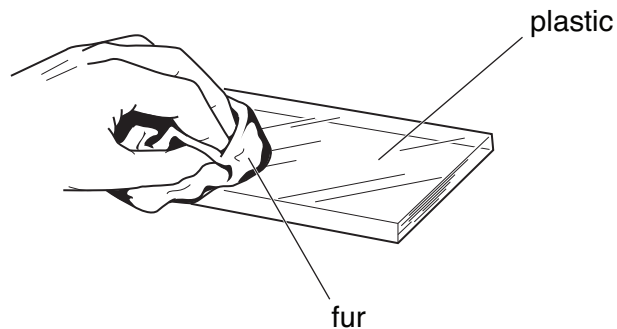
(b) Write down **one** other example of a longitudinal wave.

..... [1]

[Total: 3]

12 This question is about static electricity.

(a) Mel rubs some plastic with a piece of fur.



The plastic and the fur become charged.

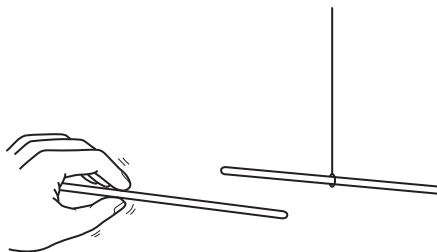
What are the two **types** of charge?

Finish the sentence.

The two types of charge are and [2]

(b) Mel hangs up a charged plastic rod on a cotton thread.

She brings another charged rod towards it.



The rods move apart.

Why do the two rods move apart?

..... [1]

(c) Photocopiers and laser printers use static electricity to make them work.

Write down two **other** uses of electrostatics.

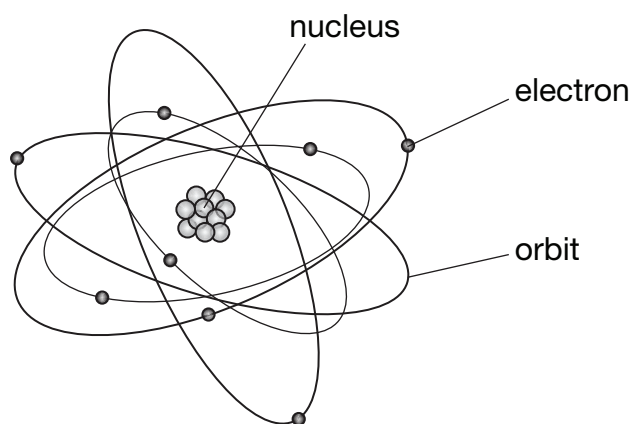
1.....

2..... [2]

[Total: 5]

17

- 13 (a) The diagram represents a radioactive atom.



Finish the sentences by choosing the **best** words from this list.

electrons**nucleus****orbits****stable****unstable**

Radiation comes from the of the atom.

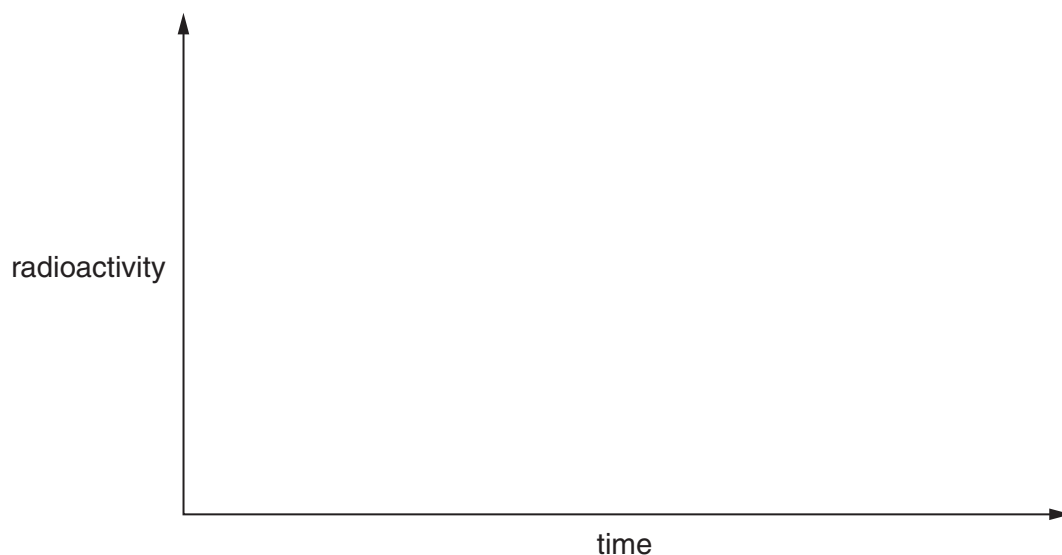
The radioactive atom is

[2]

- (b) The radioactivity of an object changes with time.

- (i) Sketch a graph to show how the radioactivity changes.

Use these axes.

**[1]**

- (ii) Finish the sentence.

The radioactivity of an object is measured by the number of per second.

[1]**[Total: 4]**

14 Radioactive atoms can emit **three** different types of nuclear radiation.

One type is **alpha** (α) radiation.

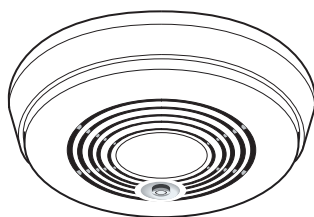
(a) Write down the names of the **other** two types of nuclear radiation.

1

2 **[2]**

(b) Americium-241 does not occur naturally.

It is a source of alpha radiation. It is used in smoke alarms.



(i) Where is americium-241 made?

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

in a lead lined box

☐

in the core of a nuclear reactor

☐

in the path of X-rays

☐

near to another radioactive source

☐

[1]

19

- (ii) Describe how a smoke detector containing americium-241 works.

Use ideas about **ionisation** to answer the question.

.....

.....

.....

.....

..... [2]

[Total: 5]

END OF QUESTION PAPER



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The Periodic Table of the Elements

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1	2	Key										3	4	5	6	7	0
		relative atomic mass atomic symbol name atomic (proton) number															
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1	H	1
	hydrogen	

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.