Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 16 June 2023

Morning (Time: 1 hour 45 minutes)

Paper reference **1PH0/2F**

Physics

PAPER 2

Foundation Tier

You must have:
Calculator, ruler, Equation Booklet (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.
- A list of equations is included at the end of this exam paper.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 This question is about static electricity.

(a) Figure 1 shows a plastic comb picking up small pieces of paper.

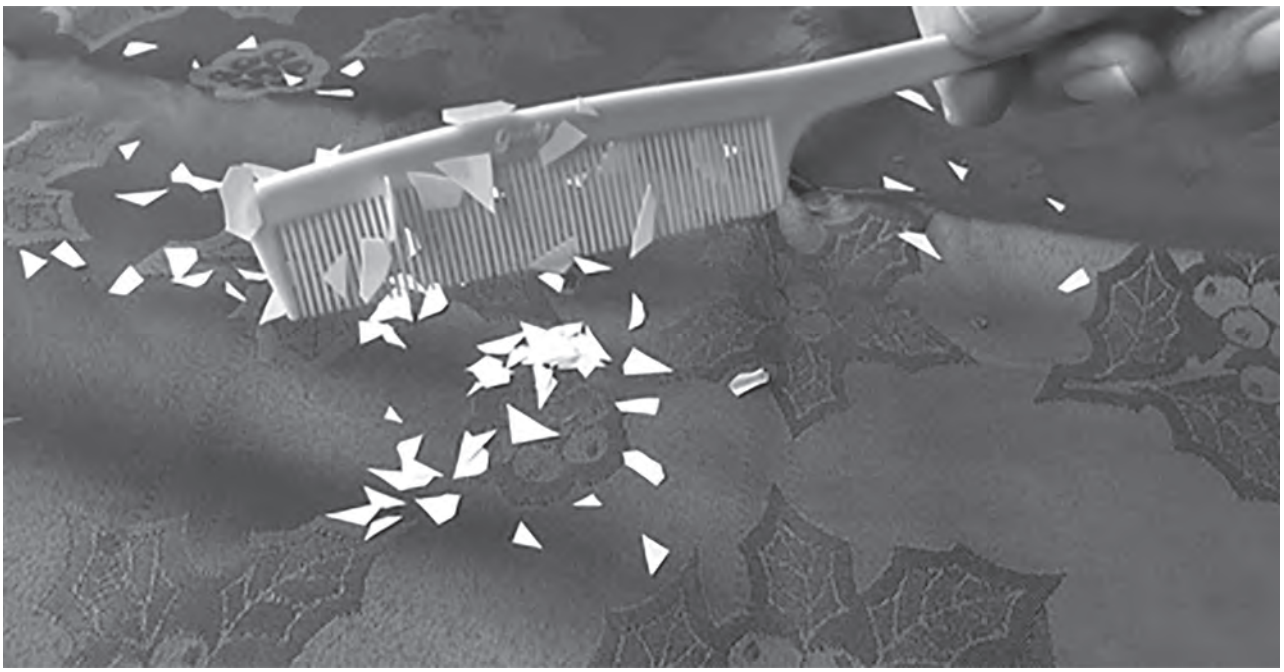

Figure 1

The comb picks up the paper because the comb has extra

(1)

☒ **A** magnetism

☒ **B** charge

☒ **C** resistance

☒ **D** weight

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(b) Figure 2 shows a person touching a charged dome.

The person's hair is standing on end.

Figure 2

(i) Explain how electric charge causes the hair to spread out, as shown in Figure 2.

(2)

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.....

.....

(ii) The person lets go of the charged dome.

The charge on the person's hair is 10 μC.

The charge on the dome is 25 μC.

Calculate the percentage of charge on the hair compared with on the dome.

Use the equation

$$\text{percentage of charge on the hair} = \frac{\text{charge on hair}}{\text{charge on dome}} \times 100$$

(2)

percentage of charge on the hair = ... %

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(c) Draw **one** straight line from each example of electrostatic charges in action to their descriptions.

(3)

electrostatic charges in action	**description**
charging a plastic comb	small droplets are charged so they will stick to an object
electrostatic paint spraying	build-up of charge in a cloud causes a discharge to Earth
safe fuelling of cars by earthing	prevents a dangerous build-up of charge between a flowing liquid and a pipe
lightning	produced by friction between solid surfaces

(Total for Question 1 = 8 marks)

2 (a) Figure 3 shows the parts in an electrical circuit.

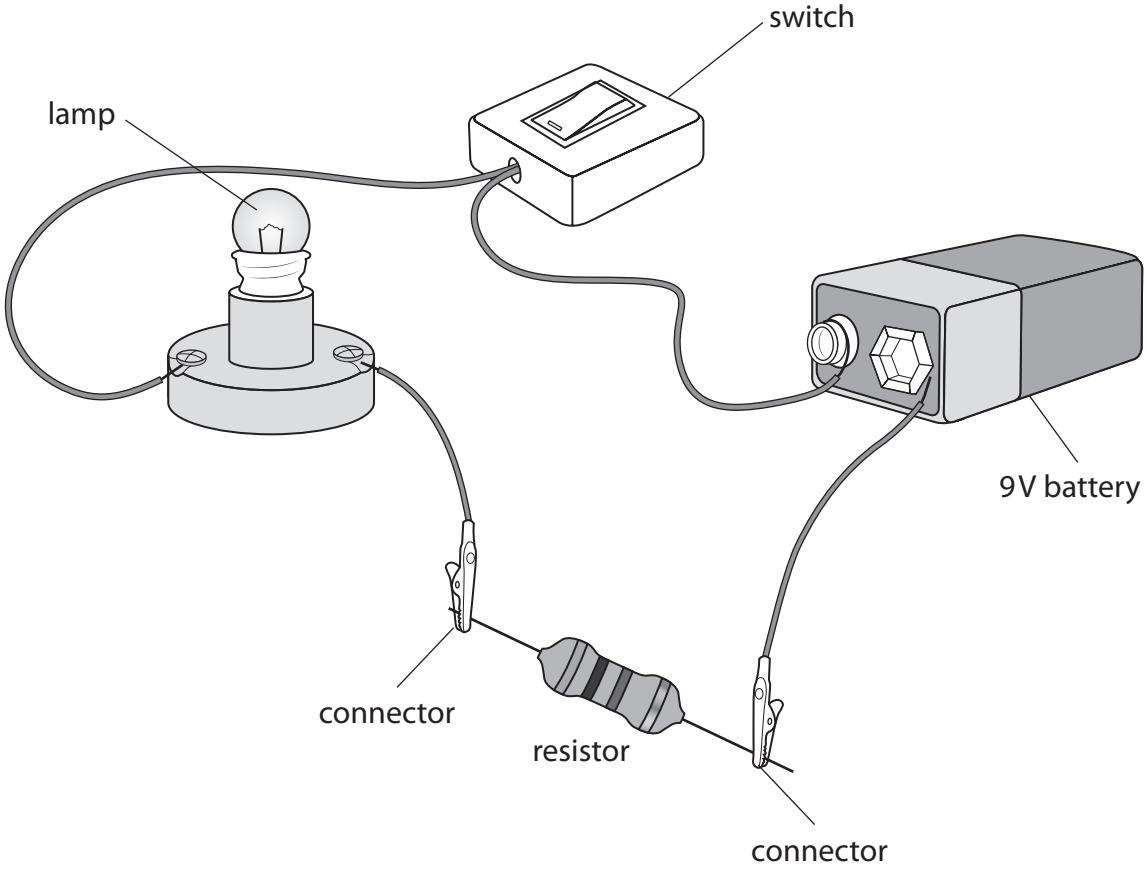


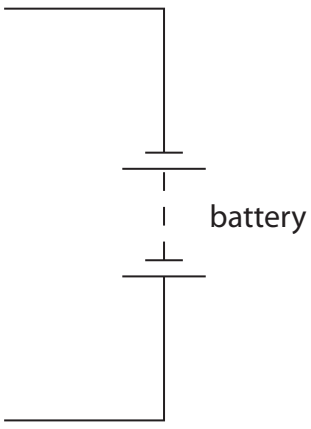
Figure 3

Draw the circuit diagram of this electrical circuit in the space provided.

The battery symbol and some of the connecting wires have been drawn for you.

(4)

circuit diagram



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(b) Figure 4 shows the current flowing into and out of point P in part of a circuit.

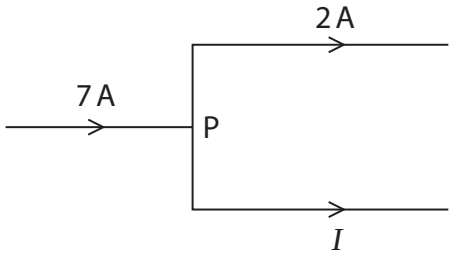

Figure 4

Which of these is the value of current I?

(1)

- ☒ **A** 2 A
- ☒ **B** 5 A
- ☒ **C** 7 A
- ☒ **D** 9 A

(c) (i) There is a current of 0.46 A in a lamp.

Calculate the total charge that flows through the lamp in 30 seconds.

Use the equation

charge = current × time in seconds

(2)

charge = ... C

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(ii) The voltage across the lamp is 6.0 V.

The current in the lamp is 0.46 A.

Calculate the energy transferred to the lamp in one minute.

Use the equation

energy transferred = current × voltage × time in seconds

(2)

energy transferred = ... J

(Total for Question 2 = 9 marks)

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3 (a) Figure 5 shows the apparatus used to investigate the melting of some crushed ice.

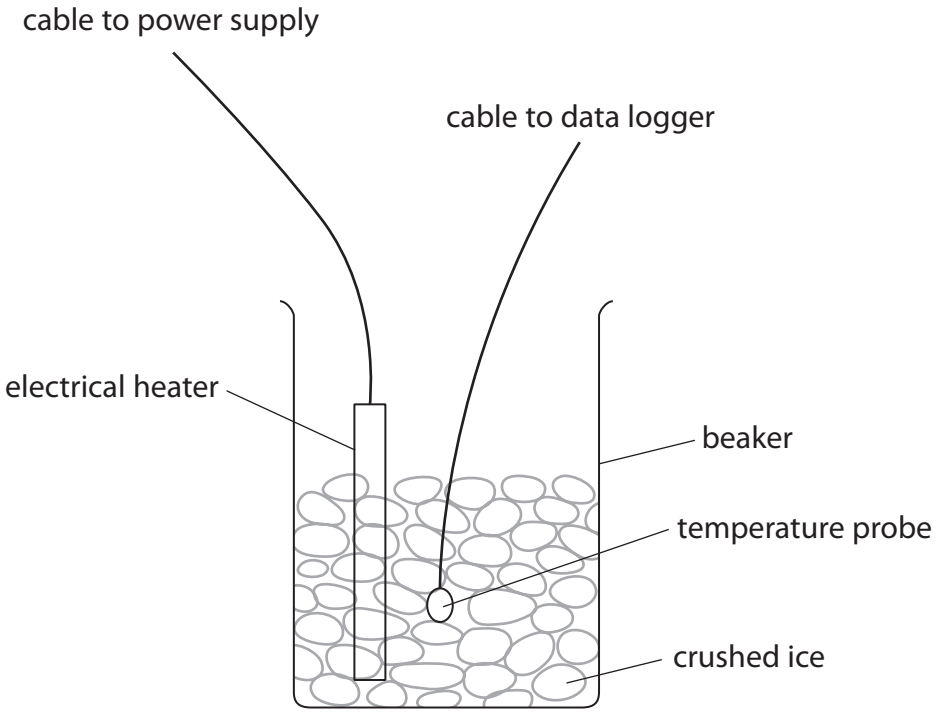

Figure 5

(i) Suggest **one** safety precaution needed when using the electrical heater.

(1)

.....

.....

(ii) Suggest **one** way of heating the crushed ice without using electricity.

(1)

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(b) Figure 6 shows a graph produced from the data collected by the data logger in Figure 5.

Labels P, Q, R and S have been added.

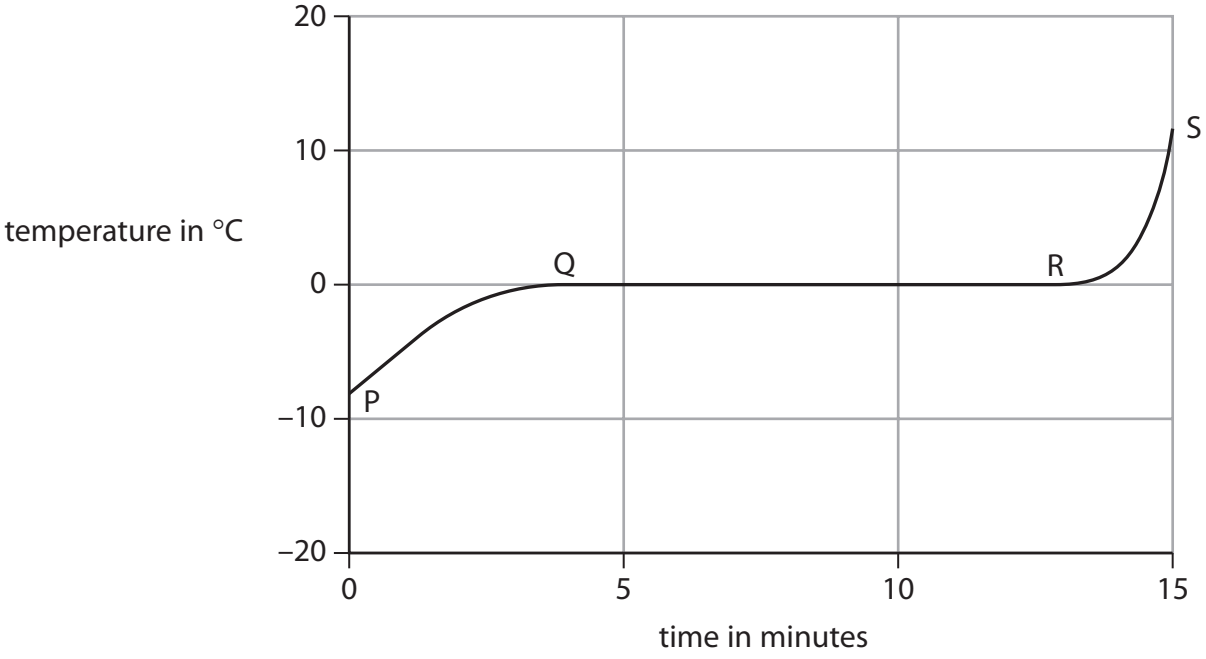

Figure 6

At the start, P, the beaker contains crushed ice at –8 °C.

Describe what happens to the crushed ice during the next 15 minutes.

You may use labels P, Q, R and S to help your answer.

(3)

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(c) Figure 7 shows bubbles of air that a diver breathes out.

The bubbles rise towards the surface.

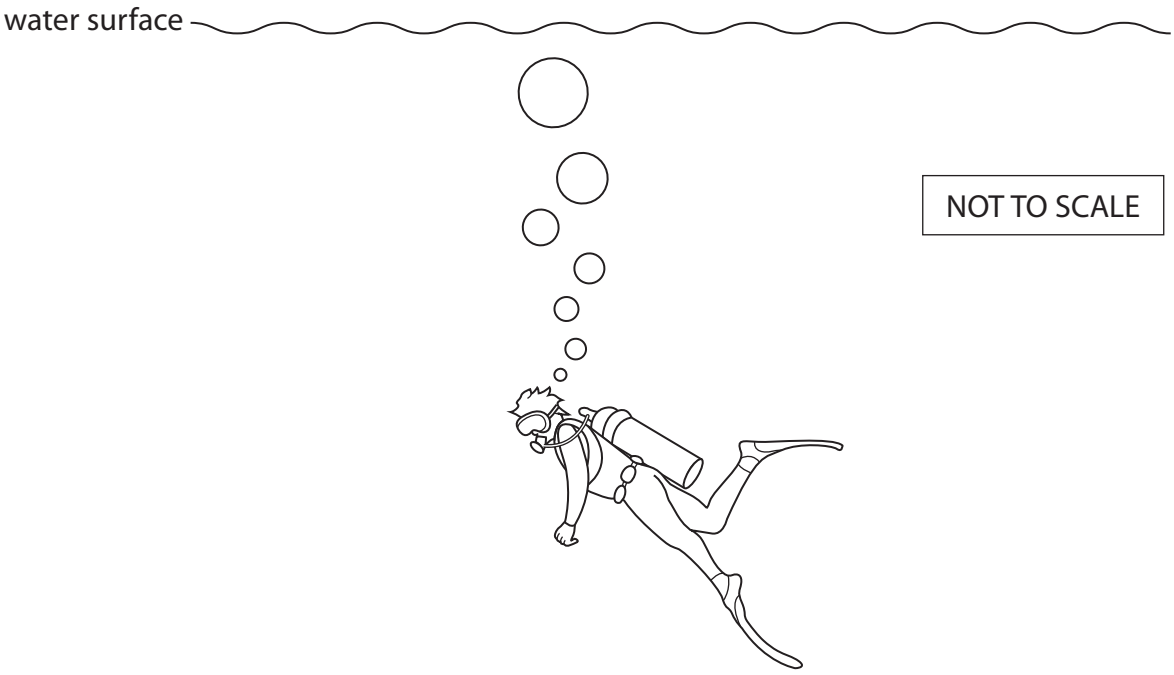

Figure 7

(i) Which row of the table is correct as one bubble rises?

(1)

		the air pressure in the bubble	the volume of the bubble
☒	**A**	decreases	decreases
☒	**B**	decreases	increases
☒	**C**	increases	decreases
☒	**D**	increases	increases

(ii) Which of these is a unit of pressure?

(1)

☒ **A** g/cm^3

☒ **B** J

☒ **C** kg/cm

☒ **D** Pa

(iii) The diver measures air pressure in atmospheres.

A bubble has an initial volume, V_1, of 0.50 litres, at a pressure, P_1, of 3.30 atmospheres.

The bubble rises towards the surface of the water, where the pressure, P_2, is 1.07 atmospheres.

Calculate the volume, V_2, of the bubble near the surface.

Use the equation

$$V_2 = \frac{P_1 \times V_1}{P_2}$$

(2)

volume, V_2, of the bubble = ... litres

(Total for Question 3 = 9 marks)

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4 This question is about magnets and magnetism.

(a) Figure 8 shows a magnet that has picked up three paper clips.

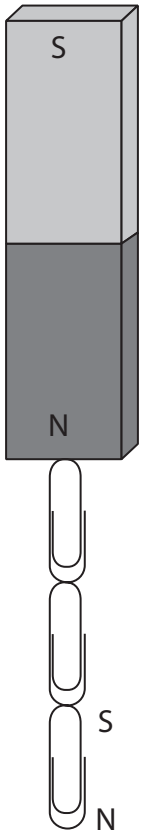

Figure 8

(i) The poles of the lowest paper clip are labelled.

Label the poles of the other two paper clips in Figure 8.

(2)

(ii) Complete the sentence, by choosing a word from the box, to describe the type of magnetism that these paper clips have.

(1)

alternated	earthed	induced	transformed

These paper clips have ..... magnetism.

(iii) Suggest a material that these paper clips in Figure 8 could be made from.

(1)

.....

(iv) When the paper clips were pulled off the magnet they fell separately to the table.

Describe how you could test whether any of the paper clips had kept any magnetism.

(2)

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(b) Figure 9 shows the magnetic field around a wire carrying a current.

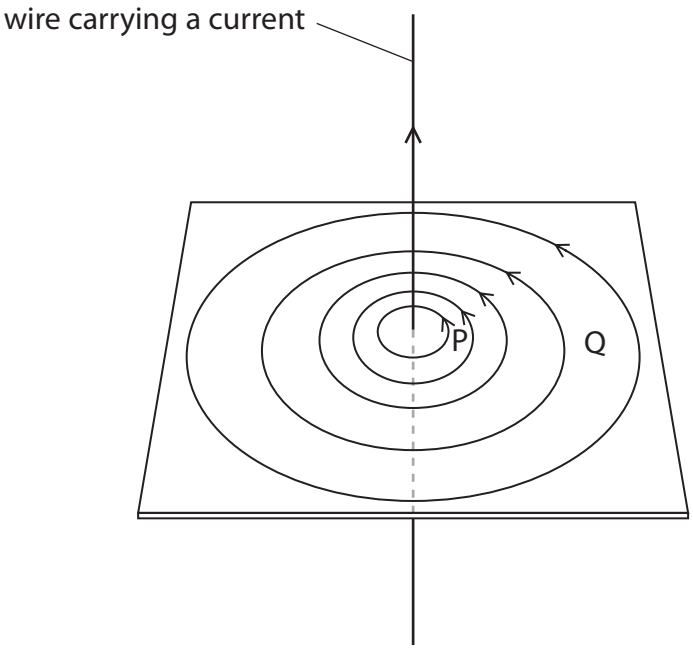

Figure 9

(i) State how you can tell from Figure 9 that the strength of the field is greater at P than at Q.

(1)

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(ii) The magnetic field strength is measured at P for different values of current in the wire.

The results of this investigation are shown in Figure 10.

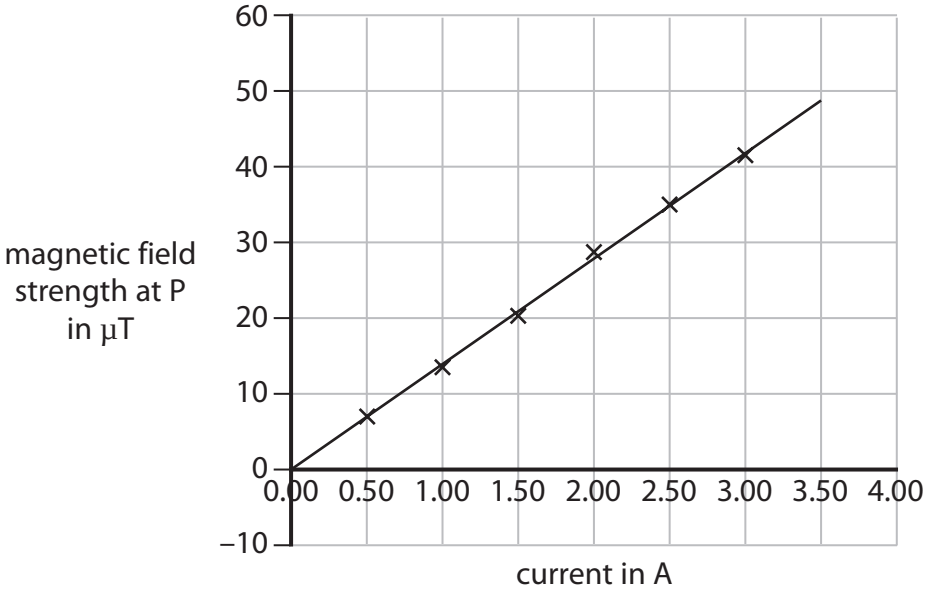

Figure 10

Describe the relationship between magnetic field strength and current.

(2)

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(Total for Question 4 = 9 marks)

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5 Figure 11 shows part of the UK National Grid system for the supply of electricity to homes.

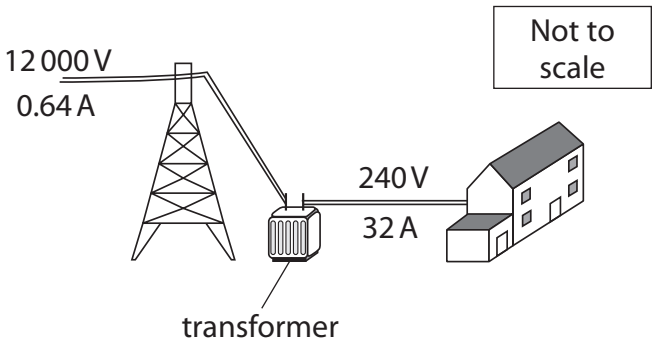

Figure 11

(a) Electricity supplied to homes has a frequency of

(1)

- ☒ **A** 0.02 Hz
- ☒ **B** 20 Hz
- ☒ **C** 50 Hz
- ☒ **D** 500 Hz

(b) Explain why the National Grid uses high voltages with small currents to transfer electricity from power stations.

(2)

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(c) Figure 12 shows details of a transformer.

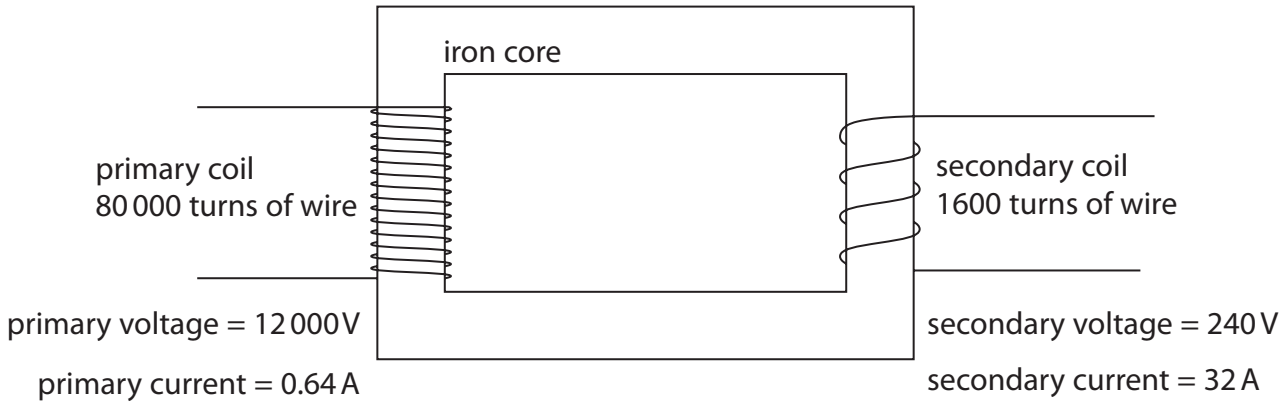

Figure 12

(i) Calculate the power in the primary coil.

Use the equation

$$P = V \times I$$

(2)

power in the primary coil = ... W

(ii) Calculate the following for the transformer in Figure 12.

$$\frac{\text{number of turns in secondary coil}}{\text{number of turns in primary coil}}$$

(2)

.....

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(iii) For the transformer in Figure 12, evaluate, in its simplest form, the ratio

secondary voltage : primary voltage

(2)

..... : .....

(Total for Question 5 = 9 marks)

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6 This question is about energy transfers.

Figure 13 shows the apparatus used for investigating the transfer between gravitational potential energy and kinetic energy.

A metal ball is attached to a thread.

The ball is released from a starting position and swings on the thread.

The ball cuts a light beam at the bottom of its swing.

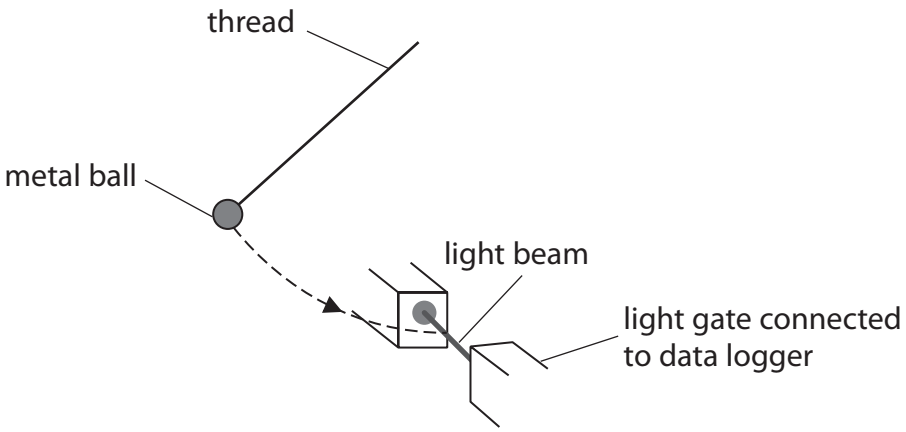

Figure 13

When the ball cuts the light beam, the speed of the ball is recorded by the data logger.

The ball was released 3 times from the same height and the speed measured each time.

The measurements of speed are given in Figure 14.

speed in m/s	1.31	1.27	1.16

Figure 14

(a) Calculate the mean speed.

(2)

mean speed = ... m/s

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(b) Suggest **one** reason why the measurements of speed were repeated.

(1)

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(c) The mass of the ball is 0.052 kg.

The ball falls through a vertical height (Δh) of 5.0 cm as it swings.

The gravitational field strength, g, is 10 N/kg.

Calculate the change in the gravitational potential energy of the ball.

Use the equation

$$\Delta GPE = m \times g \times \Delta h$$

(3)

change in gravitational potential energy = ... J

(d) Figure 15 shows an end-on view of the ball's swing from its starting position.

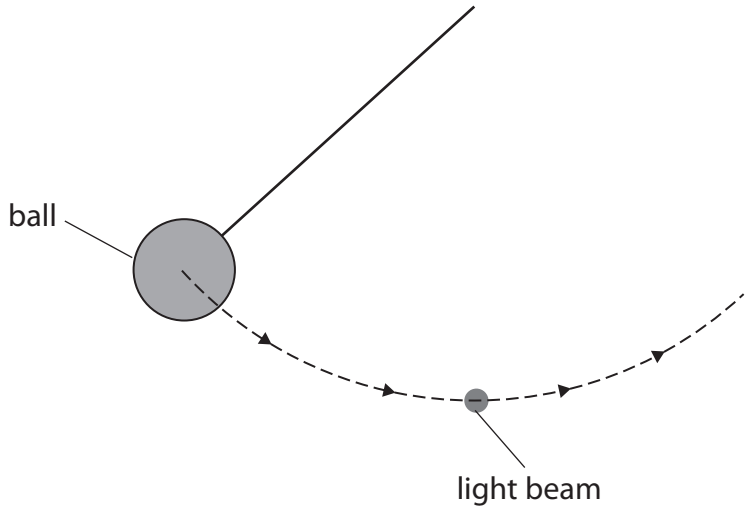

Figure 15

(i) To measure the change in vertical height, Δh, through which the ball moves, a ruler could be used.

Draw a ruler on Figure 15, placed in a position to measure the change in vertical height Δh.

(1)

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(ii) Figure 16 shows a set square.

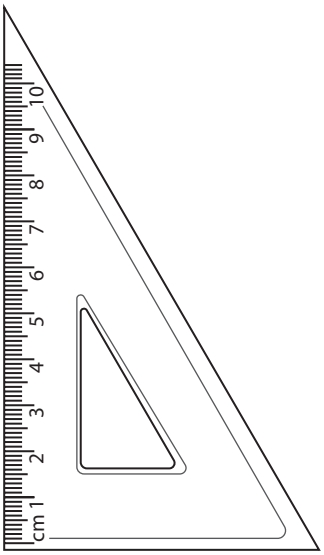

Figure 16

Describe how the measurement of the change in vertical height, Δh, could be improved using the set square.

You may add to Figure 15 or Figure 16 to help your description.

(2)

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(Total for Question 6 = 9 marks)

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7 (a) Which of these is a vector?

(1)

- ☒ **A** distance
- ☒ **B** force
- ☒ **C** mass
- ☒ **D** work done

(b) Figure 17 shows a balanced seesaw with two children on it.

The pivot is at the centre of the seesaw.

The seesaw is balanced with no children sitting on it.

Child P has a weight of 150 N.

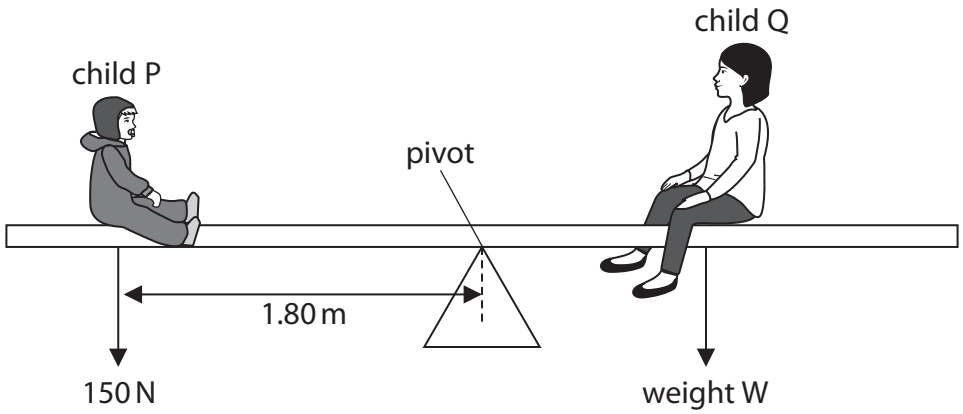

Figure 17

(i) Calculate the moment of the weight of child P about the pivot in N m.

Use the equation

moment of a force = force × distance to pivot

(2)

moment = ... N m

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(ii) Figure 18 shows the same balanced seesaw, with the distance of child Q to the pivot labelled as well.

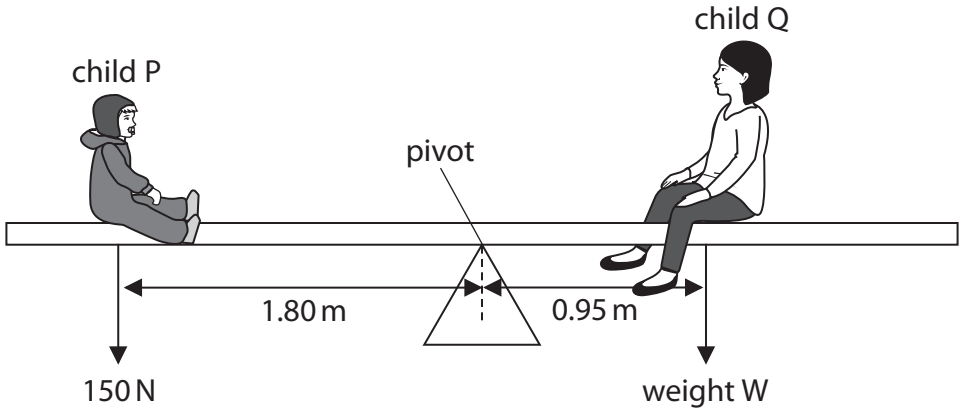

Figure 18

Calculate the value of W, the weight of child Q.

Use the idea of moments and the equation

the moment of W = the moment of the weight of child P

Give your answer to 2 significant figures.

(3)

W = ... N

*(c) Figure 19 shows a crowbar being used to lift a heavy weight.

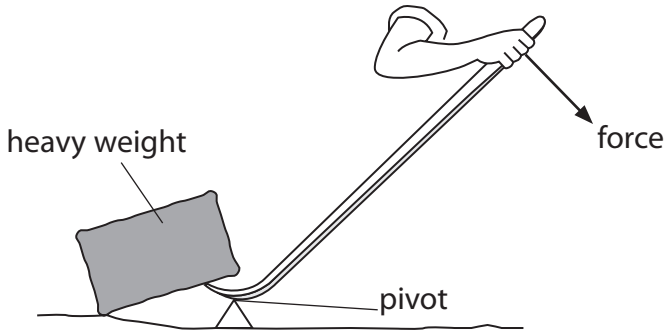

Figure 19

Explain how the crowbar enables a person to lift a heavy weight.

You should include the idea of moments in your answer.

It may help to label some distances in Figure 19 and use those distances in your explanation.

(6)

(Total for Question 7 = 12 marks)

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8 (a) The voltage (potential difference) across a length of wire is 1.5 V.

A charge of 0.042 C flows through the wire.

Calculate the energy transferred.

Use the equation

$$E = Q \times V$$

(2)

E = ... J

(b) Figure 20 shows some of the apparatus that students use to determine the resistance of a piece of iron wire.

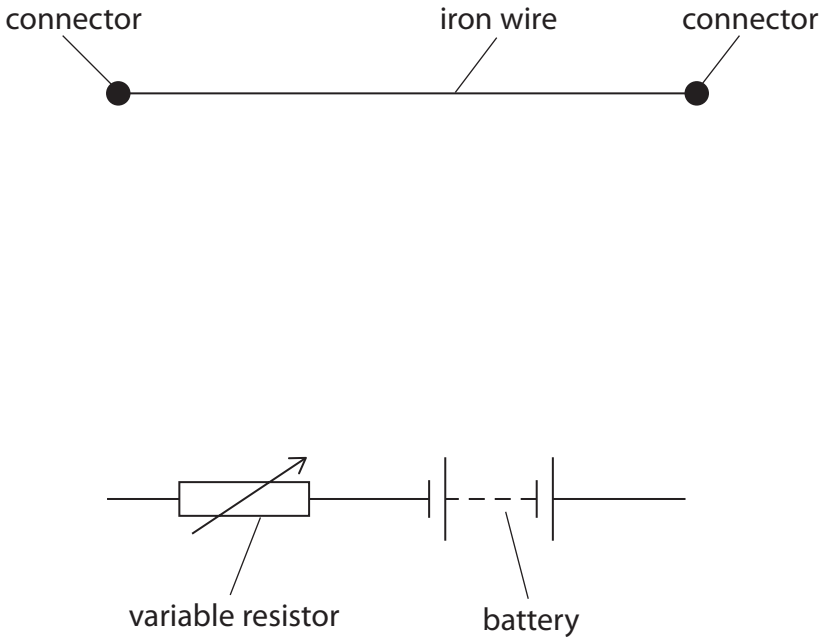

Figure 20

Add connecting wires, a voltmeter and an ammeter to complete the circuit in Figure 20 so that the students can determine the resistance of the piece of iron wire.

(2)

(c) The students extend the investigation to determine how the resistance of the iron wire changes with its length.

(i) Give the name of **one** additional piece of apparatus the students would need.

(1)

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(ii) Figure 21 shows a graph of the results.

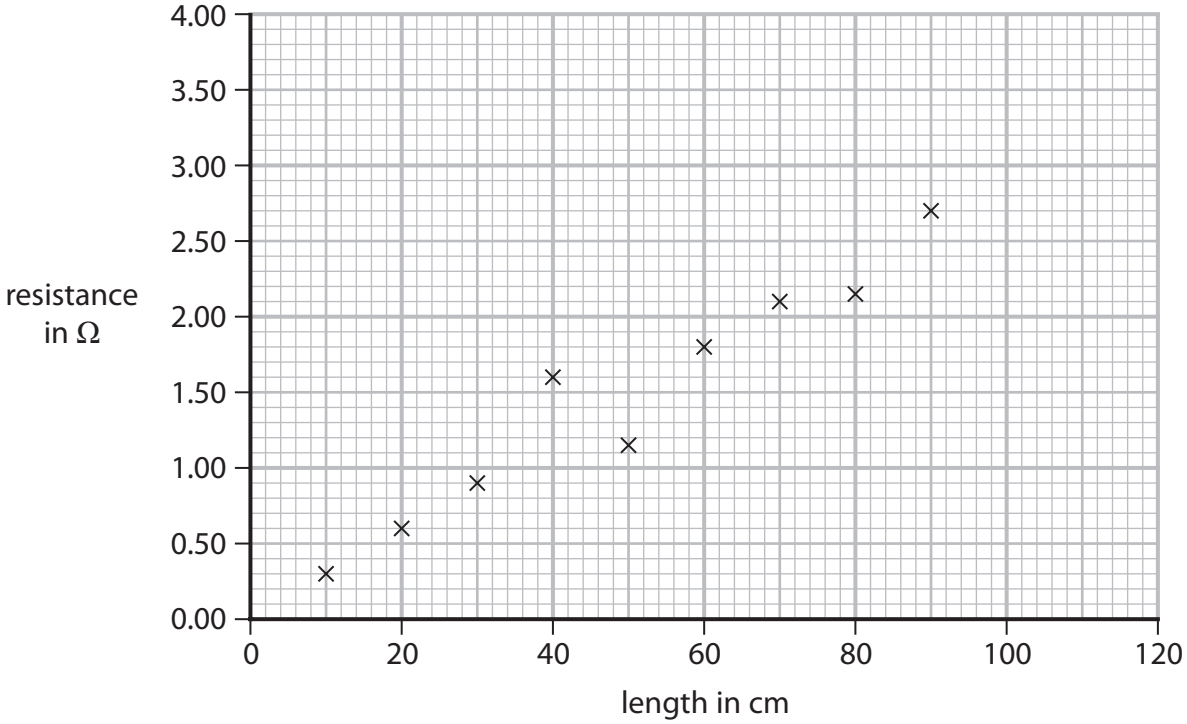

Figure 21

Draw a straight line of best fit on Figure 21.

(1)

(iii) Use Figure 21 to estimate the resistance of a 100 cm length of the iron wire.

(1)

resistance = ... Ω

(iv) The variable resistor shown in Figure 20 is used to prevent the iron wire from becoming too hot.

Explain how the variable resistor is used to prevent the iron wire from becoming too hot.

(2)

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.....

(d) The potential difference (voltage) across another piece of wire is 1.56 *V*.

The current in the wire is 0.45 *A*.

Calculate the resistance of this piece of wire.

Use the equation

$$V = I \times R$$

(2)

resistance = ... Ω

(Total for Question 8 = 11 marks)

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9 (a) Which of these means changing state from solid directly to gas?

(1)

- ☒ **A** condensing
- ☒ **B** freezing
- ☒ **C** melting
- ☒ **D** sublimating

(b) An object has a mass of 7.22×10^{-2} kg and a volume of 2.69×10^{-5} m^3.

Calculate the density, ρ, of the object.

Use the equation

$$\rho = \frac{m}{V}$$

(3)

State the unit.

density = ... unit .....

(c) Aluminium has a melting point of 660 °C.

The absolute zero of temperature is –273 °C.

(i) Calculate the melting point of aluminium in kelvin.

(1)

melting point of aluminium = ... K

(ii) Describe the motion of particles in liquid aluminium (above 660 °C).

(2)

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*(d) The table shows some properties of two materials used as thermal insulation.

The higher the R-value, the better the thermal insulating properties of the material.

material	R-value	fire resistance
fibreglass, made from sand	R-3.3	non-flammable
polystyrene, made from petroleum oil	R-4.0	melts at 270 °C and spreads fire very quickly

Assess which of these materials may be the more suitable to use as thermal insulation in a building.

Your answer should compare the properties of fibreglass and polystyrene given in the table.

(6)

(Total for Question 9 = 13 marks)

10 This question is about pressure.

(a) Figure 22 shows windows in an aeroplane.

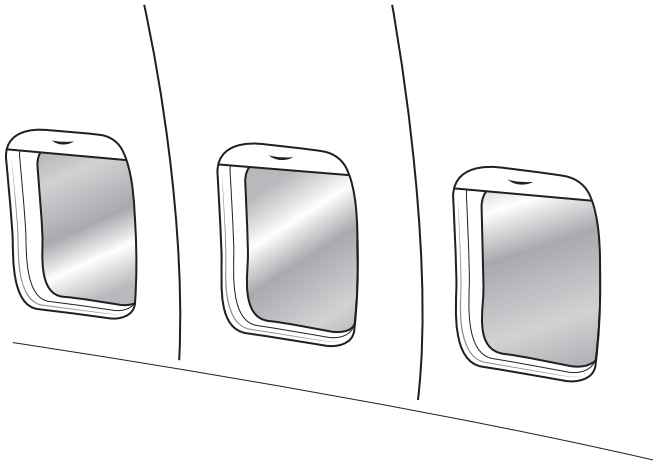

Figure 22

The aeroplane is high above the Earth's surface.

The atmospheric pressure outside the aeroplane is 23 000 Pa.

The air pressure inside the aeroplane is 80 000 Pa.

(i) Calculate the pressure difference between inside and outside of the aeroplane.

(1)

pressure difference = ... Pa

(ii) The surface area of the window is 0.094 m^2.

Calculate the size of the force on the window due to the cabin air pressure of 80 000 Pa.

Use the equation

$$P = \frac{F}{A}$$

(2)

force = ... N

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(iii) On the same aeroplane, a different window has a smaller surface area.

Explain how the force due to the air pressure inside the cabin on the small window differs from the force on the larger window.

(2)

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(iv) Figure 23 shows a cross-section through the aeroplane including one window.

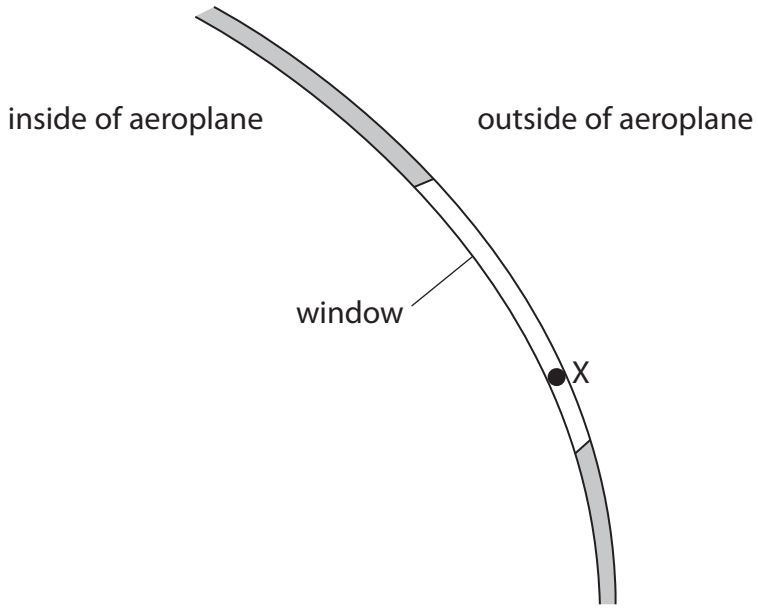

Figure 23

Draw an arrow on Figure 23 to show the direction of the resultant force due to the air pressure inside the cabin on the window at point X.

(2)

(b) Figure 24 shows the atmospheric pressure at different heights above the Earth's surface.

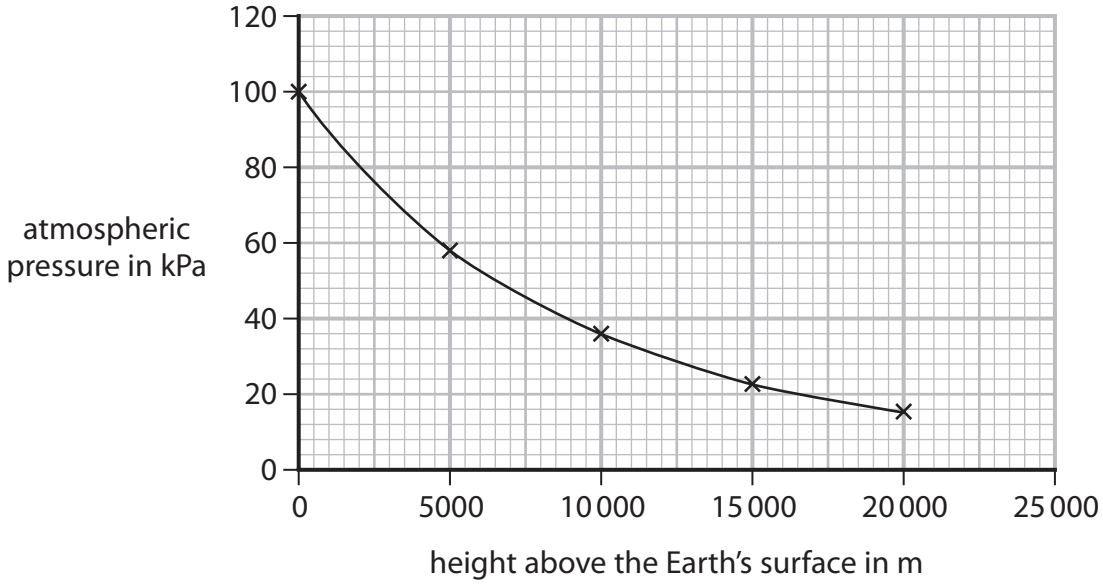

Figure 24

(i) Describe how the atmospheric pressure changes with height above the Earth's surface.

Use data from Figure 24 to support your answer.

(3)

(ii) Suggest **one** reason why the atmospheric pressure changes with height above the Earth's surface.

(1)

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

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Equations

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $v^2 - u^2 = 2 \times a \times x$
energy transferred = current × potential difference × time $E = I \times V \times t$
potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil $V_p \times I_p = V_s \times I_s$
change in thermal energy = mass × specific heat capacity × change in temperature $\Delta Q = m \times c \times \Delta\theta$
thermal energy for a change of state = mass × specific latent heat $Q = m \times L$
to calculate pressure or volume for gases of fixed mass at constant temperature $P_1 V_1 = P_2 V_2$
energy transferred in stretching = 0.5 × spring constant × (extension)^2 $E = ½ \times k \times x^2$

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