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 **4WPH1/1P**

Physics (Modular)

UNIT 1: 4WPH1
PAPER: 1P

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

Y:1/1/1/1/
P 8 1 5 8 0 A 0 1 2 8

FORMULAE

You may find the following formulae useful.

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

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

$$(\text{final speed})^2 = (\text{initial speed})^2 + (2 \times \text{acceleration} \times \text{distance moved})$$

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

$$\text{Force} = \text{mass} \times \text{acceleration} \qquad F = m \times a$$

$$\text{weight} = \text{mass} \times \text{gravitational field strength} \qquad W = m \times g$$

$$\text{momentum} = \text{mass} \times \text{velocity} \qquad p = m \times v$$

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

$$\text{moment} = \text{force} \times \text{perpendicular distance from the pivot}$$

$$\text{power} = \text{current} \times \text{voltage} \qquad P = I \times V$$

$$\text{energy transferred} = \text{current} \times \text{voltage} \times \text{time} \qquad E = I \times V \times t$$

$$\text{voltage} = \text{current} \times \text{resistance} \qquad V = I \times R$$

$$\text{charge} = \text{current} \times \text{time} \qquad Q = I \times t$$

$$\text{energy transferred} = \text{charge} \times \text{voltage} \qquad E = Q \times V$$

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

$$\text{work done} = \text{force} \times \text{distance moved} \qquad W = F \times d$$

$$\text{gravitational potential energy} = \text{mass} \times \text{gravitational field strength} \times \text{height}$$

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

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

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

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

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

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 This question is about electric kettles, which are domestic appliances.

(a) Which of these can protect a kettle by breaking the electrical circuit?

(1)

☐ **A** cell

☐ **B** diode

☐ **C** fuse

☐ **D** resistor

(b) (i) State the formula linking charge, current and time.

(1)

(ii) A current of 10.5 A is in the heating element of a kettle.

Calculate the charge that flows through the heating element in a time of 90 s.

Give a unit for your answer.

(3)

charge = ... unit ....

(c) A kettle contains a heating element.

A heating element is a metal wire that increases in temperature when there is a current in the wire.

Explain why the current in the wire causes the temperature of the wire to increase.

(2)

....

....

....

....

(d) Some kettles have a metal case.

Explain how an earth wire connected to this type of kettle protects the user of the kettle.

(4)

....

....

....

....

....

....

....

....

(Total for Question 1 = 11 marks)

2 This question is about energy resources.

(a) The table lists some energy resources.

Complete the table by placing a tick (✓) next to the energy resources that are non-renewable.

(2)

Energy Resource	Non-renewable
coal	
hydroelectric	
oil	
solar	
tidal	
wind	

(b) A power station has an efficiency of 38% with a useful energy output of 12 000 MJ in one minute.

Calculate the total energy output of the power station in one minute.

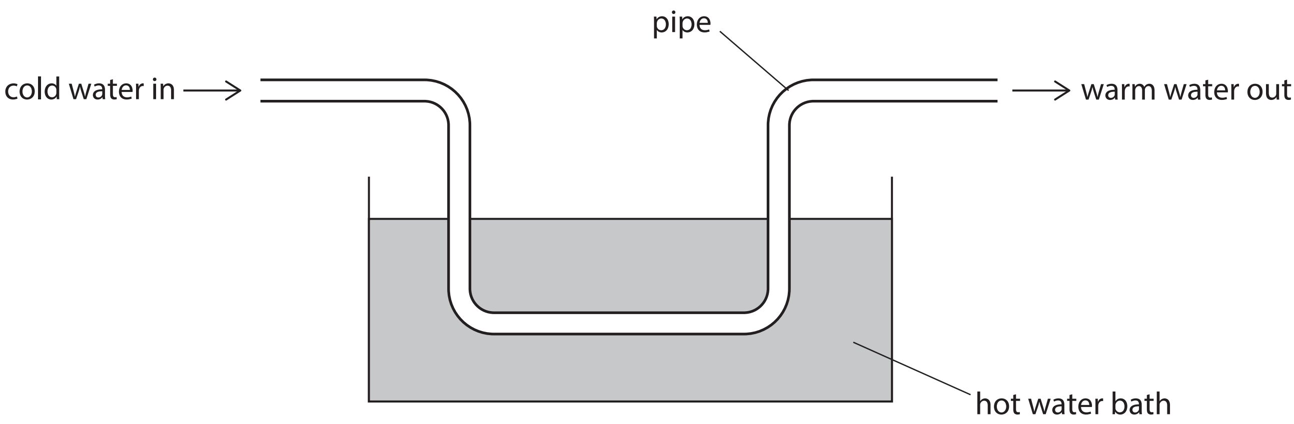
(3)

total energy output = ... MJ

(c) The diagram shows a model of a geothermal power station.

Water flows through a pipe placed in a hot water bath.

A student investigates the relationship between the temperature of the hot water bath and the temperature of the warm water leaving the pipe.



Give two variables the student should control.

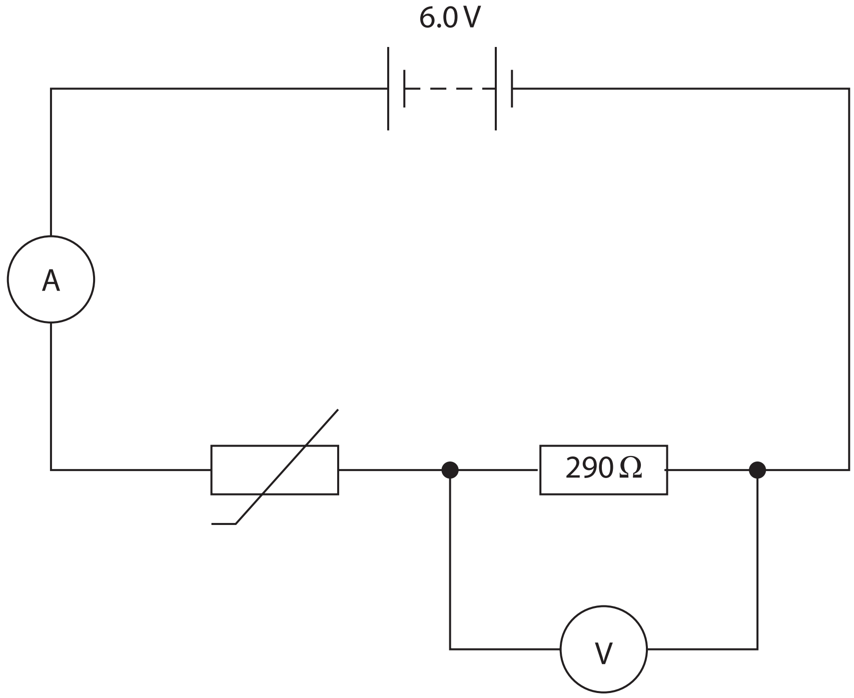
(2)

1 ....

2 ....

(Total for Question 2 = 7 marks)

3 A student builds this electric circuit to measure the temperature of a room.



(a) At 20 °C, the voltage across the thermistor is 3.9 V.

(i) Explain why the reading on the voltmeter is 2.1 V.

(2)

....

....

....

....

(ii) The resistor in the circuit has a resistance of 290 Ω.

Calculate the current in the resistor.

Use the formula

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

(3)

current = ... A

(iii) State the reading on the ammeter.

(1)

ammeter reading = ... A

(iv) Calculate the resistance of the thermistor.

(3)

resistance = ... Ω

(b) The student observes that as the temperature of the room increases, the voltmeter reading also increases.

(i) Explain this observation.

(3)

....

....

....

....

....

....

....

....

....

(ii) The student wants to use the circuit as a temperature-measuring device.

They have this additional equipment

- a large beaker
- water at different temperatures
- a thermometer

Describe what measurements the student needs to take so that the circuit could be used as a temperature-measuring device.

Assume that the thermistor in the circuit is waterproof.

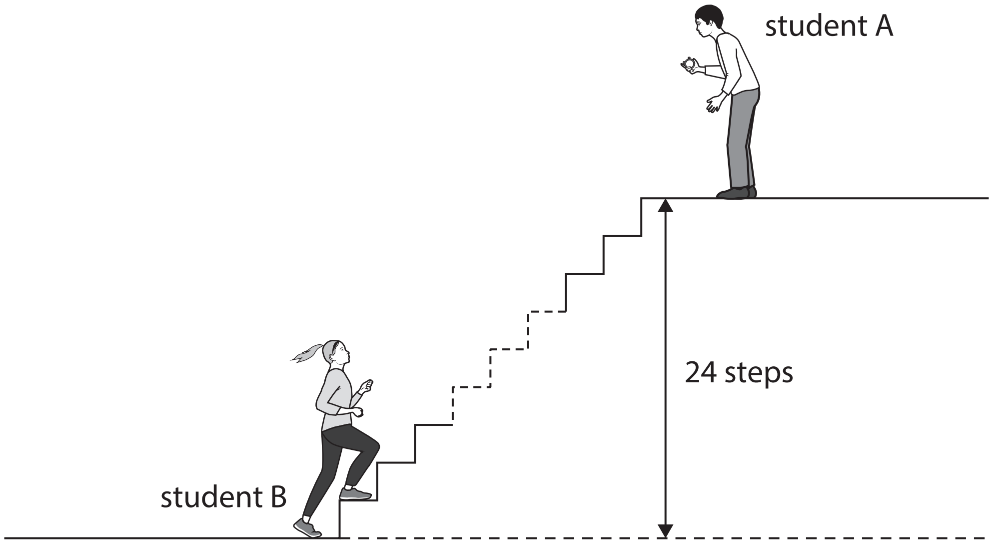
You may draw a diagram to help your answer.

(3)

(Total for Question 3 = 15 marks)

4 Two students do an experiment to determine their power when running up a set of steps.

The diagram shows how they set up their experiment. Not all of the steps are shown in the diagram.



This is the students' method.

- student A stands with a stopwatch at the top of the steps
- student A starts timing on the stopwatch and shouts "go" at the same time
- student B begins to run up the steps when she hears student A shout
- student A stops timing when student B reaches the top of the steps

The students repeat their method two more times.

(a) Give a reason why the times recorded may not be accurate.

(1)

....

....

....

(b) There are 24 steps in total and each step has a height of 19 cm.

(i) Student B has a mass of 67 kg.

Show that student B gains about 3000 J of energy in her gravitational store when she runs up the set of steps.

(3)

(ii) The table shows the times recorded for student B.

Time in s
4.28
4.95
4.65

Calculate the mean time from this data.

Give your answer to three significant figures.

(2)

mean time = ... s

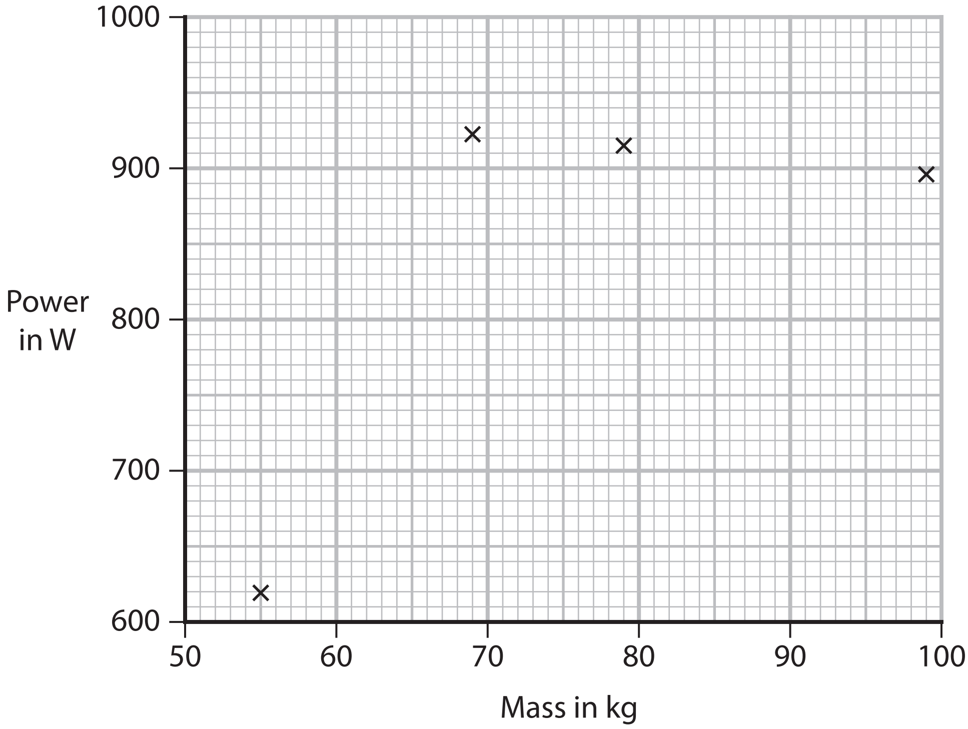
(iii) Calculate the mean power of student B transferring energy to her gravitational store as she runs up the steps.

(2)

mean power = ... W

(c) The students extend their investigation by calculating the power for students of different masses running up the steps.

The graph shows their results.



The students conclude that the greater the mass of the person, the greater the power of the person when running up the steps.

Comment on the students' conclusion.

(4)

....

....

....

....

....

....

....

....

....

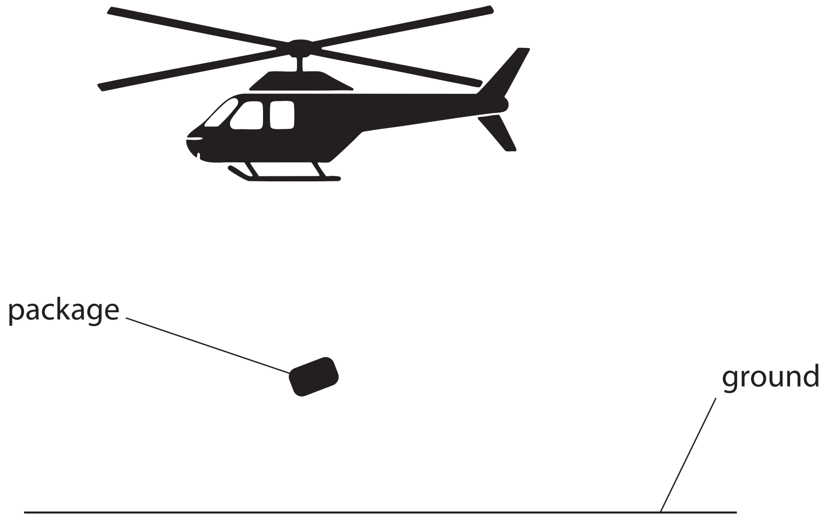
(Total for Question 4 = 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

P 8 1 5 8 0 A 0 1 5 2 8

5 Diagram 1 shows a package delivered by being dropped from a helicopter.



(Source: © sojan66/Shutterstock)

Diagram 1

The package initially accelerates towards the ground, before reaching a constant speed.

(a) Explain the motion of the package.

Refer to the forces on the package in your answer.

(3)

....

....

....

....

....

....

....

....

....

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(b) The package has a mass of 58 kg.

The momentum of the package as it reaches the ground is 3700 kg m / s.

Calculate the speed of the package as it reaches the ground.

(3)

speed = ... m / s

(c) Two students suggest a method to reduce the force applied to the package as it collides with the ground.

Student X suggests putting a parachute on the package.

Student Y suggests wrapping the package in padded material.

Explain why both of these suggestions would reduce the force.

(4)

student X

....

....

....

....

....

....

student Y

....

....

....

....

....

....

(d) Diagram 2 shows the package on the ground.

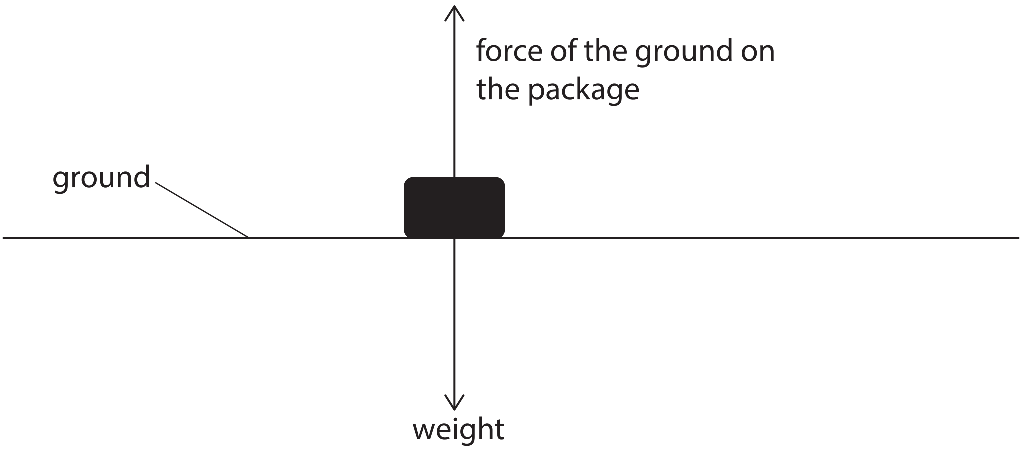


Diagram 2

Explain why the two forces acting on the package are **not** an example of Newton's third Law.

(3)

....

....

....

....

....

....

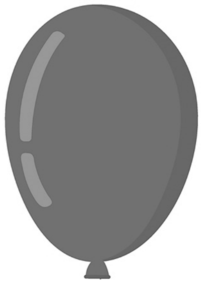
....

....

....

(Total for Question 5 = 13 marks)

6 Diagram 1 shows a balloon filled with air.



(Source: © Wise ant/Shutterstock)

Diagram 1

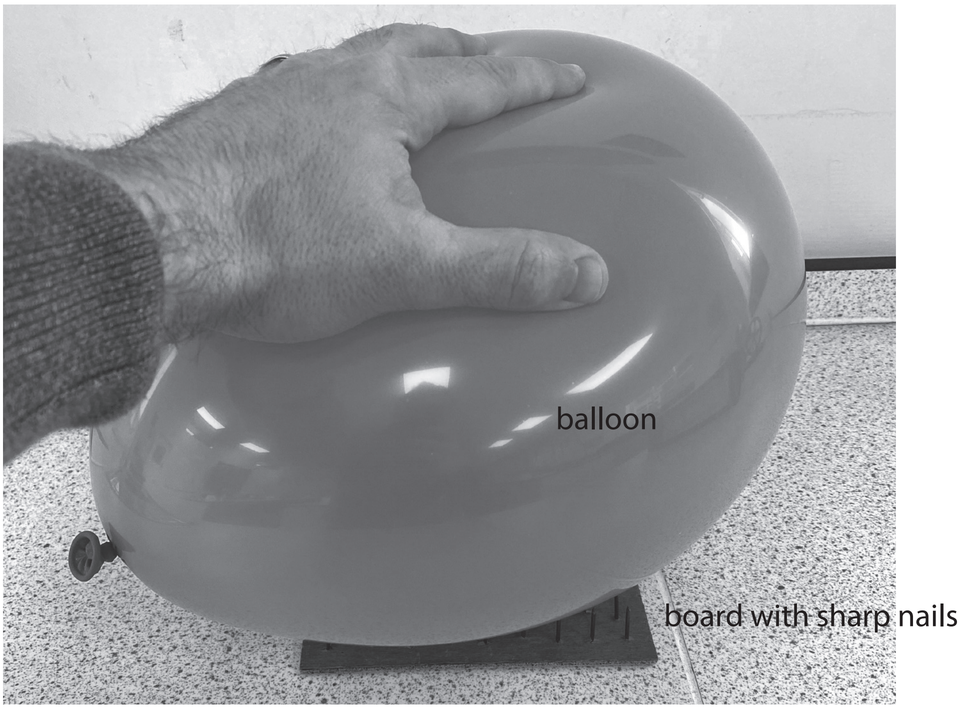
(a) The air in the balloon has a mass of 0.010 kg and a volume of 0.0056 m^3.

Calculate the density of the air in the balloon.

(2)

density = ... kg / m^3

(b) A teacher does a demonstration using an inflated balloon and a board with many sharp nails.



The teacher pushes the balloon onto the board of nails. The balloon does not pop.

The teacher then pops the balloon using a single nail.

Explain why the balloon does not pop when pushed onto the board of nails.

(3)

....

....

....

....

....

....

(c) The teacher then uses the balloon to investigate electrostatic effects.

(i) Describe how the teacher could charge the balloon.

(2)

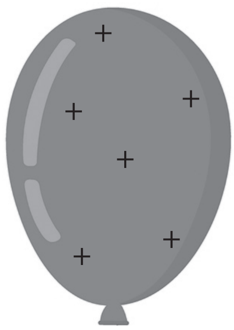
....

....

....

....

(ii) Diagram 2 shows a positively charged balloon.



(Source: © Wise ant/Shutterstock)

Diagram 2

Which of these explains why the ballon is positively charged?

(1)

☒ **A** balloon gains negatively charged electrons

☒ **B** balloon gains positively charged electrons

☒ **C** balloon loses negatively charged electrons

☒ **D** balloon loses positively charged electrons

(iii) A charge meter can be used to demonstrate that the balloon is charged.

Describe another method of demonstrating that the balloon is charged.

(2)

....

....

....

....

(d) Electrostatic charges can be useful.

Give one use of electrostatic charges.

(1)

....

(Total for Question 6 = 11 marks)

7 A student compares two different jackets by wearing each of them outside on a cold day, as shown in the photographs.

Jacket X

Jacket Y

Jacket X is a thick, black padded jacket.

Jacket Y is a thin, white jacket.

The student has the same body temperature whilst wearing each jacket.

The temperature of the surroundings is 0 °C.

Comment on the energy transferred from the student to the surroundings when they are wearing each jacket.

Refer to conduction, convection and radiation in your answer.

(6)

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

(Total for Question 7 = 6 marks)

8 A car is driven along a straight horizontal road.

(a) Which row of the table shows the change to thinking and braking distance when the speed of the car increases?

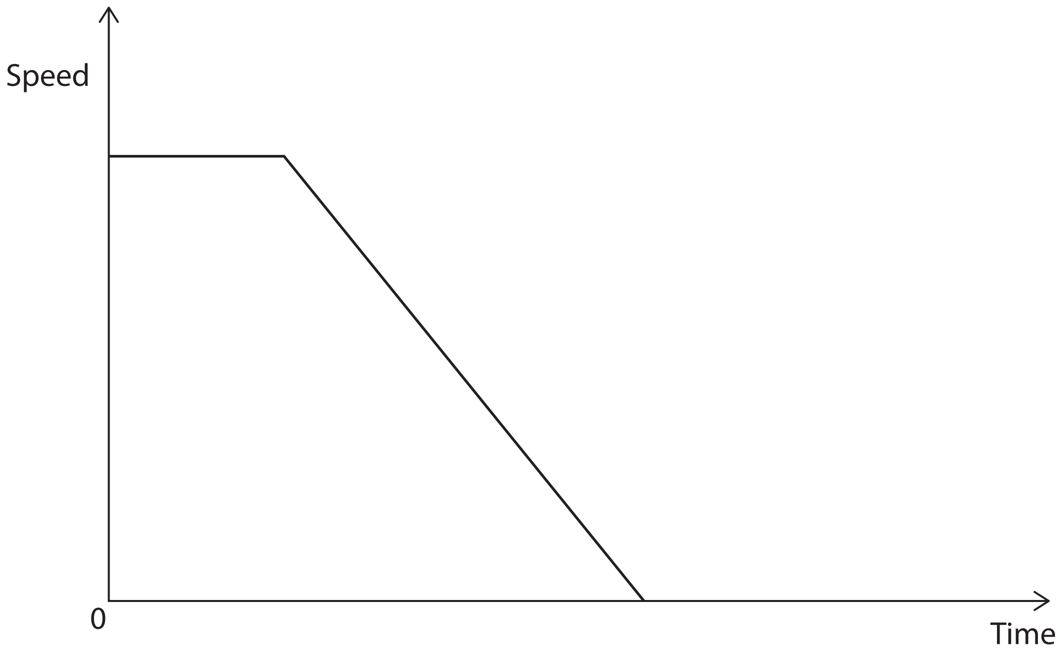
(1)

		Thinking distance	**Braking distance**
☒	**A**	increases	increases
☒	**B**	stays the same	increases
☒	**C**	increases	stays the same
☒	**D**	stays the same	stays the same

(b) A truck drives along a straight horizontal dry road.

The driver of the truck has to stop due to an obstacle on the road.

The graph shows how the speed of the truck varies with time from when the driver sees the obstacle.



(i) Draw another line on the graph to show how the speed of the truck would vary with time if the road had been icy.

(2)

P 8 1 5 8 0 A 0 2 6 2 8

(ii) The initial kinetic energy of the truck is 6.3×10^5 J.

The mass of the truck is 7.5×10^3 kg.

Calculate the initial speed of the truck.

(4)

speed = ... m/s

(iii) The truck brakes until it stops.

Explain why the work done by the braking force is equal to the kinetic energy of the truck before it started to brake.

(2)

....

....

....

....

(iv) The braking distance for the truck is 14 m.

Calculate the braking force of the truck.

(2)

braking force = ... N

Question 8 continues on next page

(v) Which of these describes how energy is transferred by the braking force to stop the truck?

(1)

- ☒ **A** mechanically
- ☒ **B** electrically
- ☒ **C** by heating
- ☒ **D** by radiation

(c) The table shows the stopping distance data for a truck travelling at different speeds.

Speed in m / s	**Stopping distance in m**
10	14
15	27
20	45
25	65
30	100

Evaluate whether the stopping distance for a truck is directly proportional to speed.

(3)

....

....

....

....

....

....

....

....

....

(Total for Question 8 = 15 marks)

TOTAL FOR PAPER = 90 MARKS

Pearson Edexcel International GCSE (9–1)

Thursday 22 May 2025

Morning (Time: 1 hour 40 minutes)

Paper reference **4WPH1/1P**

Physics (Modular)

UNIT 1: 4WPH1
PAPER: 1P

Equation Booklet
Do not return this Booklet with the question paper.

Turn over

P81580A

Y:1/1/1/

P 8 1 5 8 0 A

Pearson

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(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