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OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE **B624/01**

ADDITIONAL SCIENCE B
Unit 2 Modules B4 C4 P4 (Foundation Tier)

Candidate forename		Candidate surname	

Centre number					Candidate number				

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. Pencil may be used for graphs and diagrams only.
• 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).
• Answer **all** the questions.
• 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 **24** pages. Any blank pages are indicated.

Turn over

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

BLANK PAGE

Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

Section A – Module B4

1 Henry grows vegetables on his allotment.

(a) Henry wants to make compost to provide minerals for his growing plants.

(i) Henry makes compost from dead plant material.

Look at the list of different plant materials.

Which **two** materials decay most easily to make compost?

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

bark chippings	☐
coconut shells	☐
dead leaves	☐
grass cuttings	☐
wooden branches	☐

[2]

(ii) Write down **one** type of living thing that makes dead plant material decay.

.... **[1]**

(b) Although Henry puts some compost on his allotment, his plants still do **not** grow very well.

Some have yellow leaves.

Henry decides they need more minerals, particularly nitrate.

He goes to a garden centre to buy some artificial fertiliser.

He has a choice of three brands of fertiliser: **Quik Grow**, **Soil Optimum** and **Growth Boost**.

Each has a different NPK value.

The table shows the NPK values of the three fertilisers.

brand of fertiliser	Quik Grow	Soil Optimum	Growth Boost
NPK value	2 : 8 : 11	3 : 5 : 9	5 : 2 : 2

   (i) Henry particularly wants nitrate.

   Which fertiliser should he choose?

   Choose your answer from the table.

   .... **[1]**

  (ii) The fertiliser Henry chooses is a powder.

   The instructions on the package tell Henry to mix the fertiliser with water.

   Suggest why the fertiliser should be mixed with water.

   ....

   .... **[1]**

  (iii) Which part of a plant absorbs minerals?

   .... **[1]**

[Total: 6]

2 Sam grows tomatoes in a glasshouse.
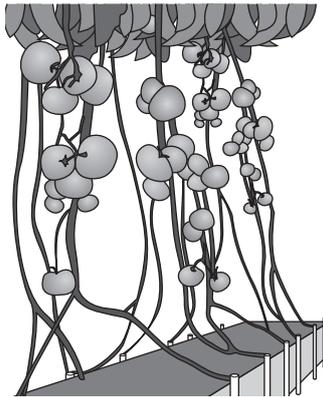
(a) The glasshouse lets in sunlight.

The tomato plants absorb light for photosynthesis.

   (i) Why do tomato plants need to photosynthesise?

   .... **[1]**

   (ii) Look at the diagram of a cell from the leaf of a tomato plant.

vacuole

cell wall

chloroplast
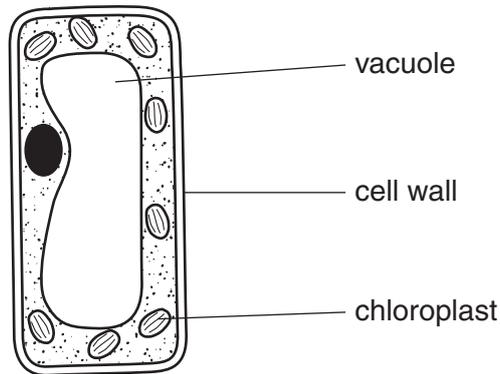
   Which part of the cell absorbs light for photosynthesis?

   Choose your answer from the diagram.

   .... **[1]**

(b) Sam keeps the glasshouse warm using gas heaters.

The heaters give out carbon dioxide.

The tomato plants use carbon dioxide for photosynthesis.

Which part of a tomato plant takes in most carbon dioxide?

.... [1]

(c) Sam's tomato plants do not grow in soil.

Instead, the roots grow in water.

Write down the word which describes this way of growing plants.

.... [1]

(d) Sam finds insects called greenflies feeding on the tomato plants.

Sam wants to kill the greenflies.

She puts other insects called ladybirds into the glasshouse.

Ladybirds eat greenflies.

(i) Write down the scientific word that describes this way of killing the greenflies.

.... [1]

(ii) What word describes animals, like ladybirds, that eat other animals?

.... [1]

(iii) Sam could also use a chemical to kill the greenflies.

Write down the name of this **type** of chemical.

.... [1]

[Total: 7]

3 Eucalyptus trees grow in Australia.

They are important for both humans and animals.
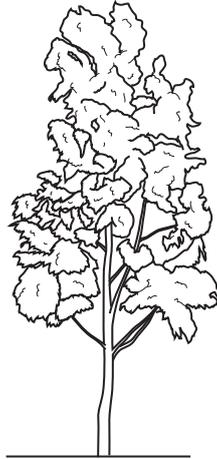
(a) Eucalyptus trees grow quickly and the wood can be used as a fuel.

What word describes this type of fuel?

Put a (ring) around the correct answer.

biogas   **biomass**   **detritus**   **fossil fuel**

[1]

(b) Animals called koalas feed on eucalyptus leaves.

Koalas need to eat a lot of eucalyptus leaves, about a thousand every day.

Koalas are not very active, resting for about 16–18 hours every day.

Suggest what this information tells us about eucalyptus leaves.

....

.... [1]

(c) Eucalyptus trees are sometimes planted to drain swamps and other wet areas.

They remove a lot of water from the ground when they transpire.

Explain how transpiration removes water from the ground.

In your answer, write about

- the parts of a plant through which water moves

- the processes that make water move.

....

....

....

.... **[3]**

(d) Look at the drawing of eucalyptus leaves.

Describe and explain **two** ways eucalyptus leaves are adapted for efficient photosynthesis.

first adaptation ....

explanation ....

....

second adaptation ....

explanation ....

.... **[2]**

[Total: 7]

Turn over

Section B – Module C4

4 Julie buys a new jacket.

Look at the wash label from inside her jacket.

55% POLYESTER
45% VISCOSE
LINING
100% POLYESTER

(a) What **temperature** of water should Julie use to wash her jacket?

.... °C **[1]**

(b) Julie uses a washing powder to clean her jacket.

Join each **ingredient** in the washing powder to the **job** it does.

Draw **three** straight lines.

ingredient	**job**
active detergent	used in low temperature washes to remove food stains
bleaches	does the cleaning
enzymes	removes coloured stains

[2]

(c) The label shows that Julie's jacket can be **dry cleaned**.

What is meant by dry cleaning?

.... **[1]**

[Total: 4]

5 This question is about fertilisers.

Look at the picture. It shows a farmer spreading fertiliser on a field.

(a) Write down **one** reason why farmers add fertilisers to their fields.

.... [1]

(b) A farmer tests a solution of fertiliser with universal indicator.

The pH of the fertiliser is 7.

What does this pH tell you about the fertiliser?

Choose from the list.

it is acidic

it is alkaline

it is neutral

.... [1]

(c) Ammonium sulfate is a fertiliser.

The farmer has a pond.

He wants to find out if his pond has ammonium sulfate in it.

He tests a sample of pond water with barium chloride solution.

What will he **see** if the pond water contains sulfate ions?

.... [1]

Turn over for the remainder of question 5

(d) Ann-Marie makes some ammonium sulfate in a laboratory.

Ann-Marie predicts that she should make 3.5 g of ammonium sulfate.

She actually makes 2.1 g.

Calculate the percentage yield of ammonium sulfate.

....

....

....

percentage yield = ... %   **[2]**

(e) Look at the table. It shows some information about two fertilisers.

name of fertiliser	formula	relative formula mass, M_r
ammonium nitrate	NH_4NO_3	80
ammonium sulfate	$(NH_4)_2SO_4$	....

Calculate the relative formula mass, M_r, of ammonium sulfate.

Write your answer in the table.

The relative atomic mass, A_r, of N = 14, of H = 1, of S = 32 and of O = 16.

[1]

[Total: 6]

6 This question is about water.

(a) Water is an important resource for many chemical processes in industry.

Write down one **use** for water in industrial processes.

.... [1]

(b) Write down **one** pollutant that may be found in tap water in the home.

Choose from the list.

hydrochloric acid

lead compounds

sodium hydroxide

water softener

.... [1]

(c) Clean water is very important.

People in developing countries are sometimes not able to get clean water.

Suggest why having clean water is important for people in developing countries.

....

.... [1]

[Total: 3]

7 **(a)** Graphite and buckminster fullerene are two forms of carbon.

Write down the **name** of another form of carbon.

.... **[1]**

(b) Graphite is used to make pencil leads.
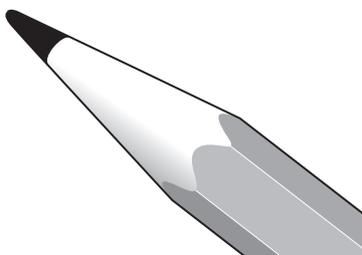
Graphite easily makes marks on paper.

Explain why.

....

.... **[1]**

(c) Fullerenes can be joined together to make nanotubes.
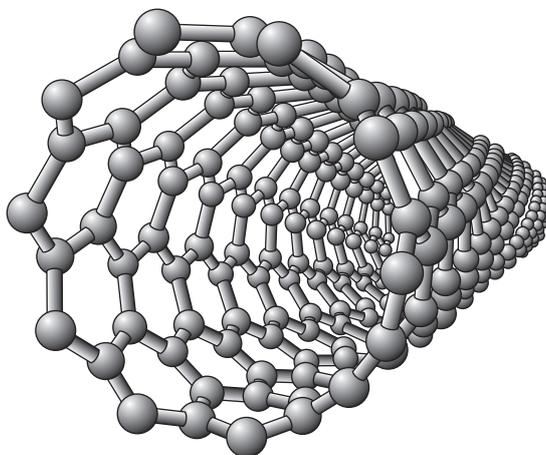
Nanotubes are used to reinforce graphite in tennis rackets.

Write down one **property** of nanotubes.

.... **[1]**

[Total: 3]

8 This question is about making ammonia.

Ammonia is made by the Haber process.

Look at the diagram. It shows the process used.
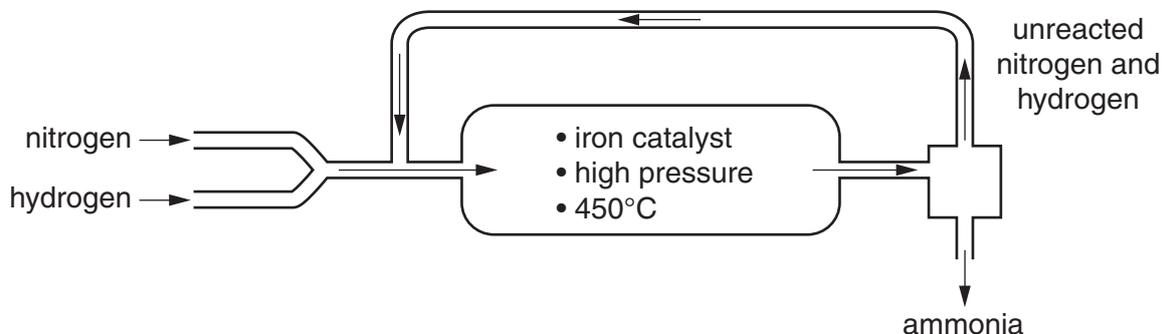
Nitrogen reacts with hydrogen to make ammonia.

The equation shows the reaction.

<div align="center">

nitrogen + hydrogen $\rightleftharpoons$ ammonia

</div>

(a) Nitrogen is needed for the reaction.

Where does the nitrogen come from?

.... [1]

(b) The $\rightleftharpoons$ sign in the equation indicates that the reaction is **reversible**.

What is meant by a reversible reaction?

.... [1]

(c) There are many costs in making ammonia.

One of these is the cost of the catalyst.

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

....

....

.... [2]

[Total: 4]

Section C – Module P4

9   This question is about electric circuits.

(a) Look at the diagram of a plug.
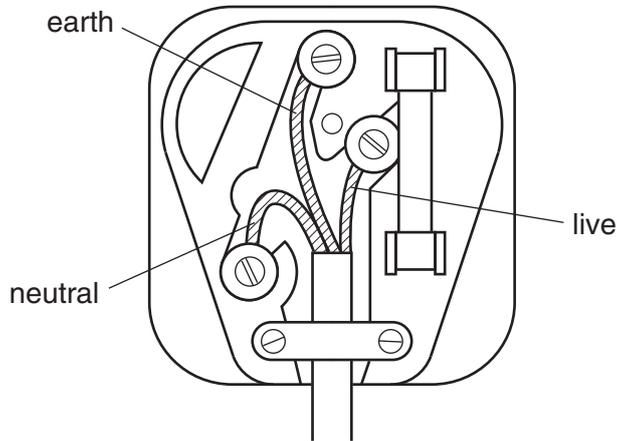
Look at the table.

line	live	neutral	earth
A	brown	blue	green/yellow
B	blue	green/yellow	brown
C	green/yellow	brown	blue
D	blue	brown	green/yellow

Which line shows the correct colours for the wires?

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

answer ....   **[1]**

(b) Andrew builds a circuit.
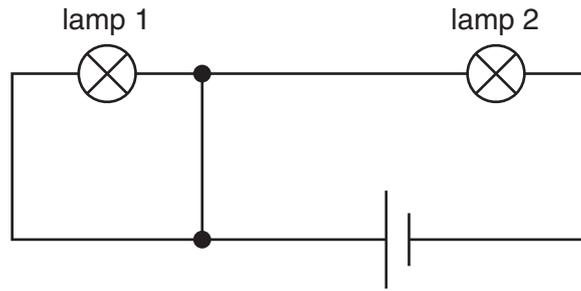
Lamp 1 does not light up.

It is **not** broken.

Why does lamp 1 not light up?

....

.... **[1]**

(c) Andrew connects another circuit.
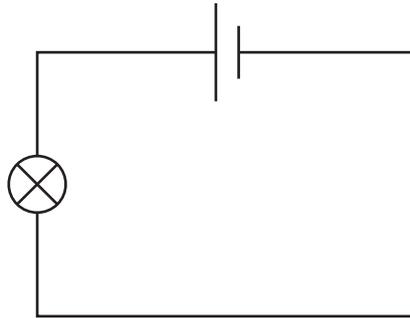
He wants to make the lamp less bright by **reducing** the current.

What electrical component should he add to the circuit?

answer .... **[1]**

Turn over for the remainder of question 9

(d) Doug measures the current and voltage for a torch bulb.

Look at his results.

current in amps	voltage in volts
0.25	1.5

Calculate the resistance of the torch bulb.

The equations on page 2 may help you.

....

....

answer .... ohms **[2]**

[Total: 5]

10 This question is about electrostatic charge.

(a) There are two types of electrostatic charge.

These are called .... and .... **[1]**

(b) Alice gets an electrostatic shock when she takes off her jumper.

Explain why.

In your answer write about

- what type of material becomes charged

- how the jumper becomes charged

- why she gets an electrostatic shock.

....

....

....

....

.... **[3]**

(c) Electrostatic charges can be useful in paint spraying and removing dust from chimneys.

Write down one **other** use of electrostatic charge.

....

.... **[1]**

[Total: 5]

11 This question is about ultrasound.

Ultrasound is a longitudinal wave.

(a) Look at the list of features and descriptions of **longitudinal** waves.

Draw a straight line from each **feature** to its correct **description**.

Two have been done for you.

feature   **description**

| amplitude | ————— | maximum displacement of each particle |

| wavelength | | region where particles in the wave are far apart |

| frequency | | region where the particles in the wave are close together |

| compression | | number of vibrations each second |

| rarefaction | | shortest distance between two particles moving identically |

[2]

(b) Ultrasound is used in hospitals for body scans.

Humans can hear sounds between frequencies of 20 Hz and 20 000 Hz.

What is the approximate frequency of ultrasound waves?

Choose from

28 Hz

180 Hz

2800 Hz

18 000 Hz

28 000 Hz

answer .... Hz **[1]**

[Total: 3]

12 (a) Radioactivity can be useful.
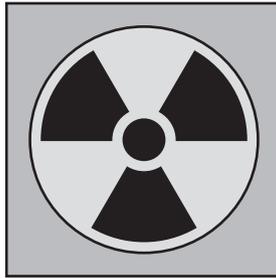
Some radioactive materials emit alpha particles.

(i) Which part of an atom emits alpha particles?

.... [1]

(ii) Some radioactive materials are used as tracers in hospitals.

Radioactive materials which emit alpha particles cannot be used as tracers.

Explain why.

....

.... [1]

(iii) What happens to the radioactivity of the tracer over a period of a week?

.... [1]

(b) Look at the picture of a smoke alarm.
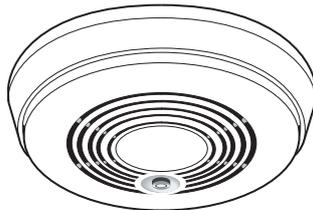
Which type of radiation is used in a smoke alarm?

Choose from   **alpha**   **beta**   **gamma**

answer ....   **[1]**

[Total: 4]

13 Nuclear power stations use uranium as fuel.

Energy is produced in a nuclear reactor when a uranium atom splits.

(a) Write down the name of this process.

.... **[1]**

(b) Metals can be made radioactive.

This happens when they **absorb** particles inside a nuclear reactor.

Write down the name of the particles absorbed.

.... **[1]**

(c) Nuclear power stations contribute to background radiation.

What is background radiation?

....

.... **[1]**

[Total: 3]

END OF QUESTION PAPER

The Periodic Table of the Elements

Key

| relative atomic mass |
| **atomic symbol** |
| name |
| atomic (proton) number |

| 1 | H | hydrogen | 1 |

Group 1	Group 2			3	4	5	6	7	0
									4 **He** helium 2
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

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.