

**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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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.

EQUATIONS

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

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

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

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

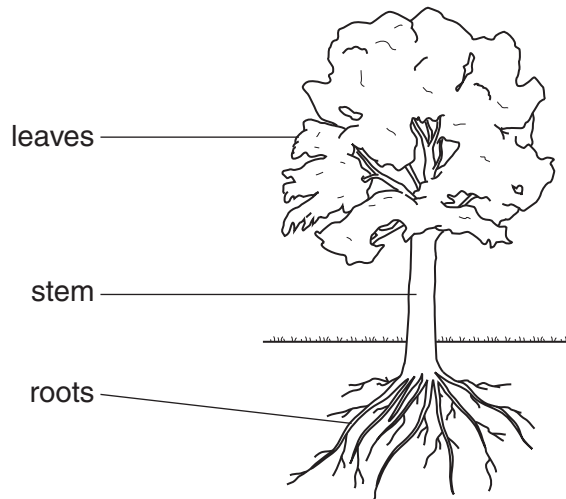
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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

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	part of plant
anchorage	flower
photosynthesis	leaf
reproduction	root

[2]

[Total: 5]

Turn over

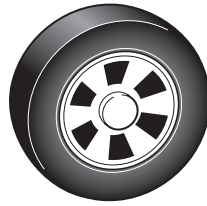
2 (a) Look at some objects left at a rubbish tip.



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]

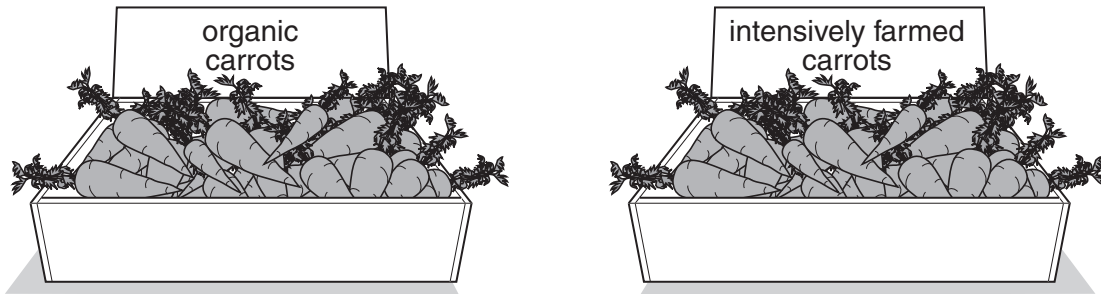
[Total: 4]

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.

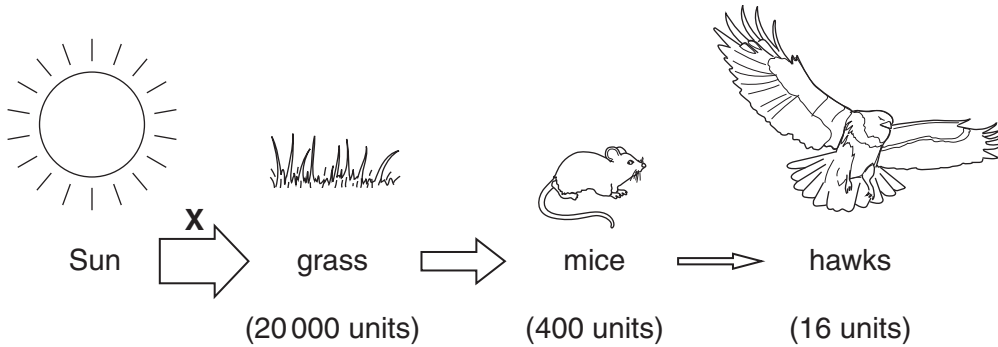
.....

..... [1]

[Total: 5]

4 Look at the 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.

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]

(c) Look at the food chain.

A disease reduces the number of hawks.

What is likely to happen to the amount of grass?

Explain your answer.

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

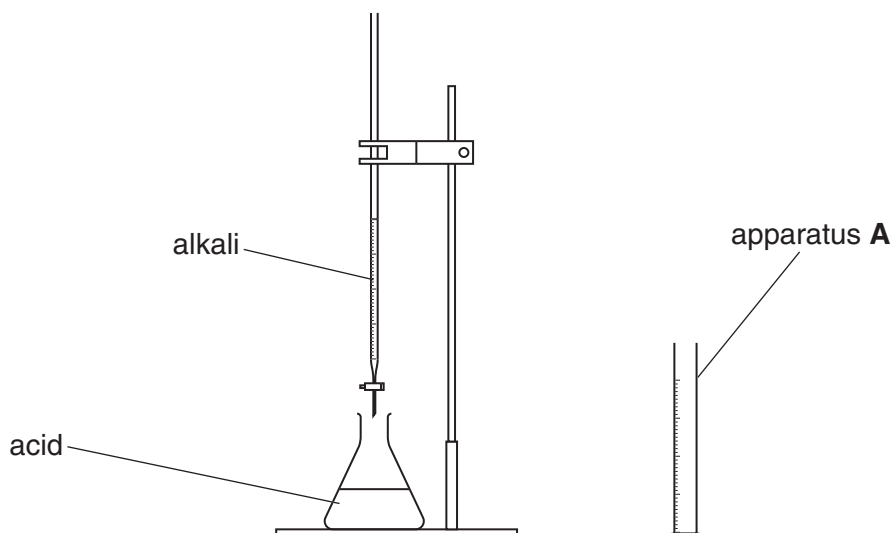
[Total: 6]

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 → + [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]

(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.

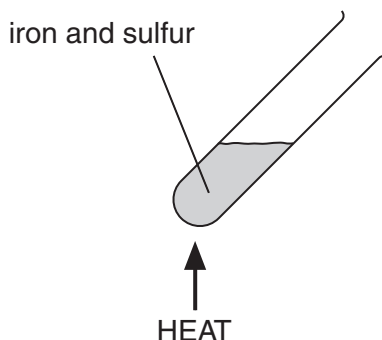
..... [1]

[Total: 7]

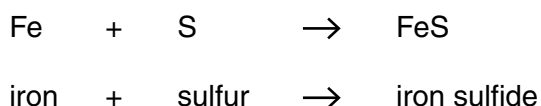
6 This question is about chemical calculations.

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) Finchfield Pharmaceuticals make medicines.

The 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.

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

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

[Total: 4]

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

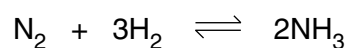
cleans dishes

[3]

[Total: 3]

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.

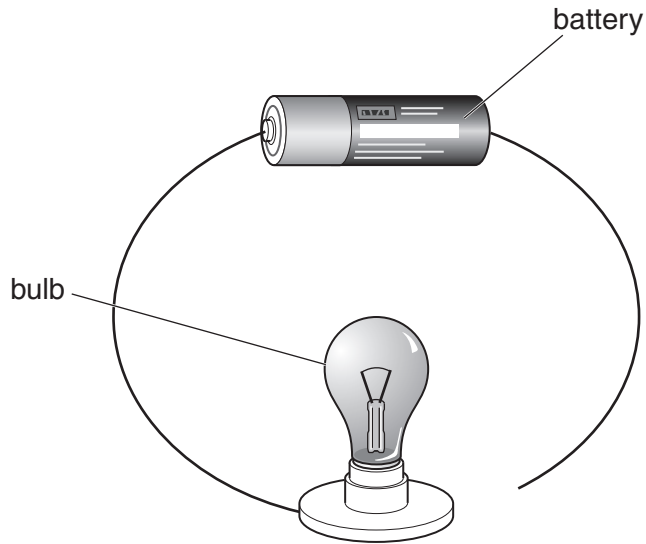
..... [1]

[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?

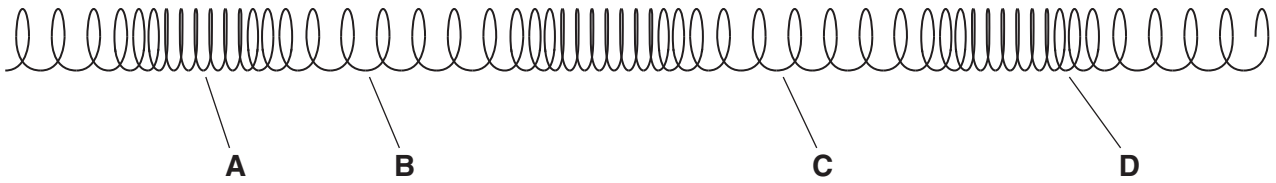
..... [1]

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

..... [1]

[Total: 3]

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]

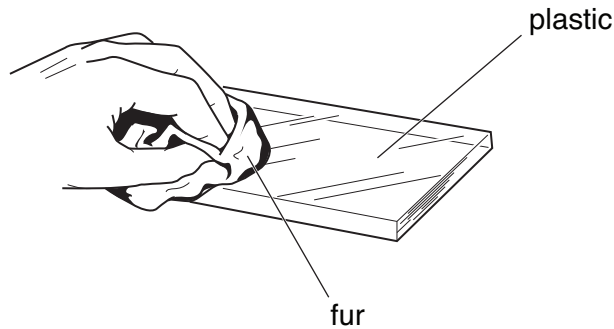
(b) Write down **one** other example of a longitudinal wave.

..... [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.

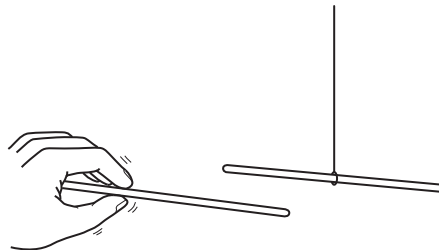
What are the two **types** of charge?

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.

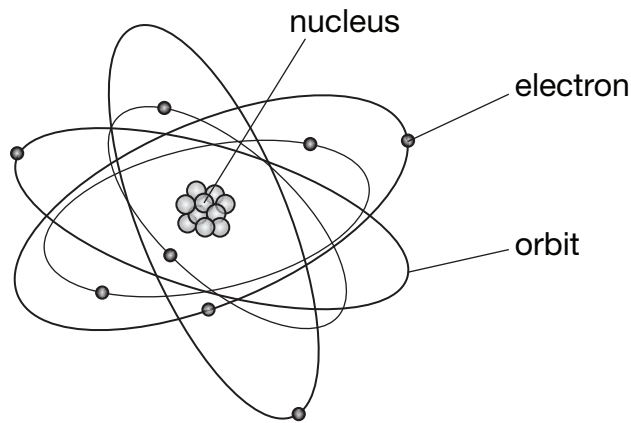
Write down two **other** uses of electrostatics.

1.....

2..... [2]

[Total: 5]

13 (a) The diagram represents a radioactive atom.



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

electrons nucleus orbits stable unstable

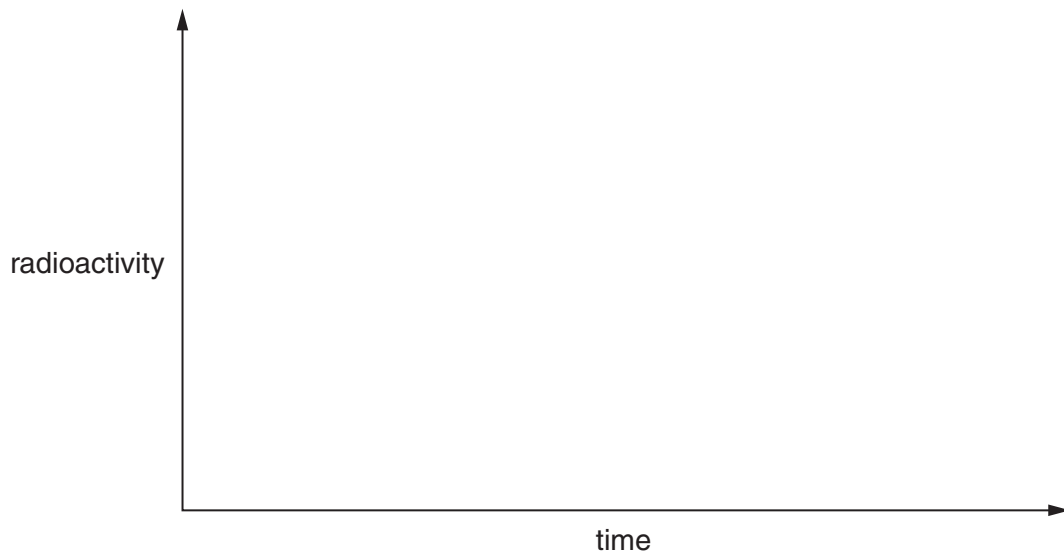
Radiation comes from the of the atom.

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.



(ii) Finish the sentence. [1]

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.

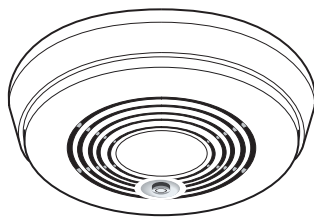
(a) Write down the names of the **other** two types of nuclear radiation.

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]

(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

1	2	3	4	5	6	7	0										
7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18								
19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36
37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium [98]	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Cd cadmium 47	48 In indium 48	49 Sn tin 49	50 Sb antimony 50	51 Te tellurium 51	52 I iodine 52	53 Xe xenon 53	54 Kr krypton 54
55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	86 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 hydrogen 1
---	---------------------------

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.