



Centre Number

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Candidate Number

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General Certificate of Secondary Education
2024–2025

Single Award Science: Physics

Unit 3
Higher Tier



[GSA32]

GSA32

WEDNESDAY 13 NOVEMBER 2024, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete questions in black ink and use a dark HB pencil for drawings and graphs.

Do not write with a gel pen.

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You may use a scientific calculator.

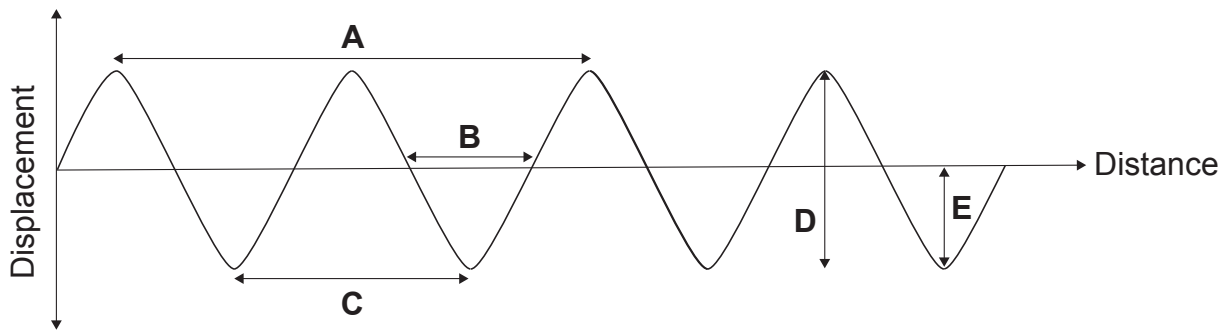
Quality of written communication will be assessed in Question 2.

14853



20GSA3201

1 (a) The diagram below shows a wave.



(i) Which letter **A**, **B**, **C**, **D** or **E** represents the amplitude of this wave?

_____ [1]

(ii) Which letter **A**, **B**, **C**, **D** or **E** represents the wavelength of this wave?

_____ [1]

There are two types of waves, transverse and longitudinal.

(b) Name **one** example of a transverse wave.

[1]

(c) Use the equation:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

to calculate the speed of a wave that has a wavelength of 3.4 m and a frequency of 100 Hz.

Show your working out.

_____ m/s [2]



(d) Echoes can cause problems with the music heard by an audience inside concert halls (auditoria).

(i) What is an echo?

[1]

(ii) State **one** way to counteract the problem caused by echoes inside concert halls (auditoria).

[1]

[Turn over





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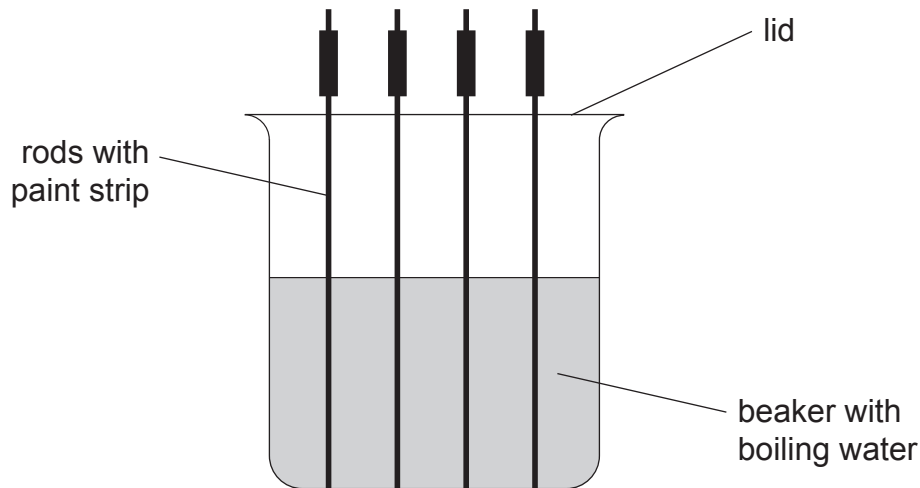
[Turn over



20GSA3205

- 3 (a) A student used the apparatus shown below to compare how heat travels through **four** different metal rods.

Each rod has a strip of paint which will change colour when heated.



The investigation was repeated, and the results are shown below.

Rod material	Time for paint to change colour/s	Time for paint to change colour/s	Average time/s
copper	7	5	6
aluminium	11	13	12
brass	10	15	13
steel	17	21	19

- (i) Which metal is the best conductor?

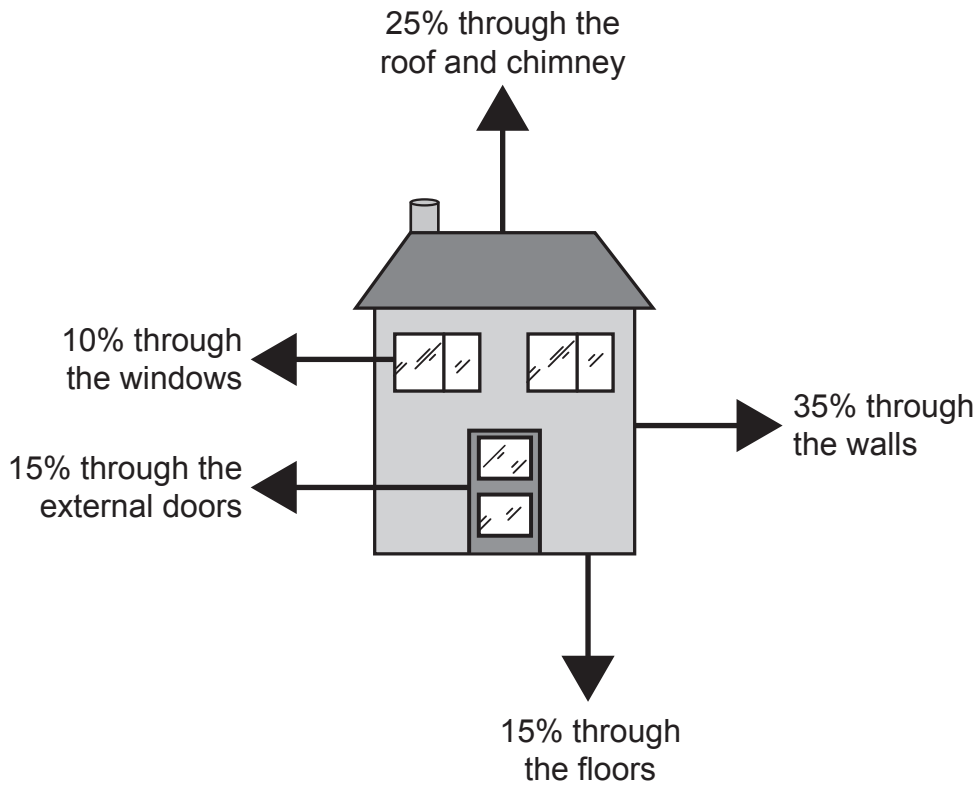
_____ [1]

- (ii) Suggest **one** way the student ensured a valid (fair) test was carried out.

_____ [1]



(b) The diagram below shows the percentage of heat lost from different parts of our home.



(i) Give **one** conclusion that can be made from this information.

_____ [1]

(ii) Describe **one** way heat loss can be reduced in our homes.

_____ [1]

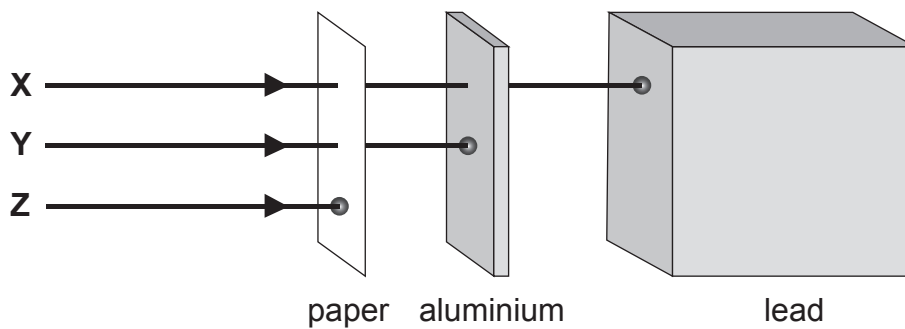
(iii) Explain why it is important to reduce heat loss from our homes.

_____ [2]

[Turn over



4 The diagram below shows how the different types of radiation are stopped.



(a) Name the types of radiation X, Y and Z.

X _____

Y _____

Z _____

[2]

(b) Describe **one** use of radioactivity.

[1]

(c) Explain why some nuclei are radioactive and emit radiation.

[2]





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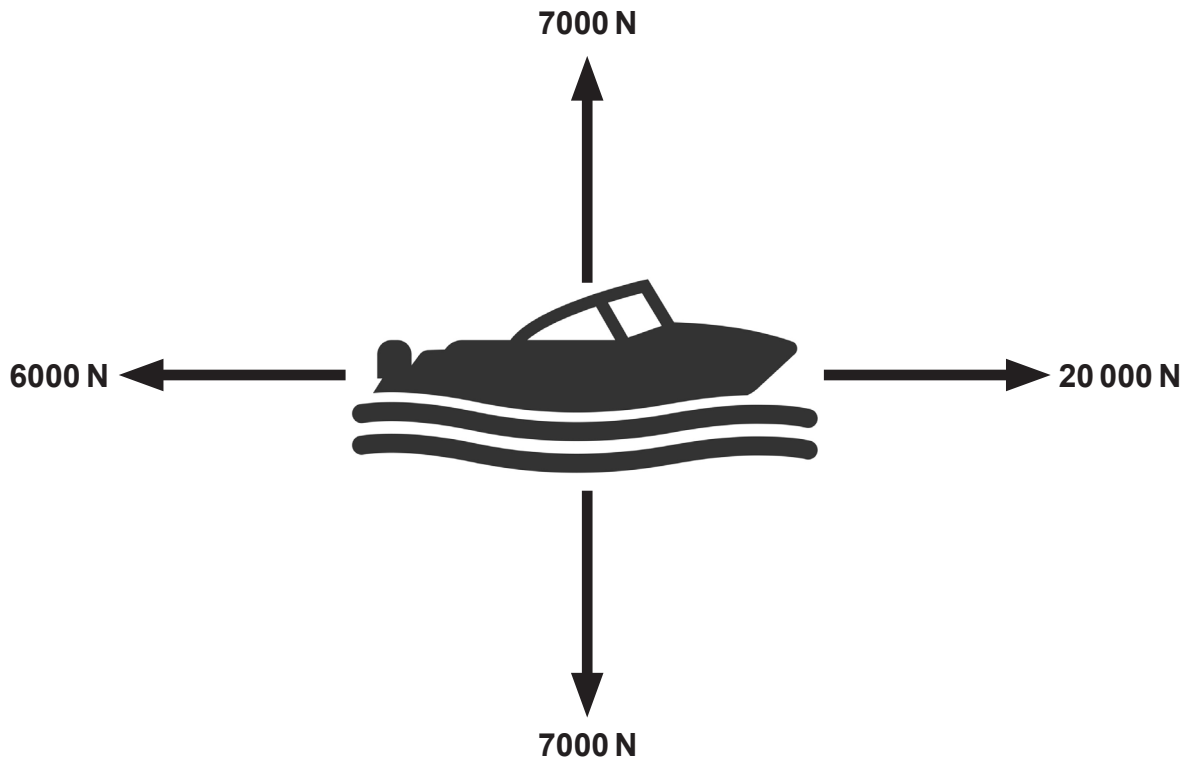
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[Turn over



20GSA3209

- 5 The diagram below shows the forces acting on a 700 kg speedboat which is moving across the water.



- (a) (i) Describe, in terms of forces, the motion of this boat.

[3]

- (ii) Give the size and direction of any resultant force.

[1]



(b) Use the equation:

$$E_k = \frac{1}{2} mv^2$$

to calculate the kinetic energy of the boat when travelling at a velocity of 9 m/s.

Show your working out.

_____ J [3]



- 6 The photograph below shows an 800 W microwave oven that is connected to the 240 V mains.



- (a) (i) Use the equation:

$$\text{power} = \text{voltage} \times \text{current}$$

to calculate the current flowing through the microwave oven.

Show your working out.

_____ A [1]

- (ii) What size of fuse is required for this microwave oven?

Circle your answer.

1 A

3 A

5 A

13 A

[1]



(iii) Describe how a fuse protects the microwave oven.

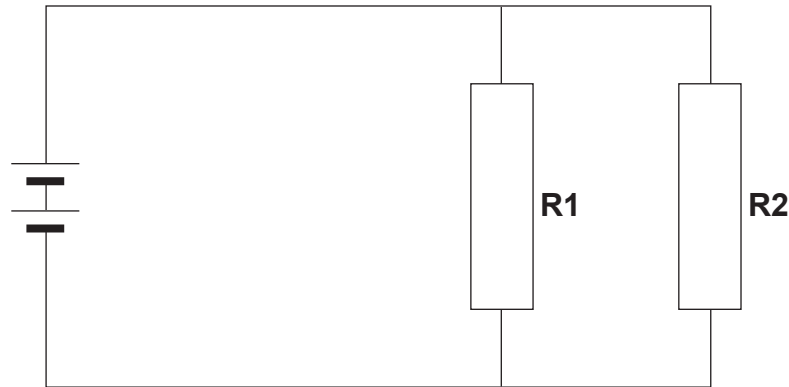
[2]

(b) Explain the microwave heating effect in terms of energy absorption and molecular behaviour.

[3]



- 7 The circuit diagram below shows two identical resistors **R1** and **R2** connected to a 3 V battery supplying 0.5 A.



- (a) (i) How much voltage is applied across each resistor?

_____ [1]

- (ii) How much current flows through each resistor?

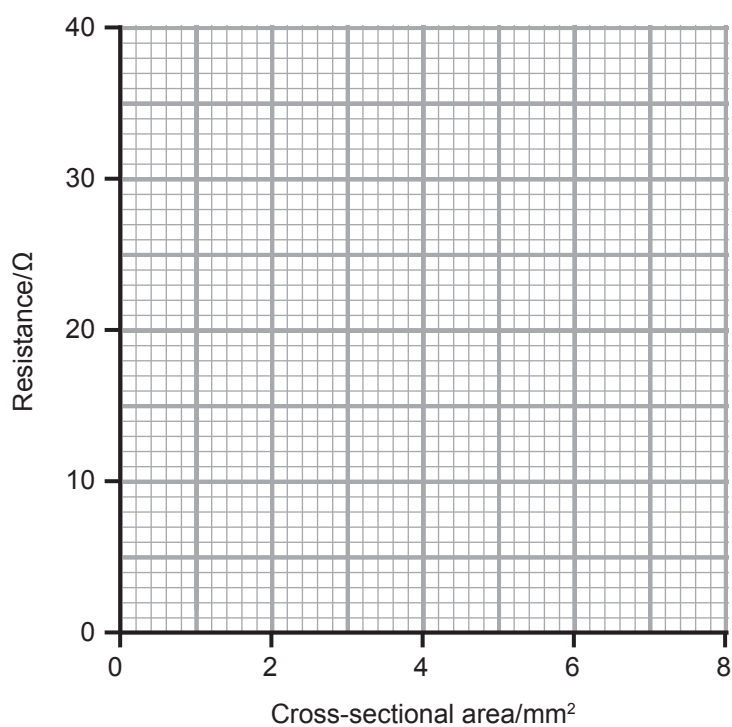
_____ [1]

- (b) The table below shows how resistance changes with the cross-sectional area of a wire.

Cross-sectional area/mm ²	Resistance/ Ω
0.5	30
1.0	15
2.0	8
4.0	4
8.0	2



(i) On the grid below plot and draw a line graph for these results.



[3]

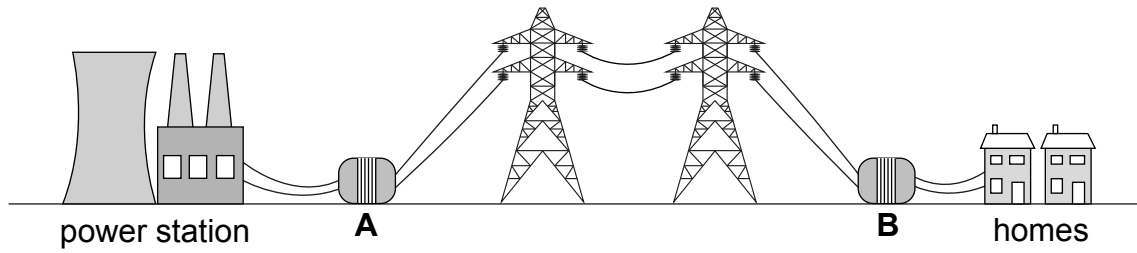
(ii) State fully the trend shown by these results.

[2]

[Turn over



(c) The diagram below shows electricity being transmitted across the National Grid by overhead cables.



(i) Name the type of transformer shown at **A** and **B** in the diagram.

A _____

B _____

[1]

(ii) Explain the reason for using transformer **A**.

[2]



The table below gives the resistance of wires made from four different metals. Each wire has the same length and cross-sectional area. It also gives the mass and cost of 1 kg of each metal.

Metal	Resistance/ $\Omega \times 10^{-3}$	Mass/kg	Cost per kg/£
copper	0.17	8.94	7.5
aluminium	0.28	2.70	2.2
lead	2.2	11.34	1.69
iron	1	7.86	1.5

(d) Suggest which metal should be chosen for use in the overhead cables. Explain your answer.

[3]

[Turn over



8 (a) The Steady State theory, for the formation of the Universe, states that the Universe has always existed, and that the Universe is expanding and constantly creating matter as it expands.

(i) Name the other scientific theory for the formation of the Universe.

_____ [1]

(ii) Give **one** difference between the two theories for the formation of the Universe.

_____ [1]

(b) (i) Describe the movement of galaxies in the Universe.

_____ [2]

(ii) Name the force that holds a galaxy together.

_____ [1]

(c) Describe the formation of a star.

_____ [3]





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Question Number	Marks
1	
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Total Marks	
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Examiner Number

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