

Paper Reference(s) 4PH1/2P

Pearson Edexcel International GCSE (9–1)

Physics

Paper: 2P

Total Marks

Time: 1 hour 15 minutes plus your additional time allowance

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					



YOU MUST HAVE

Calculator, ruler

YOU WILL BE GIVEN

Formulae Booklet

Diagram Booklet

INSTRUCTIONS

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.

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 .

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.

Answer ALL questions.

1 (a) Look at the diagram for Question 1(a) in the Diagram Booklet. It shows an incomplete Hertzsprung-Russell diagram.

(i) Which of these is in the shaded area of the diagram?

(1 mark)

A black holes

B main sequence stars

C neutron stars

D protostars

(ii) On the diagram, draw the area to show the position of white dwarf stars.

Label this area WD.

(1 mark)

(iii) On the diagram, draw the area to show the position of red giant stars.

Label this area RG.

(1 mark)

(continued on the next page)

Turn over

1 continued.

(iv) State what is meant by the term
ABSOLUTE MAGNITUDE.
(2 marks)

(continued on the next page)

1 continued.

(b) The Sun emits various parts of the electromagnetic spectrum.

**(i) Which part of the electromagnetic spectrum causes damage to human surface skin cells?
(1 mark)**

A microwaves

B radio waves

C ultraviolet

D visible light

**(ii) Which of these increases the risk of damage to human surface skin cells?
(1 mark)**

A sunbathing

B using protective sun cream

C very cloudy weather

D wearing sunglasses

(Total for Question 1 = 7 marks)

Turn over

2 Two students investigate the speed of sound.

Student A has a device that makes a loud sound.

Student B has a stopwatch.

Look at the diagram for Question 2 in the Diagram Booklet. A sound wave travels from student A to the wall and is reflected back to student B.

- (a) Calculate the total distance the sound wave travels from student A to the wall and back to student B. (1 mark)**

distance = _____ m

(continued on the next page)

2 continued.

(b) Student B hears the sound before and after the sound wave reflects from the wall.

When student B hears the sound before reflection, he starts the stopwatch.

When student B hears the sound after reflection, he stops the stopwatch.

The students repeat this experiment five times.

Look at the table for Question 2(b) in the Diagram Booklet. It shows the students' results.

Calculate the mean (average) time.

**Give your answer to 2 significant figures.
(2 marks)**

mean time = _____ s

(continued on the next page)

2 continued.

**(c) Calculate the speed of sound for this investigation.
(4 marks)**

speed = _____ m/s

(continued on the next page)

2 continued.

(d) Suggest a reason why the students' results are not always the same.

(1 mark)

(Total for Question 2 = 8 marks)

3 Look at the diagram for Question 3 in the Diagram Booklet. It shows part of a radio antenna.

The plastic tube protects the radio antenna from bad weather.

Dust particles carried by the wind rub against the plastic tube.

After some time, the dust particles cause the tube to become positively charged.

(a) State the property of plastic that allows it to become electrostatically charged.

(1 mark)

(continued on the next page)

3 continued.

**(b) Explain how the plastic tube becomes positively charged.
(2 marks)**

(continued on the next page)

3 continued.

(c) The plastic tube is attached to a metal mast.

This would cause the metal mast to become positively charged.

**Explain why there is a wire connecting the metal mast to the Earth.
(3 marks)**

(continued on the next page)

3 continued.

(d) The plastic tube gains a charge of 4.3 mC.

The energy stored on the tube is 3.7 J.

Calculate the voltage between the plastic tube and the metal mast.

(3 marks)

voltage = _____ V

(continued on the next page)

3 continued.

(e) An engineer is working on the radio antenna.

Describe the hazard to the engineer if there is no earth wire.

(2 marks)

(Total for Question 3 = 11 marks)

4 (a) A student investigates a sound wave with a frequency of 25 000 Hz.

(i) Calculate the wavelength of this sound wave.
(3 marks)

[speed of sound = 330 m/s]

wavelength = _____ m

(continued on the next page)

4 continued.

- (ii) Look at the oscilloscope trace for Question 4(a)(ii) in the Diagram Booklet. The oscilloscope trace represents the sound wave.**

**Determine the amplitude of the oscilloscope trace.
(2 marks)**

amplitude = _____ V

(continued on the next page)

4 continued.

- (b) (i) Look at Diagram 1 for Question 4(b)(i) in the Diagram Booklet. It shows a coil of wire wrapped around a cardboard tube.**

The coil is fixed to the cardboard tube.

On diagram 1 in the Diagram Booklet, draw field lines to represent the magnetic field produced when the current is in the direction shown.

(3 marks)

(continued on the next page)

4 continued.

- (ii) Look at Diagram 2 for Question 4(b)(ii) in the Diagram Booklet. It shows a model of a loudspeaker that uses the coil and the cardboard tube.**

The cardboard tube is fixed to a thin piece of card, which is clamped at both ends.

The student holds a bar magnet near the bottom of the cardboard tube.

Explain why this causes the loudspeaker to produce a sound.

(3 marks)

(continued on the next page)

4 continued.

(continued on the next page)

4 continued.

(iii) When the frequency of the alternating current is 10 kHz, the student hears a sound.

The student increases the frequency of the alternating current to 25 kHz.

Explain why the student cannot hear a sound now, even though the card is still vibrating.

(2 marks)

(continued on the next page)

4 continued.

- (iv) Suggest a change to the apparatus that would increase the loudness of the sound when the frequency of the alternating current is 10 kHz.
(1 mark)**

(Total for Question 4 = 14 marks)

5 Look at the diagram for Question 5 in the Diagram Booklet. It shows some of the apparatus a student uses to investigate the effect of heating a solid substance.

(a) Describe how the student could use their apparatus to help determine the specific heat capacity of the substance.

You should give details of any additional apparatus needed in your answer.

(5 marks)

(continued on the next page)

5 continued.

(continued on the next page)

5 continued.

- (b) The student continues to heat the substance, keeping the power of the heater constant.**

Look at the graph for Question 5(b) in the Diagram Booklet. It shows how the temperature of the substance changes with time.

- (i) Use the graph to determine the melting point of this substance.
(1 mark)**

melting point = _____ °C

(continued on the next page)

5 continued.

- (ii) Describe, in terms of particles, what is happening in the substance when the graph line is horizontal.
(2 marks)**

(continued on the next page)

5 continued.

- (iii) Suggest why the two non-horizontal lines on the graph have different gradients.
(2 marks)**

(Total for Question 5 = 10 marks)

6 This is a question about a nuclear fusion power station.

**(a) Explain what happens during nuclear fusion.
(3 marks)**

(continued on the next page)

6 continued.

(b) Look at the diagram for Question 6(b) in the Diagram Booklet. It shows how a fusion power station could supply the National Grid in the future.

**(i) State the main method of energy transfer from the fusion power station generator to the primary coil of the step-up transformer.
(1 mark)**

(continued on the next page)

6 continued.

- (ii) The fusion power station could supply the input coil of the step-up transformer with a current of 28 kA at a voltage of 21 kV.**

The output coil of the transformer has a voltage of 330 kV.

Assume the transformer is 100% efficient.

Calculate the current in the output coil of the transformer.

(3 marks)

current = _____ kA

(Total for Question 6 = 7 marks)

7 Look at the diagram for Question 7 in the Diagram Booklet. It shows two blocks at rest on a table, viewed from above.

A spring is attached to the large block.

The small block is attached by a piece of string to a fixed point on the table.

A student pushes the two blocks together so that the spring is compressed.

(a) The student releases the blocks.

The kinetic energy (KE) store of the small block is 0.29 J when the blocks are no longer in contact.

Show that the speed of the small block is about 6 m/s.

(3 marks)

7 continued.

- (b) Using ideas about momentum, show that the speed of the large block is about 1 m/s after the blocks are no longer in contact.
(4 marks)**

(continued on the next page)

7 continued.

(c) The small block takes 0.11 s to reach 6 m/s.

Calculate the mean force exerted on the small block by the spring.

(3 marks)

mean force = _____ N

(continued on the next page)

7 continued.

(d) The small block then moves around the fixed point on the table.

The block moves in a circular orbit of radius 17.6 cm at a constant orbital speed of 6 m/s.

The time period of the orbit can be found using the formula

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}}$$

Calculate the time period of the orbit.

(3 marks)

time period = _____ s

(Total for Question 7 = 13 marks)

TOTAL FOR PAPER = 70 MARKS

END