Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Thursday 22 May 2025

Morning (Time: 1 hour 40 minutes)

Paper reference **4WPH1/1PR**

Physics (Modular)

UNIT 1: 4WPH1

PAPER: 1PR

You must have:
Ruler, calculator, protractor, Equation Booklet (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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.*
- Show all the steps in the calculations and state the units where required.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Y:1/1/1/1/1/

P 8 1 5 6 3 A 0 1 2 8

Pearson

FORMULAE

You may find the following formulae useful.

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

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time}} \qquad a = \frac{(v - u)}{t}$$

(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)

$$v^2 = u^2 + (2 \times a \times s)$$

Force = mass × acceleration $\qquad F = m \times a$

weight = mass × gravitational field strength $\qquad W = m \times g$

momentum = mass × velocity $\qquad p = m \times v$

moment = force × perpendicular distance from the pivot

$$\text{force} = \frac{\text{change in momentum}}{\text{time taken}} \qquad F = \frac{(mv - mu)}{t}$$

power = current × voltage $\qquad P = I \times V$

energy transferred = current × voltage × time $\qquad E = I \times V \times t$

voltage = current × resistance $\qquad V = I \times R$

charge = current × time $\qquad Q = I \times t$

energy transferred = charge × voltage $\qquad E = Q \times V$

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$$

work done = force × distance moved $\qquad W = F \times d$

gravitational potential energy = mass × gravitational field strength × height

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

kinetic energy = ½ × mass × speed^2 $\qquad KE = \frac{1}{2} \times m \times v^2$

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{density} = \frac{\text{mass}}{\text{volume}} \qquad \rho = \frac{m}{V}$$

$$\text{pressure} = \frac{\text{force}}{\text{area}} \qquad p = \frac{F}{A}$$

pressure difference = height × density × gravitational field strength

$$p = h \times \rho \times g$$

change in thermal energy = mass × specific heat capacity × change in temperature

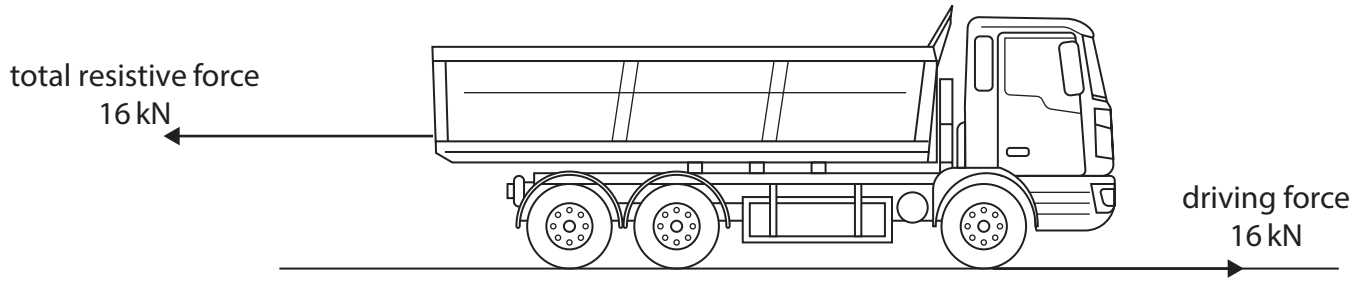
$$\Delta Q = m \times c \times \Delta T$$

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

Answer ALL questions.

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 The diagram shows a truck travelling along a horizontal road.



(a) The diagram shows the horizontal forces acting on the truck.

Give the resultant horizontal force acting on the truck.

(1)

resultant horizontal force = ... kN

(b) The driver of the truck has to stop because a tree has fallen on the road.

(i) The thinking distance of the driver is 7 m.

The braking distance of the truck is 20 m.

Calculate the stopping distance of the truck.

(1)

stopping distance = ... m

(ii) Give two factors that would affect the braking distance of the truck.

(2)

1 .....

.....

2 .....

.....

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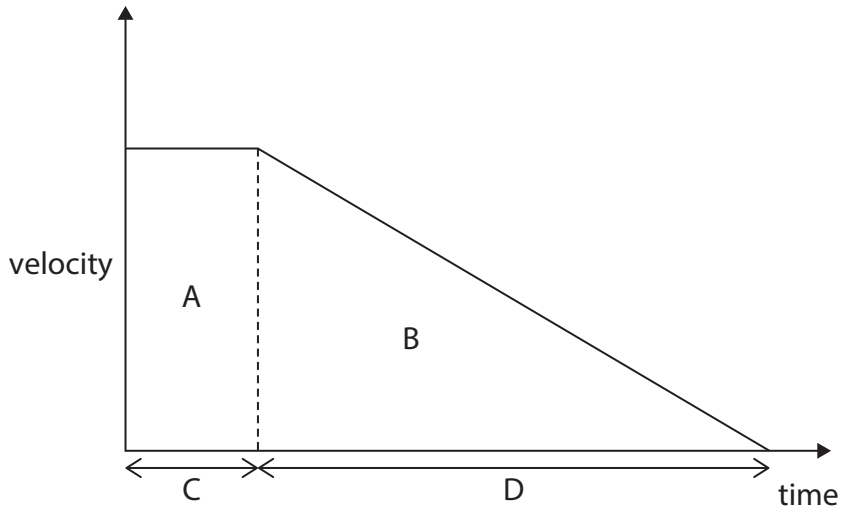
(iii) Which of these factors would **decrease** the driver's thinking distance?

(1)

- ☒ **A** the road is dry, rather than wet
- ☒ **B** the truck has old, worn tyres, rather than new tyres
- ☒ **C** the driver is tired
- ☒ **D** the truck is travelling at a lower speed

(c) The graph shows how the velocity of the truck varies as it stops.



Which of the letters on the graph represents the braking distance?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(Total for Question 1 = 6 marks)

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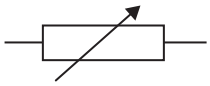
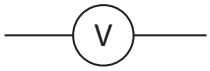
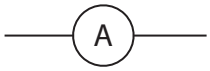
2 This question is about electrical circuits.

(a) The table shows the circuit symbols for some electrical components.

Complete the table by placing ticks (✓) to show whether each component can visibly indicate the presence of a current in a circuit.

(3)

Electrical component	Can visibly indicate the presence of a current
	
	
	
	
	
	

(b) Diagram 1 shows an electrical circuit containing a cell and component X.

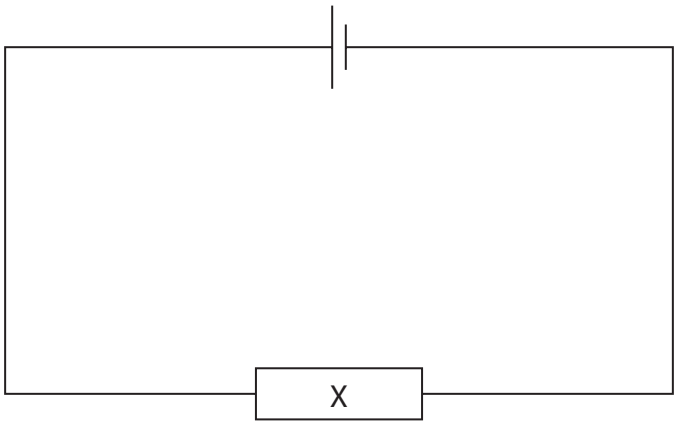


Diagram 1

The graph shows how the resistance of component X varies with temperature.

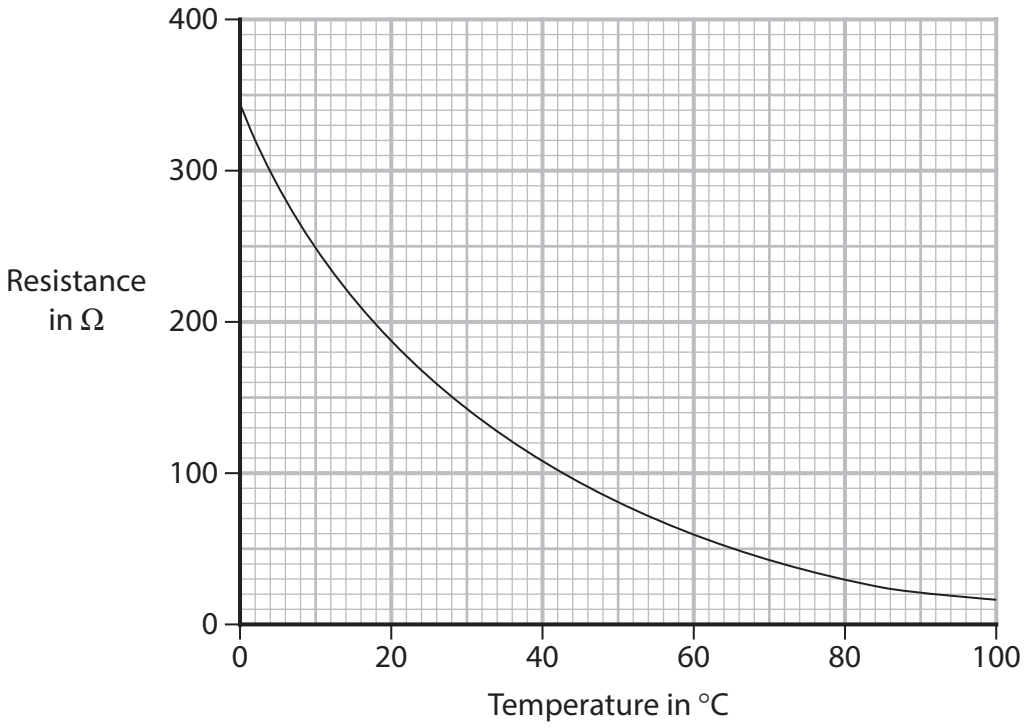


Diagram 2

(i) Give the name of component X.

(1)

.....

(ii) Using the graph, determine the resistance of component X when its temperature is 50 °C.

(1)

resistance = ... Ω

(iii) The cell in diagram 1 has a voltage of 9.0 V.

Calculate the current in component X when its temperature is 50 °C.

Use the formula

voltage = current × resistance

(3)

current = ... A

(iv) The circuit in diagram 1 is modified by adding a second identical component X in series with the other components.

The temperatures of the first component X and second component X are reduced to 26 °C.

Explain how the resistance of the circuit is affected by these changes.

(4)

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(Total for Question 2 = 12 marks)

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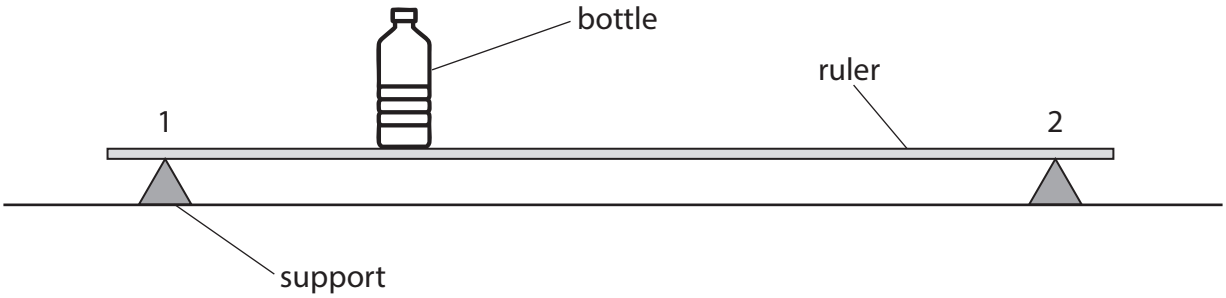
3 Diagram 1 shows a ruler placed on two supports.

A bottle is placed on the ruler in the position shown.



(Source: © AAVAA/Shutterstock)

Diagram 1

(a) Each support applies an upward force on the ruler.

The bottle is moved along the ruler towards position 2.

Which of these describes the changes to the forces applied by the supports as the bottle is moved?

(1)

	Force at position 1	Force at position 2
☒ **A**	increases	increases
☒ **B**	increases	decreases
☒ **C**	decreases	increases
☒ **D**	decreases	decreases

(b) The total weight of the ruler and the bottle is 7.2 N.

The bottle is moved until the force at position 1 is 4.7 N.

Calculate the upward force at position 2.

(2)

force = ... N

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(c) (i) Draw an arrow on diagram 2 that represents the ruler's weight.

Assume the ruler is uniform.

(1)

Diagram 2

(ii) The ruler has a mass of 120 g.

Calculate the weight of the ruler.

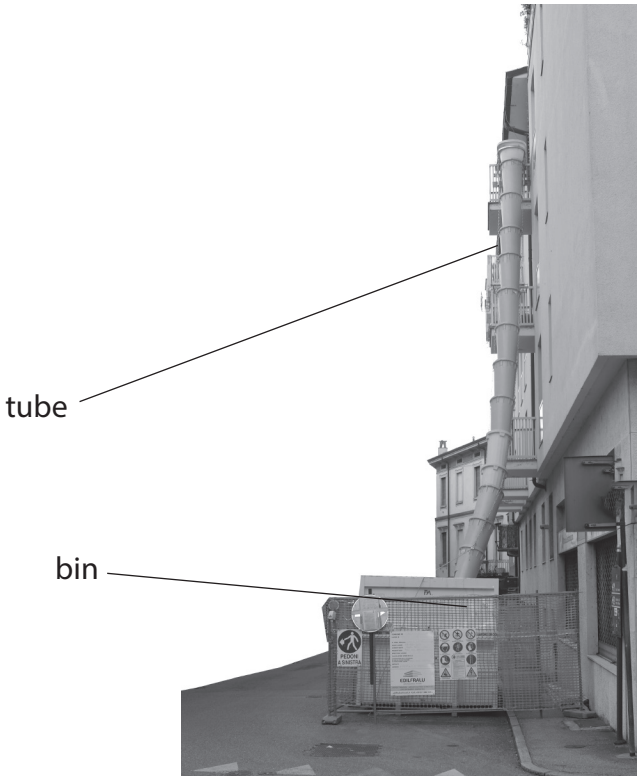
(3)

weight = ... N

(Total for Question 3 = 7 marks)

4 A builder drops a bag of waste through a tube to a bin on the road.

The photograph shows the tube and the bin.



(Source: © columbo.photog/Shutterstock)

(a) The gravitational potential energy store of the bag decreases by 4750 J as it falls from the top of the tube to the end of the tube in the bin.

The bag has a mass of 55 kg.

(i) State the formula linking gravitational potential energy, mass, gravitational field strength and height.

(1)

(ii) Calculate the vertical height of the tube.

(3)

vertical height = ... m

(iii) State the maximum kinetic energy of the bag as it leaves the end of the tube.

(1)

.....

(iv) Calculate the maximum speed of the bag as it leaves the end of the tube.

(3)

speed = ... m / s

(b) Explain why the speed of the bag as it leaves the end of the tube will be less than the value calculated.

(3)

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(Total for Question 4 = 11 marks)

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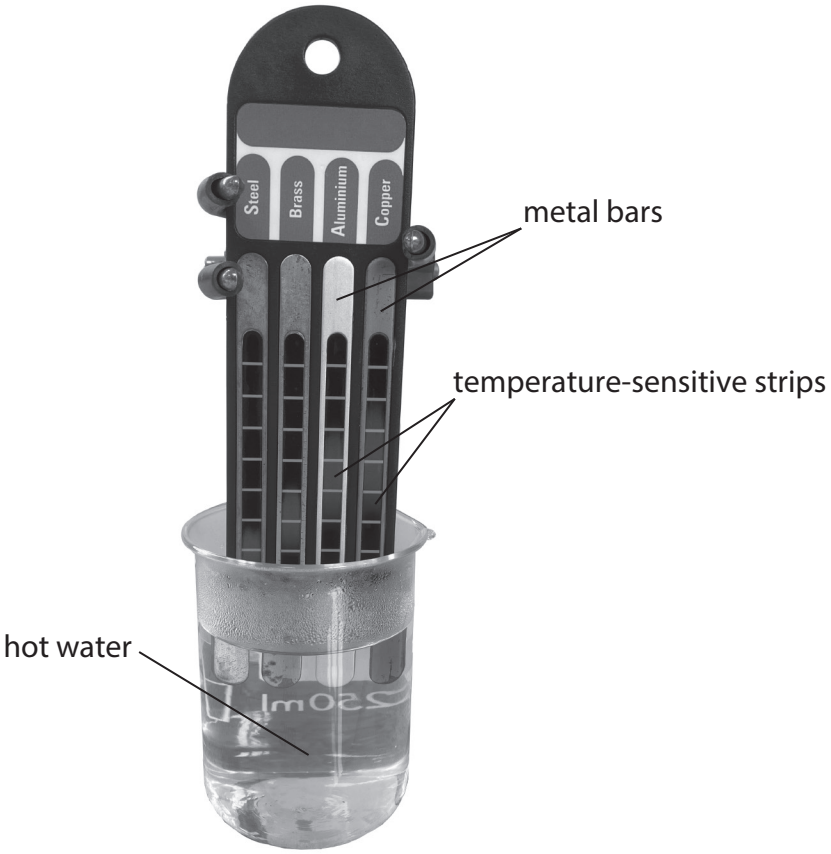
5 A student does an experiment to investigate energy transfer by conduction.

(a) The student plans to use the piece of apparatus shown in the photograph.



The apparatus has four bars made from different metals.

When the apparatus is placed in hot water, energy is transferred from the bottom of the bar to the top of the bar. The temperature-sensitive strip on each bar changes colour as the temperature of the bar changes.

The time taken for the colour change to reach the top of the bar can be used to compare how effective each metal is at transferring energy by conduction.

(i) Give three control variables in the student's investigation.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(ii) The student has this equipment.

- beaker
- hot water
- stopclock
- clamp and clamp stand

Design a method the student could use to compare the effectiveness of the metals at transferring energy by conduction.

You may draw a diagram to help your answer.

(5)

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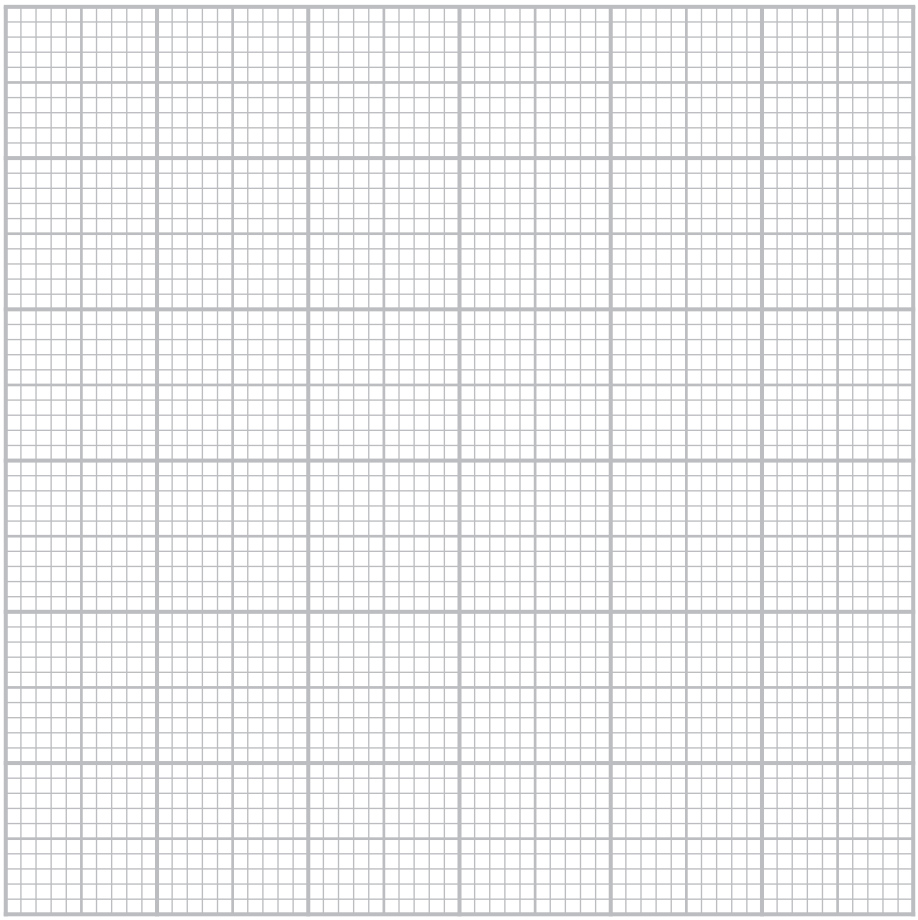
(b) The table shows the results of the student's investigation.

Metal	Time taken for colour change in seconds
aluminium	29
brass	64
copper	22
steel	115

(i) Plot a bar chart of the student's results.

(3)



(ii) Deduce which metal is the most effective at transferring energy by conduction.

(2)

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(Total for Question 5 = 13 marks)

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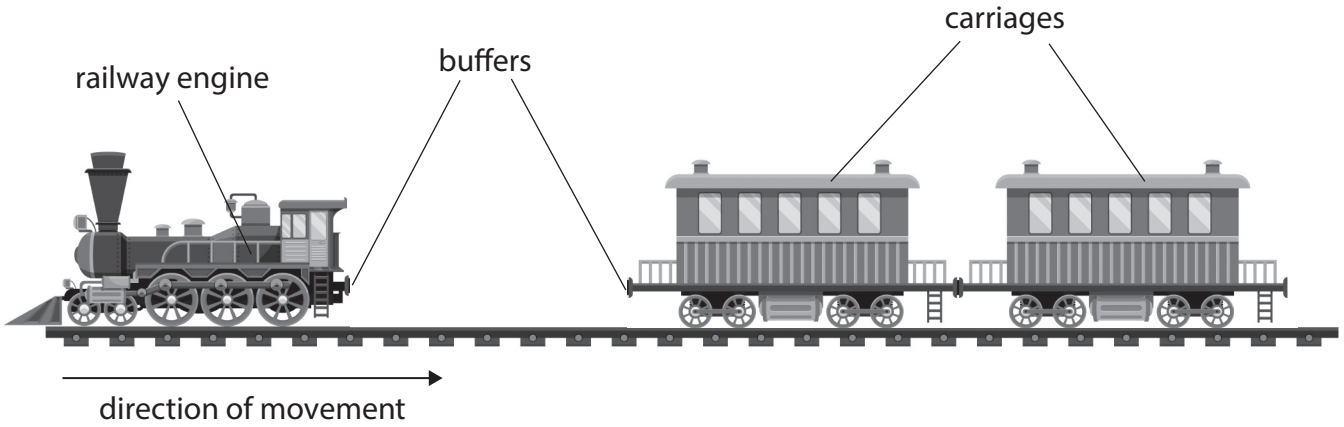
6 The diagram shows a railway engine moving towards some stationary carriages.



When the engine collides with the carriages, the buffers on the engine push on the buffers on the first carriage.

The engine and the carriages then move together in the direction shown by the arrow.

(a) (i) State the formula linking mass, velocity and momentum.

(1)

(ii) The engine has a mass of 9.0×10^4 kg and moves at a velocity of 0.72 m / s.

Calculate the momentum of the engine before it collides with the carriages.

Include a unit in your answer.

(3)

momentum = ...

unit = ...

(iii) After they collide, the engine and carriages move off together.

The total mass of the carriages is 6.0×10^4 kg.

Calculate the velocity of the engine and carriages after they collide.

(3)

velocity = ... m / s

(b) The buffers on the engine and carriages have strong springs.

These springs compress when the buffers push against each other.

Explain how the springs in the buffers make the collision more comfortable for passengers in the carriages.

(3)

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(Total for Question 6 = 10 marks)

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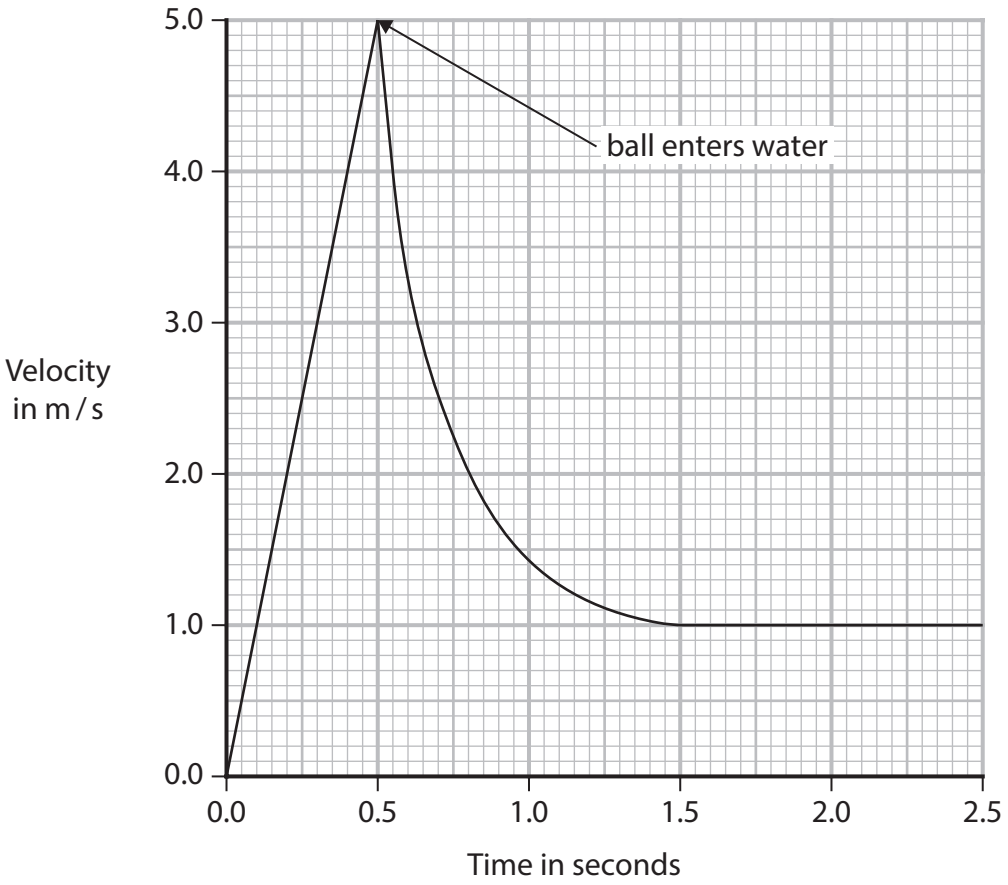
7 A metal ball is dropped from a height into a pool of water.

The graph shows how the velocity of the ball varies with time.



(a) (i) Describe the motion of the ball **before** it enters the water.

(2)

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.....

.....

(ii) Using information from the graph, determine the initial height of the ball above the water.

(3)

height = ... m

(b) Explain why the velocity of the ball decreases to a constant value as the ball travels through the water.

(4)

(c) The pool of water has a depth of 2.85 m.

Calculate the pressure difference between the surface of the water and the bottom of the pool.

[for water, density = 1000 kg/m^3]

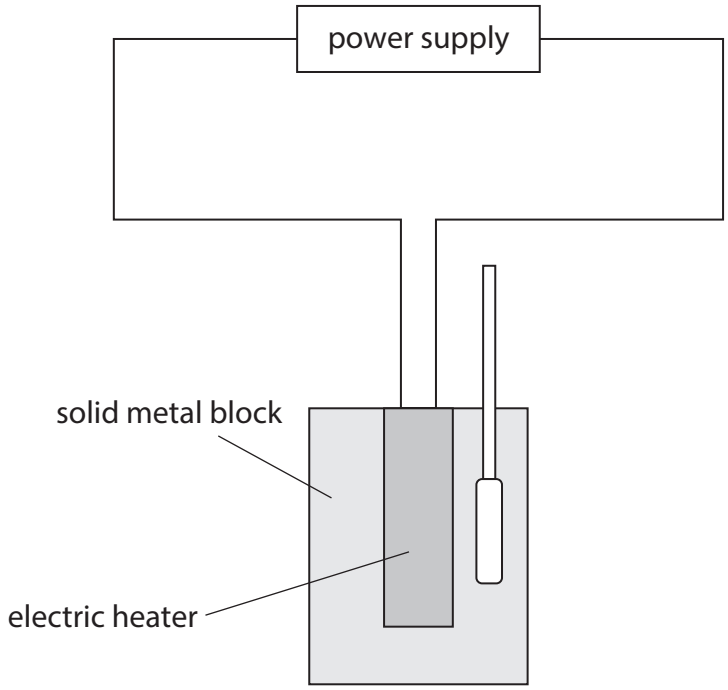
Give your answer to two significant figures.

(3)

pressure difference = ... Pa

(Total for Question 7 = 12 marks)

8 A student uses this equipment in an investigation to determine the specific heat capacity of a metal.



The student uses an electric heater to heat the solid metal block.

They record the temperature of the metal block at different times as it is heated.

(a) Name the piece of equipment used to measure temperature.

(1)

.....

(b) State how energy is transferred from the power supply to the heater.

(1)

.....

(c) The student uses a device called a joulemeter to measure the energy transferred to the heater.

Describe a different way the student could find the energy transferred to the heater.

Include the measuring devices needed.

(2)

.....

.....

.....

.....

(d) Explain how the student could reduce the thermal energy transfer from the metal block to the surroundings.

(2)

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.....

.....

.....

(e) The heater transfers 16 kJ of energy to the metal block.

The temperature of the metal block increases by 54 °C.

The metal block has a mass of 0.70 kg.

Calculate the specific heat capacity of the metal.

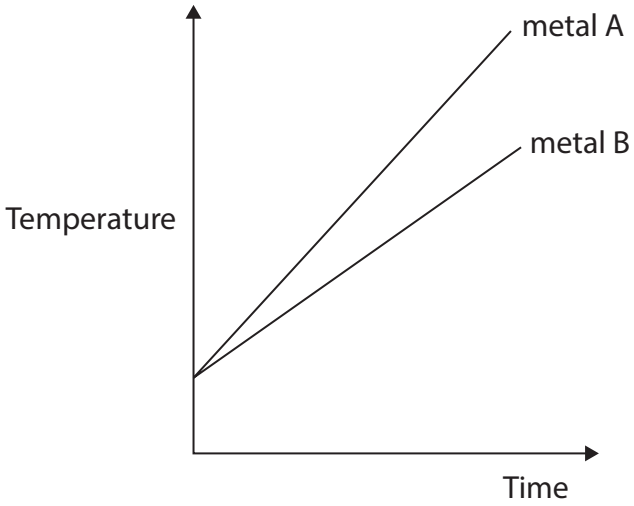
(4)

specific heat capacity = ... J / kg °C

(f) The student repeats the investigation with a block of the same mass, made of a different metal.

The power of the heater remains the same.

The graph shows how the temperature of each metal block varies with time.



Explain which metal has the larger specific heat capacity.

(3)

(Total for Question 8 = 13 marks)

9 An incubator can be used to keep things warm.

The incubator has two electric heaters.

Diagram 1 shows a model of the heating circuit made by a student.

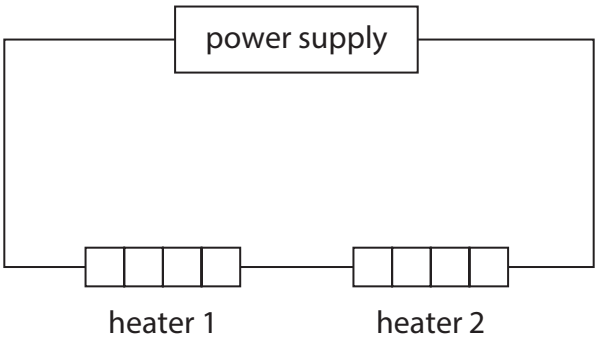


Diagram 1

(a) (i) State what will happen if there is a break in the wire connecting heater 1 to the power supply.

(1)

.....

.....

(ii) Diagram 2 shows a wire connected in parallel with heater 1 in the student's circuit.

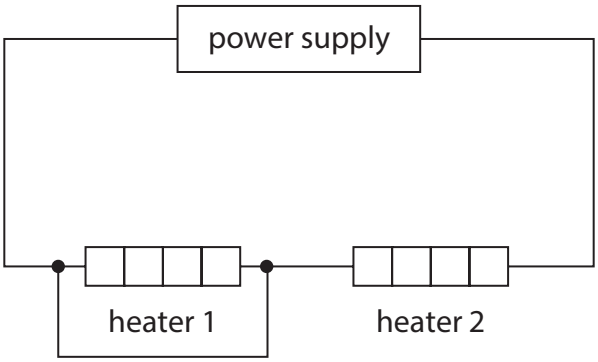


Diagram 2

Explain what happens to each heater when the wire is connected in parallel with heater 1.

Assume the wire has a low resistance.

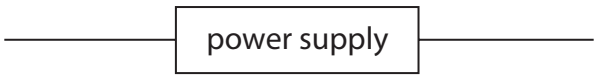
(3)

(b) The student decides to build a different circuit using the two heaters.

In this circuit, each heater can be turned on and off separately using switches.

Complete the circuit diagram to show how the two heaters and switches could be connected.

(2)



(Total for Question 9 = 6 marks)

TOTAL FOR PAPER = 90 MARKS

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Pearson Edexcel International GCSE (9–1)

Thursday 22 May 2025

Morning (Time: 1 hour 40 minutes)

Paper reference **4WPH1/1PR**

Physics (Modular)

UNIT 1: 4WPH1

PAPER: 1PR

Equation Booklet

Do not return this Booklet with the question paper.

Turn over ▶

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These equations may be required for both International GCSE Physics (4WPH1) and International GCSE Double Award (4WSD5) papers.

1. Forces and Motion	
average speed = $\frac{\text{distance moved}}{\text{time taken}}$	
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$
(final speed)^2 = (initial speed)^2 + (2 × acceleration × distance moved)	$v^2 = u^2 + (2 \times a \times s)$
force = mass × acceleration	$F = m \times a$
weight = mass × gravitational field strength	$W = m \times g$
2. Electricity	
power = current × voltage	$P = I \times V$
energy transferred = current × voltage × time	$E = I \times V \times t$
voltage = current × resistance	$V = I \times R$
charge = current × time	$Q = I \times t$
energy transferred = charge × voltage	$E = Q \times V$
3. Waves	
wave speed = frequency × wavelength	$v = f \times \lambda$
frequency = $\frac{1}{\text{time period}}$	$f = \frac{1}{T}$
refractive index = $\frac{\sin(\text{angle of incidence})}{\sin(\text{angle of refraction})}$	$n = \frac{\sin i}{\sin r}$
$\sin(\text{critical angle}) = \frac{1}{\text{refractive index}}$	$\sin c = \frac{1}{n}$

4. Energy resources and energy transfers	
efficiency = $\frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	
work done = force × distance moved	$W = F \times d$
gravitational potential energy = mass × gravitational field strength × height	$GPE = m \times g \times h$
kinetic energy = $\frac{1}{2}$ × mass × speed^2	$KE = \frac{1}{2} \times m \times v^2$
power = $\frac{\text{work done}}{\text{time taken}}$	$P = \frac{W}{t}$
5. Solids, liquids and gases	
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
pressure = $\frac{\text{force}}{\text{area}}$	$p = \frac{F}{A}$
pressure difference = height × density × gravitational field strength	$p = h \times \rho \times g$
$\frac{\text{pressure}}{\text{temperature}}$ = constant	$\frac{p_1}{T_1} = \frac{p_2}{T_2}$
pressure × volume = constant	$p_1 \times V_1 = p_2 \times V_2$
8. Astrophysics	
orbital speed = $\frac{2 \times \pi \times \text{orbital radius}}{\text{time period}}$	$v = \frac{2 \times \pi \times r}{T}$

The equations on the following page will only be required for International GCSE Physics.

These additional equations may be required in International GCSE Physics papers 2P and 2PR.

1. Forces and Motion	
momentum = mass × velocity	$p = m \times v$
force = $\dfrac{\text{change in momentum}}{\text{time taken}}$	$F = \dfrac{(mv - mu)}{t}$
moment = force × perpendicular distance from the pivot	
5. Solids, liquids and gases	
change in thermal energy = mass × specific heat capacity × change in temperature	$\Delta Q = m \times c \times \Delta T$
6. Magnetism and electromagnetism	
relationship between input and output voltages for a transformer	$\dfrac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \dfrac{\text{primary turns}}{\text{secondary turns}}$
input power = output power	$V_p I_p = V_s I_s$ for 100% efficiency
8. Astrophysics	
$\dfrac{\text{change in wavelength}}{\text{reference wavelength}} = \dfrac{\text{velocity of a galaxy}}{\text{speed of light}}$	$\dfrac{\lambda - \lambda_0}{\lambda_0} = \dfrac{\Delta\lambda}{\lambda_0} = \dfrac{v}{c}$

END OF EQUATION LIST