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)

Monday 15 June 2026

Morning (Time: 1 hour 15 minutes)

Paper reference **4PH1/2PR**

Physics
UNIT: 4PH1
PAPER: 2PR

You must have:
Ruler, calculator, 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 any calculations and state the units.

Information

- The total mark for this paper is 70.
- 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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FORMULAE

You may find the following formulae useful.

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

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

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

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{E}{t}$$

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}} \qquad v = \frac{2 \times \pi \times r}{T}$$

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

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

pressure × volume = constant $p_1 \times V_1 = p_2 \times V_2$

$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

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

$$\frac{\text{change of wavelength}}{\text{wavelength}} = \frac{\text{velocity of a galaxy}}{\text{speed of light}} \qquad \frac{\lambda - \lambda_0}{\lambda_0} = \frac{\Delta\lambda}{\lambda_0} = \frac{v}{c}$$

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, $g = 10\ \text{m/s}^2$.

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Answer ALL questions.

1 The Big Bang theory describes how the universe began.

(a) Table 1 gives some observations about the universe.

Complete table 1 by placing ticks (✓) to show which observations give direct evidence for the Big Bang theory.

(2)

Observation	**Gives direct evidence for the Big Bang theory**
a black hole is at the centre of almost every galaxy	
cosmic microwave background radiation (CMBR) is detected in all directions	
the light from distant galaxies shows a red-shift	
high-mass stars become supernovae after the red supergiant stage in their evolution	
nuclear fusion takes place in the cores of stars	

Table 1

(b) Table 2 gives some physical quantities.

Complete table 2 by placing a tick (✓) in each row to show whether the measured value of each quantity has decreased, stayed the same or increased since the Big Bang.

(3)

Physical quantity	**Measured value**		
	decreased	**stayed the same**	**increased**
mean temperature of the universe			
size of the universe			
total energy in the universe			

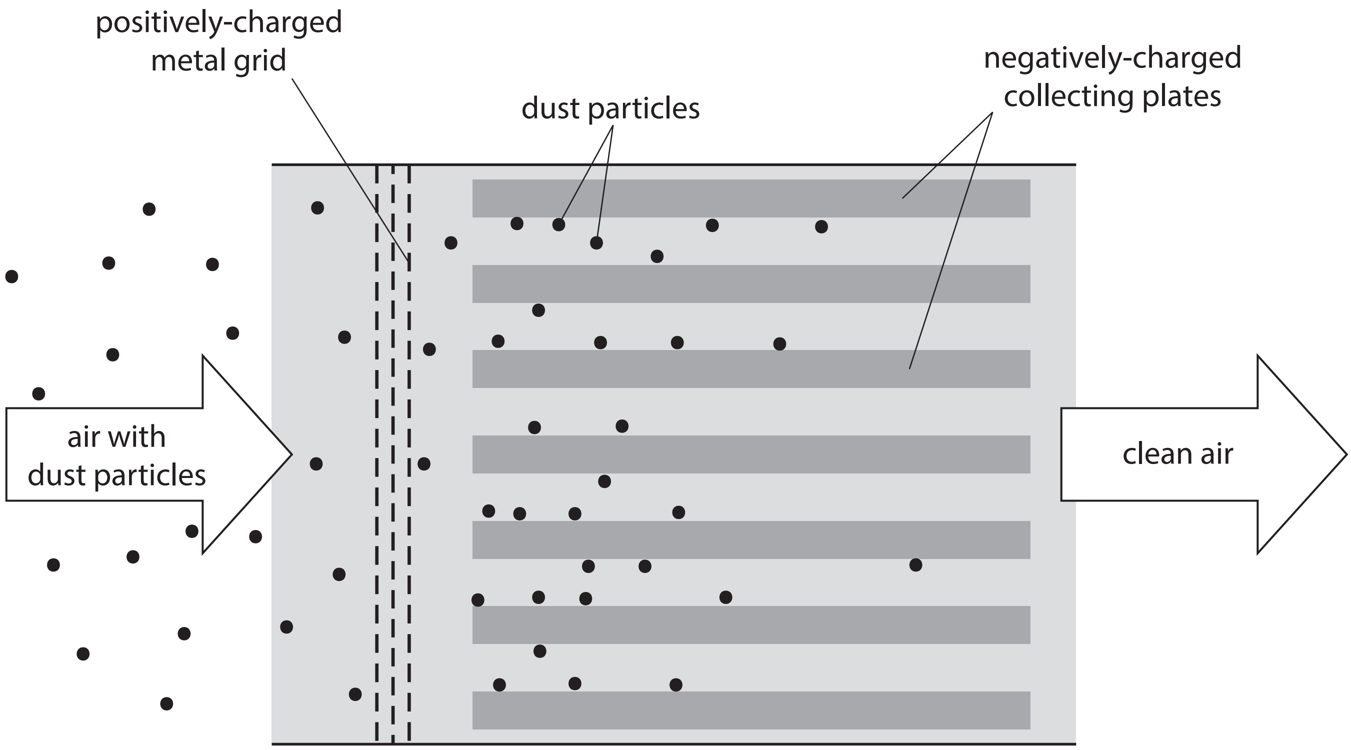
Table 2

(Total for Question 1 = 5 marks)

2 The diagram shows the simplified construction of an electrostatic air filter.

Air containing dust particles passes into the electrostatic air filter.

The electrostatic air filter removes the dust particles so that the air leaving the air filter is clean.



(a) The dust particles in the air pass through a positively-charged metal grid.

The dust particles become positively-charged when they pass through the metal grid.

(i) Explain how the dust particles become positively-charged.

(2)

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(ii) The dust particles then pass near negatively-charged collecting plates.

Explain why the dust particles collect on the negatively-charged collecting plates.

(2)

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(b) The electrostatic air filter uses mains voltage (230 V) to charge the metal grid and collecting plates.

(i) Explain why the electrostatic air filter is contained inside a plastic outer case.

(2)

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(ii) A designer suggests that a metal case could be used for the electrostatic air filter if an earth wire were included in the design.

Explain how an earth wire would protect the user of the electrostatic air filter if a fault occurred.

(3)

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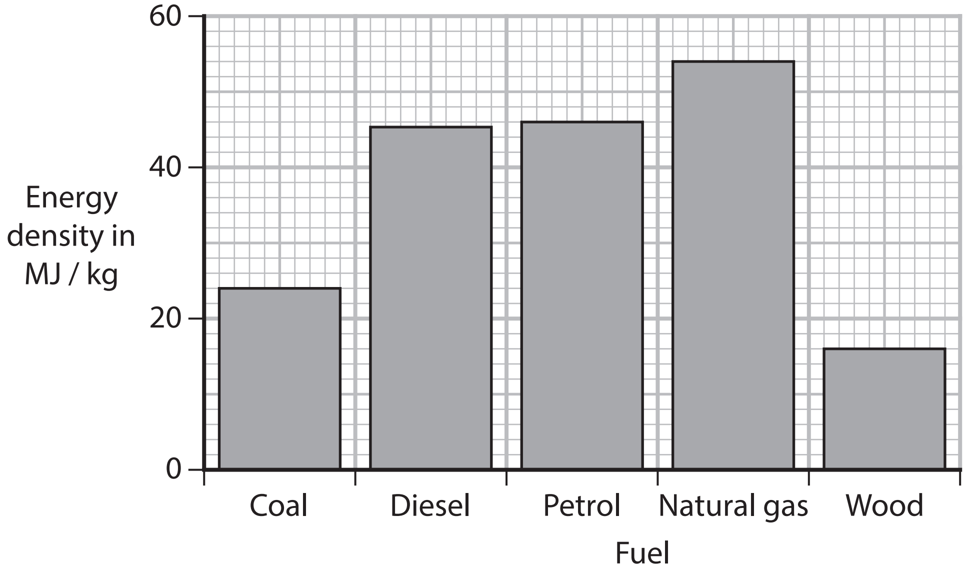
(Total for Question 2 = 9 marks)

3 The energy density of a fuel is the amount of energy that can be released from the fuel per kg of mass.

This energy can be used to generate electricity.

The bar chart shows the energy density of some fuels.



(a) Wood has the lowest energy density of the fuels shown in the bar chart.

Give an advantage of burning wood to generate electricity instead of the other fuels shown in the bar chart.

(1)

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(b) Determine the ratio of the energy density of natural gas to the energy density of coal.

Give your answer in the form n : 1

(3)

ratio = ... : 1

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(c) Uranium can be used to generate electricity through nuclear fission.

(i) Uranium has an energy density of 3 900 000 MJ / kg.

Other than the difference in the process used to generate electricity, explain why uranium is not included in the bar chart.

(2)

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(ii) In nuclear fission, a uranium nucleus absorbs a neutron and then splits.

The process of nuclear fission releases energy from the uranium nucleus.

Give two other products of the nuclear fission of uranium.

(2)

1 ....

2 ....

(iii) Give two disadvantages of using the nuclear fission of uranium to generate electricity.

(2)

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(Total for Question 3 = 10 marks)

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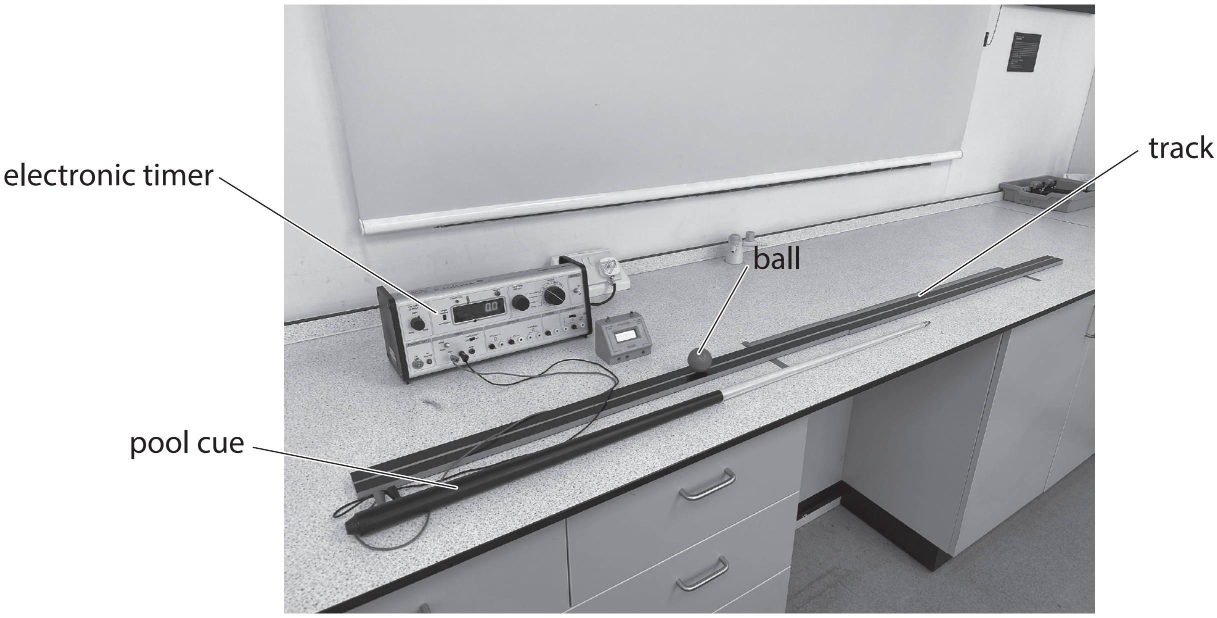
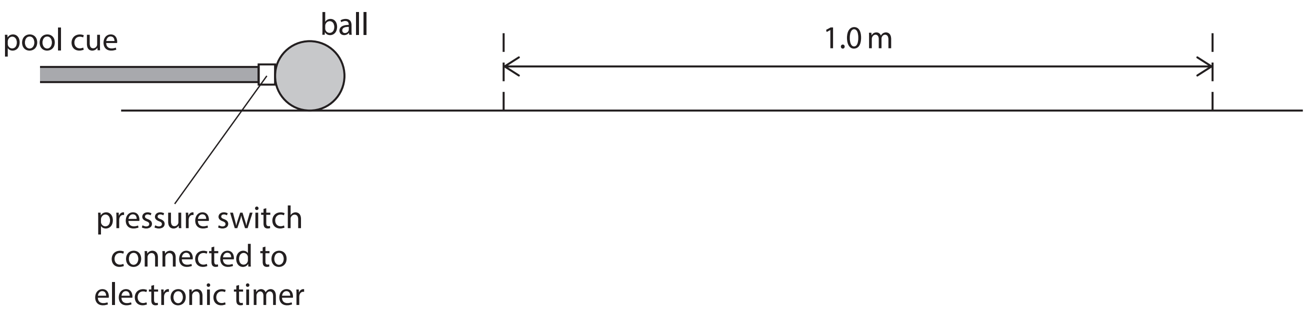
4 The photograph shows some equipment used to investigate the force applied to a stationary ball when it is hit with a pool cue.



The end of the pool cue is attached to an electronic pressure switch.

The pressure switch is connected to an electronic timer, which measures the time the pool cue is in contact with the ball when the ball is hit.

Not to scale



(a) The pool cue hits the ball and the contact time is measured by the electronic timer.

After the ball is hit, the ball travels along a horizontal track.

A student uses a stopclock to measure the time taken for the ball to travel 1.0 m along the track.

The process is repeated to obtain three sets of results.

The table shows the student's results.

Contact time in milliseconds	**Time for ball to travel 1.0 m in seconds**
2.1	1.89
1.9	2.00
2.2	1.81

Suggest a reason for the variation in the results.

(1)

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(b) (i) The student uses their measurements of the time taken for the ball to travel 1.0 m to determine the mean speed of the ball after it is hit with the pool cue.

Show that the mean speed of the ball is about 0.5 m / s.

(3)

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(ii) The mass of the ball is 0.11 kg.

Calculate the mean momentum of the ball after it is hit with the pool cue.

Give the unit.

(3)

mean momentum = ... unit ....

(iii) Using the student's results in the table, calculate the mean contact time.

(1)

mean contact time = ... ms

(iv) Calculate the mean force exerted on the ball by the pool cue.

(3)

mean force = ... N

(c) The student suggests that using a light gate would give a more accurate measurement of the speed of the ball after it is hit with the pool cue.

Comment on the student's suggestion.

(3)

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(Total for Question 4 = 14 marks)

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5 Gallium is a metal with a very low melting point.

The photograph shows a piece of gallium as it melts when held in a human hand.

(Source: © Pearson Asset Library)

(a) The melting point of gallium is 29.8 °C.

The mean temperature of the centre of a human hand is 31.4 °C.

Explain the changes that occur as the solid piece of gallium melts to form a liquid.

You should refer to particles in your answer.

(4)

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(b) The temperature of the liquid gallium increases from 29.8 °C to 31.4 °C when the liquid gallium gains 7.63 J of energy.

Calculate the mass of the liquid gallium.

Give your answer to 3 significant figures.

[specific heat capacity of liquid gallium = 0.408 J / g °C]

(5)

mass = ... g

(Total for Question 5 = 9 marks)

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6 The scientist Henri Becquerel discovered radioactivity in 1896.

(a) Becquerel designed an experiment to show that rocks containing uranium could absorb energy from the Sun and then re-emit this energy as x-rays.

Diagram 1 shows a simplified setup of his apparatus.

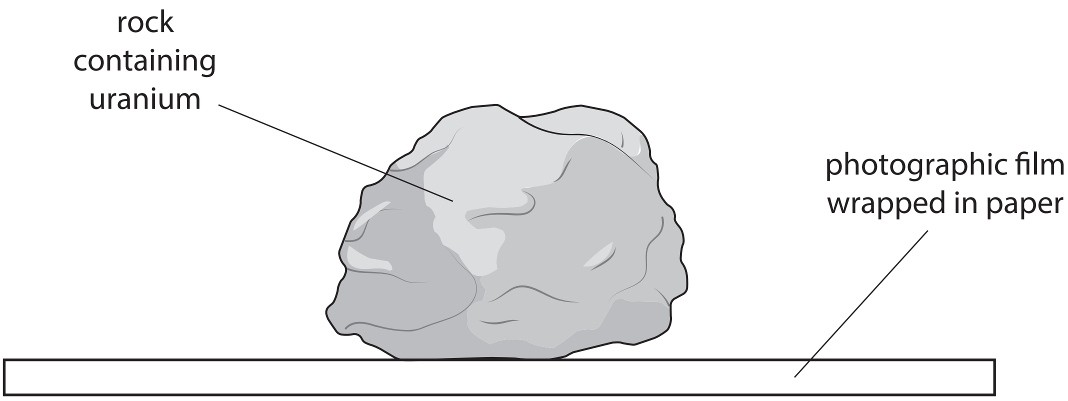

Diagram 1

Becquerel predicted that if he exposed the rock to direct sunlight, the rock would emit x-rays. The x-rays would then produce an image on the photographic film.

(i) Suggest why the photographic film was wrapped in paper.

(2)

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(ii) When Becquerel did the experiment there was no direct sunlight due to cloud cover.

The photographic film still produced an image. This image was not predicted by Becquerel's original theory.

Describe what scientists should do when the results of an experiment do not support their original theory.

(2)

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(b) Becquerel concluded that the rock emitted radiation without absorbing any energy from direct sunlight.

Becquerel passed the radiation from the rock through a magnetic field.

He found that the rock emitted three different types of radiation.

Diagram 2 shows the paths of the different types of radiation, P, Q and R, when they passed through the magnetic field.

Key

- - - - - - - - path of radiation

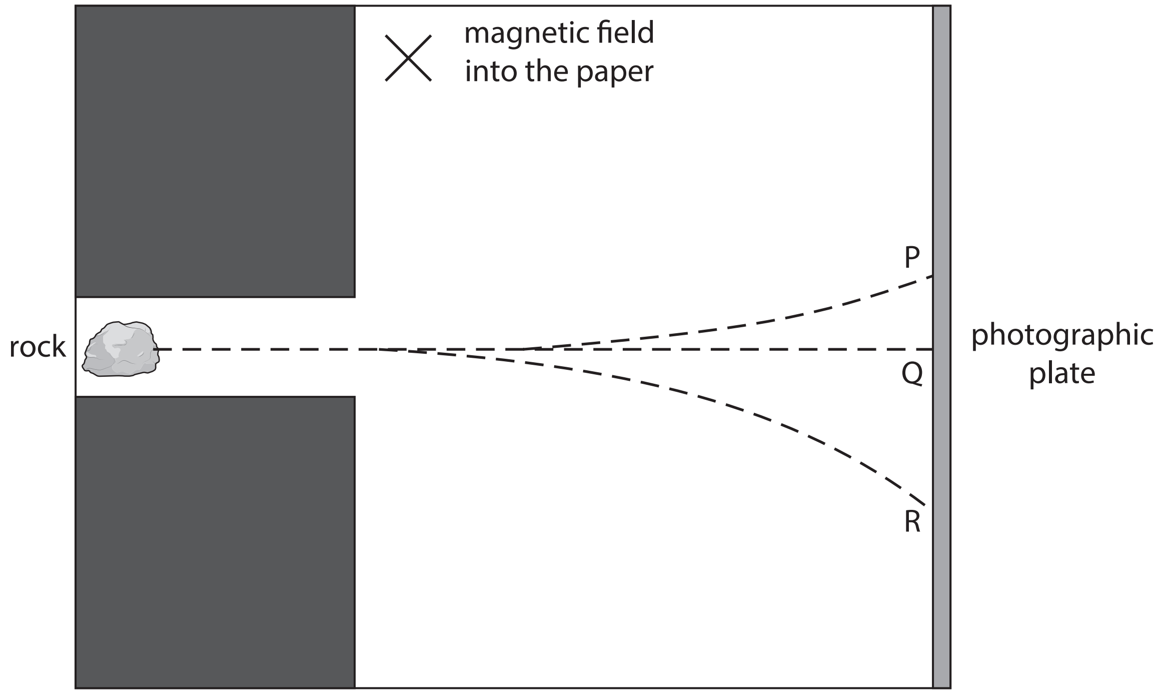

Diagram 2

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The radiation changes direction if it is charged, due to a force exerted by the magnetic field.

Using information from diagram 2, explain what can be deduced about the properties of the three types of radiation, P, Q and R.

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(Total for Question 6 = 8 marks)

7 A uniform metal bar rests horizontally on two tables, as shown in the diagram.

Each table has a triangular support so that the bar rests on two pivots, A and B.

(a) The metal bar has a length of 100 cm.

The metal bar has a weight of 30 N.

Calculate the moment of the weight of the metal bar about pivot A.

Assume that the weight of the metal bar acts at the middle of the metal bar.

(2)

moment = ... N m

(b) The metal bar is supported by an upwards force at pivot A and an upwards force at pivot B.

(i) When both moments are about pivot A, the moment of the upwards force at pivot B is equal to the moment of the weight of the bar.

Calculate the magnitude of the force at pivot B.

(3)

force at pivot B = ... N

(ii) Calculate the magnitude of the force at pivot A.

(1)

force at pivot A = ... N

(Total for Question 7 = 6 marks)

8 Diagram 1 shows a simplified cross-sectional view of a microphone receiving a sound wave.

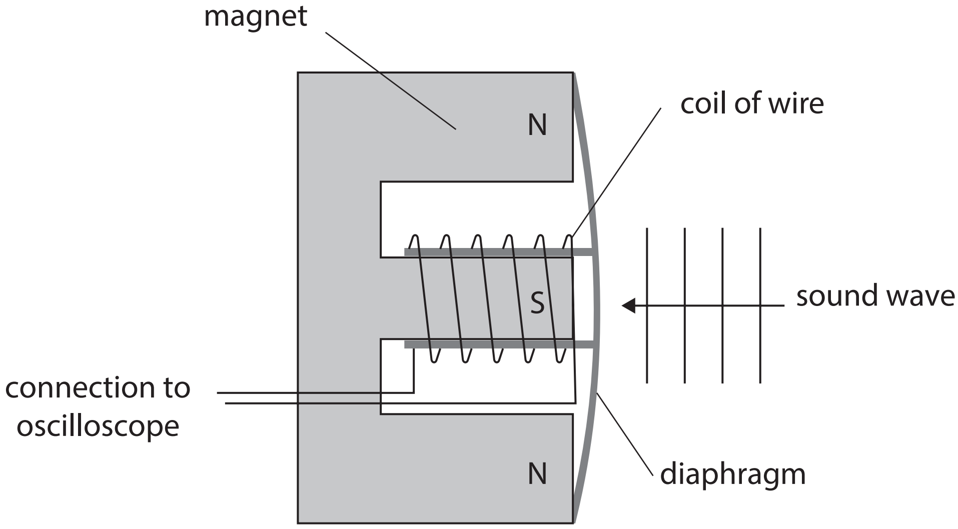

Diagram 1

(a) The diaphragm of the microphone is connected to a coil of wire. The coil of wire is free to move around the south pole of a magnet.

When the sound wave is incident on the microphone, the diaphragm vibrates.

(i) Explain how a sound wave causes the microphone to send an electrical signal to the oscilloscope.

(3)

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(ii) Suggest why very loud sounds may damage the microphone.

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(b) The microphone is connected to an oscilloscope.

Describe how the oscilloscope should be used to determine the frequency of a sound wave.

You should refer to how the oscilloscope settings should be adjusted in your answer.

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(Total for Question 8 = 9 marks)

TOTAL FOR PAPER = 70 MARKS

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Pearson Edexcel International GCSE (9–1)

Monday 15 June 2026

Morning (Time: 1 hour 15 minutes)

Paper reference **4PH1/2PR**

Physics

UNIT: 4PH1

PAPER: 2PR

Equation Booklet

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These equations may be required for both International GCSE Physics (4PH1) and International GCSE Combined Science (4SD0) papers.

1. Forces and Motion	
average speed = $\frac{\text{distance moved}}{\text{time taken}}$	
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$
$(\text{final speed})^2 = (\text{initial speed})^2 + (2 \times \text{acceleration} \times \text{distance moved})$	$v^2 = u^2 + (2 \times a \times s)$
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 = $\dfrac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	
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 = $\dfrac{1}{2}$ × mass × speed^2	$KE = \dfrac{1}{2} \times m \times v^2$
power = $\dfrac{\text{work done}}{\text{time taken}}$	$P = \dfrac{W}{t}$
5. Solids, liquids and gases	
density = $\dfrac{\text{mass}}{\text{volume}}$	$\rho = \dfrac{m}{V}$
pressure = $\dfrac{\text{force}}{\text{area}}$	$p = \dfrac{F}{A}$
pressure difference = height × density × gravitational field strength	$p = h \times \rho \times g$
$\dfrac{\text{pressure}}{\text{temperature}}$ = constant	$\dfrac{p_1}{T_1} = \dfrac{p_2}{T_2}$
pressure × volume = constant	$p_1 \times V_1 = p_2 \times V_2$
8. Astrophysics	
orbital speed = $\dfrac{2 \times \pi \times \text{orbital radius}}{\text{time period}}$	$v = \dfrac{2 \times \pi \times r}{T}$

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