

Paper Reference(s) **4PH1/2P**

Pearson Edexcel International GCSE (9–1)

Physics
Unit: 4PH1
Paper 2P

Friday 14 June 2019 – Morning

Time: 1 hour 15 minutes plus your additional time allowance

INSTRUCTIONS TO CANDIDATES
Write your centre number, candidate number, surname, other names and your signature in the boxes below. Check that you have the correct question paper.

| | | | | | |
|------------------------|----------|----------|----------|----------|--------------|
| Centre No. | | | | | |
| Candidate No. | | | | | |
| Surname | | | | | |
| Other names | | | | | |
| Signature | | | | | |
| Paper Reference | 4 | P | H | 1 | / 2 P |

- Use **BLACK** ink or ball-point pen.
- 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 ☐.

MATERIALS REQUIRED FOR EXAMINATION

Calculator, ruler

ITEMS INCLUDED WITH QUESTION PAPERS

Formulae booklet

INFORMATION FOR CANDIDATES

- 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 TO CANDIDATES

- 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)

Answer ALL questions.

1 (a) Which force is responsible for keeping satellites in orbit? (1 mark)

☐ **A electrostatic**

☐ **B gravitational**

☐ **C magnetic**

☐ **D nuclear**

(b) Which of these is the largest? (1 mark)

☐ **A galaxy**

☐ **B planet**

☐ **C star**

☐ **D universe**

(Question continues on next page)

(Turn over)

(c) Which of these represents the brightness of stars at a standard distance? (1 mark)

☐ **A absolute magnitude**

☐ **B colour**

☐ **C diameter**

☐ **D temperature**

(TOTAL FOR QUESTION 1 = 3 MARKS)

(Questions continue on next page)

(Turn over)

2 A student investigates a transformer.

This is the student's method.

- **use a primary coil with 10 turns**
- **connect the primary coil to a constant maximum input voltage**
- **measure the output voltage across the secondary coil**
- **repeat using an increasing number of turns on the primary coil**

The table shows the student's results.

| Number of turns on primary coil | Output voltage in V |
|--|----------------------------|
| 10 | 39.6 |
| 20 | 19.7 |
| 40 | 9.9 |
| 60 | 6.6 |
| 80 | 5.0 |
| 100 | 4.0 |

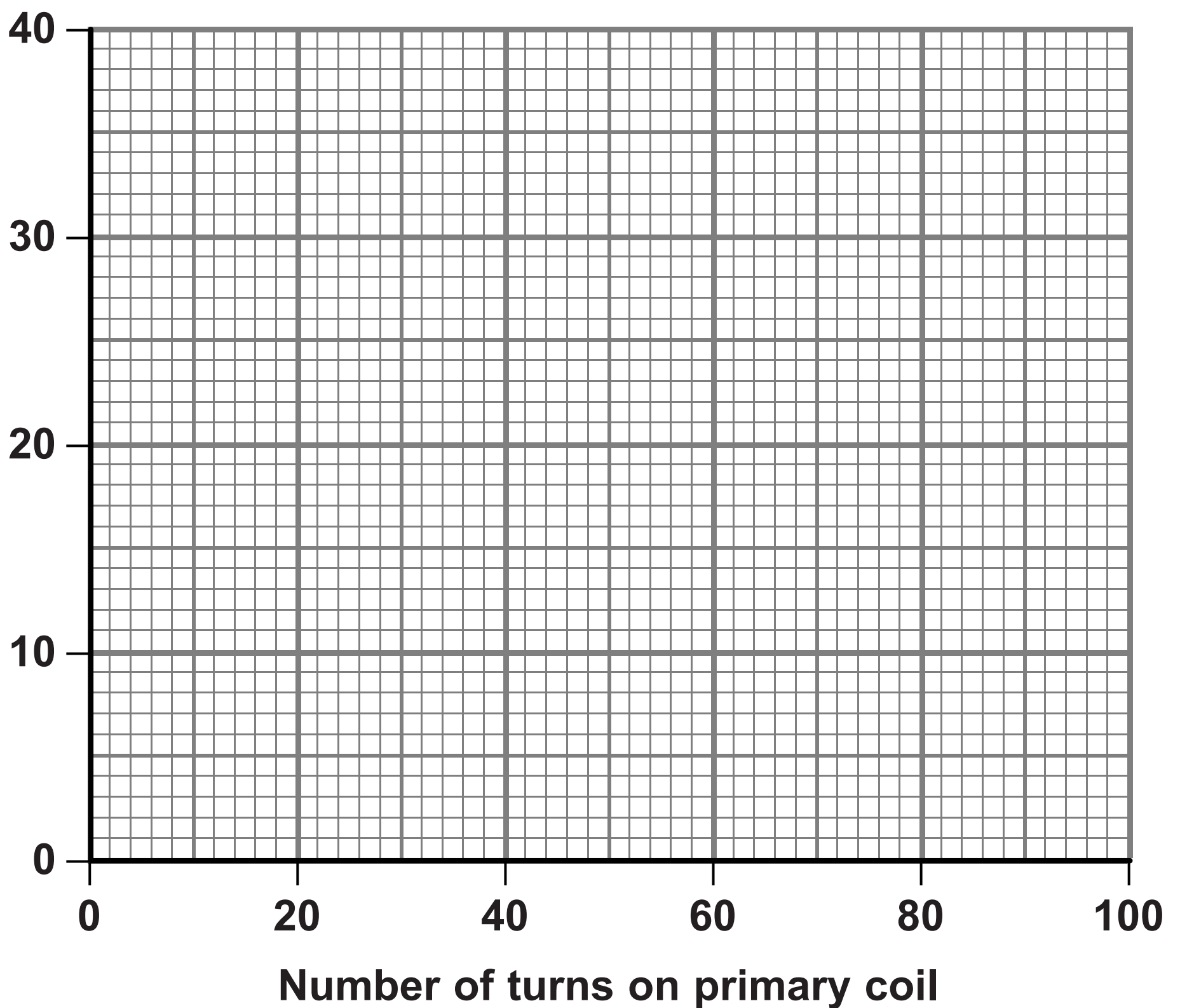
(Question continues on next page)

(Turn over)

(a) (i) Plot a graph of the student's results on the grid. (1 mark)

(ii) Draw a curve of best fit. (1 mark)

Output voltage
in V



(Question continues on next page)

(Turn over)

- (iii) Describe the relationship between the output voltage and the number of turns on the primary coil. (2 marks)**

(Question continues on next page)

- (b) (i) State the formula linking input and output voltages and the turns ratio for the transformer. (1 mark)**

(Question continues on next page)

(Turn over)

(ii) The input voltage of the transformer is 6·8 V.

Calculate the number of turns on the secondary coil. (2 marks)

number of turns = _____

(TOTAL FOR QUESTION 2 = 7 MARKS)

(Questions continue on next page)

(Turn over)

3 This question is about sound waves.

(a) Describe an experiment to measure the speed of sound in air.

**You may draw a diagram to help your answer.
(5 marks)**

(Continue your answer on next page)

(Turn over)

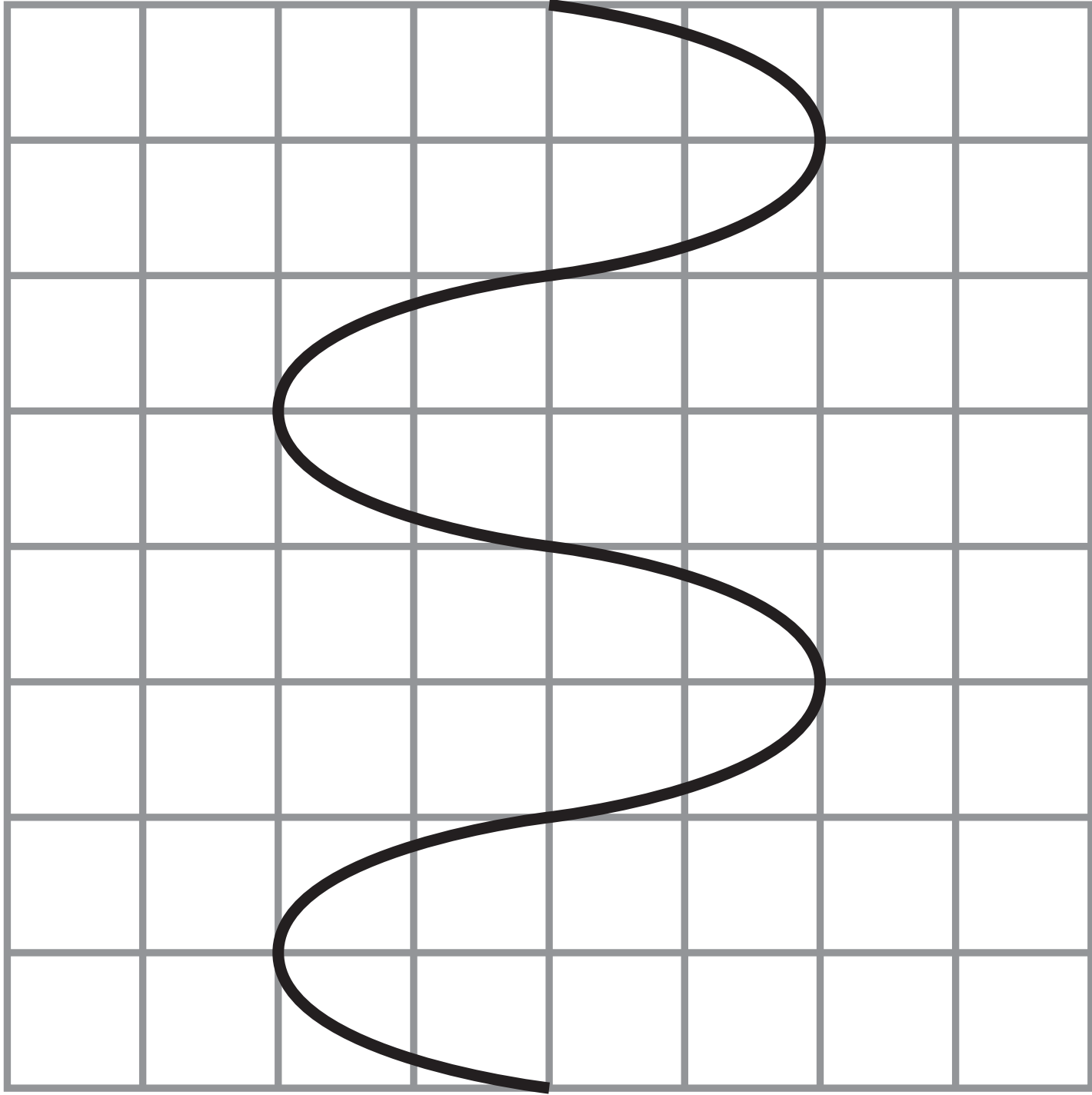
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(Question continues on next page)

(Turn over)

(b) An oscilloscope can be used to determine the frequency of a sound wave.

The diagram shows an oscilloscope trace of a sound wave.



Oscilloscope settings

y direction: 1 square = 1 V

x direction: 1 square = 0.25 ms

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

period = _____ s

(Question continues on next page)

- (ii) Calculate the frequency of this sound wave.
(2 marks)

frequency = _____ Hz

(TOTAL FOR QUESTION 3 = 10 MARKS)

(Questions continue on next page)

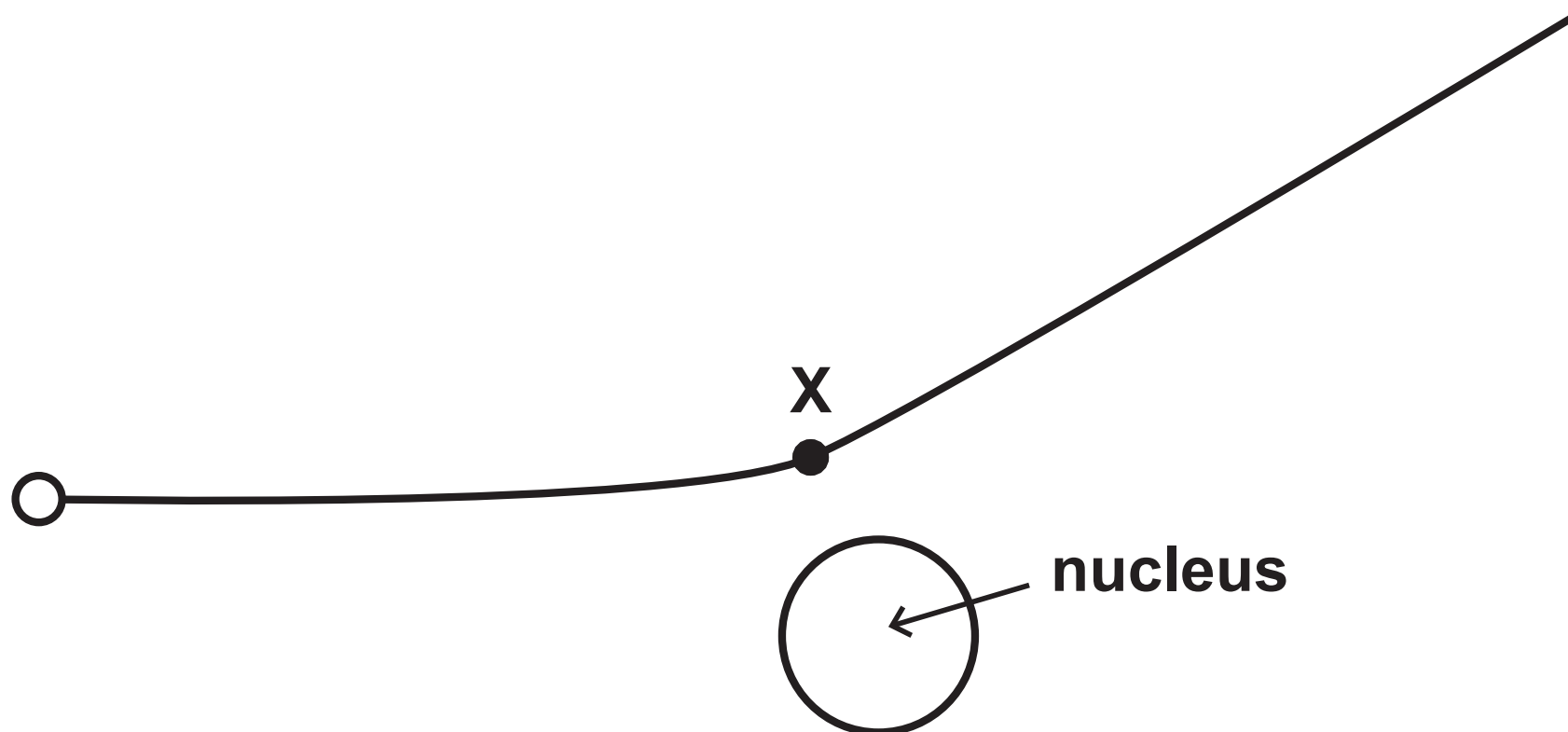
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4 This is a question about alpha particles.

(a) Describe the nature of an alpha particle. (1 mark)

(Question continues on next page)

- (b) The diagram shows the path of an alpha particle as it passes close to a nucleus.



- (i) Draw an arrow from point X to show the force on the alpha particle due to the nucleus.

Label this force Y. (2 marks)

- (ii) Draw an arrow to show the force on the nucleus due to the alpha particle.

Label this force Z. (2 marks)

(Question continues on next page)

- (iii) Explain how the path of the alpha particle shows whether the nucleus is positive, negative or neutral. (3 marks)**

(Question continues on next page)

- (c) The alpha particle experiences a resultant force of 3.6 N and has a mass of 6.6×10^{-27} kg.

Calculate the acceleration of the alpha particle.
(3 marks)

acceleration = _____ m/s^2

(TOTAL FOR QUESTION 4 = 11 MARKS)

(Questions continue on next page)

- 5 A toy produces continuous waves when floating on the surface of a pool of water.

The waves spread out as circular wavefronts.

Diagram 1 shows the wavefronts produced when the toy is not moving, as viewed from above.

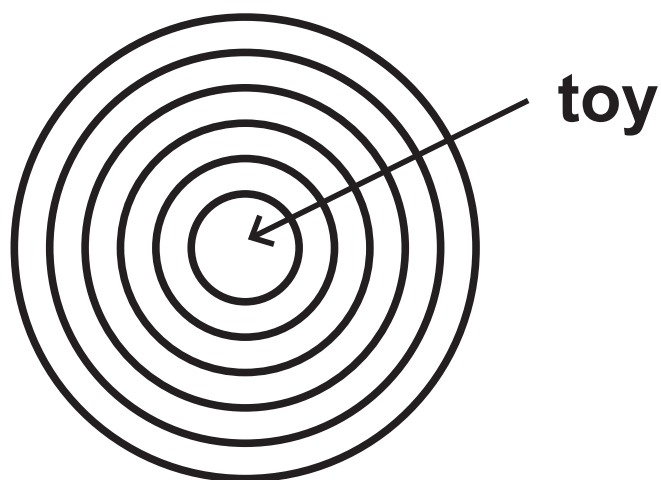


Diagram 1

Diagram 2 shows the wavefronts produced when the toy is moving across the surface of the pool of water.

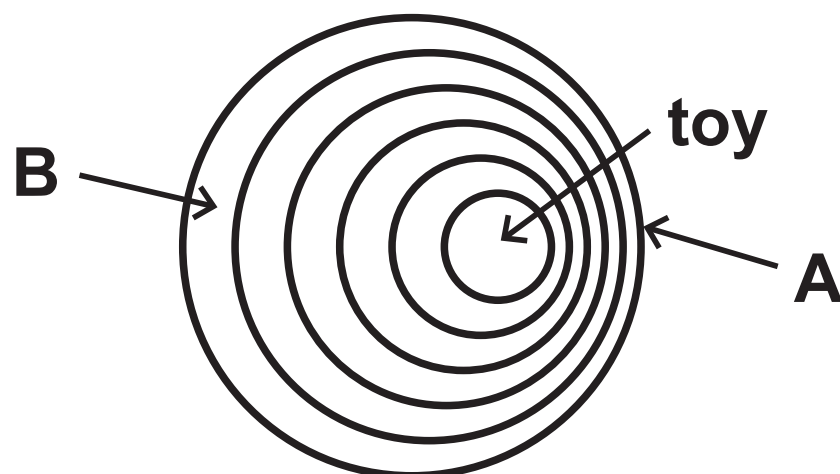


Diagram 2

- (a) Draw an arrow on diagram 2 to show the direction the toy is moving. (1 mark)

(Question continues on next page)

(Turn over)

(b) Explain how the frequency of the waves at point A is different to the frequency of the waves at point B. (4 marks)

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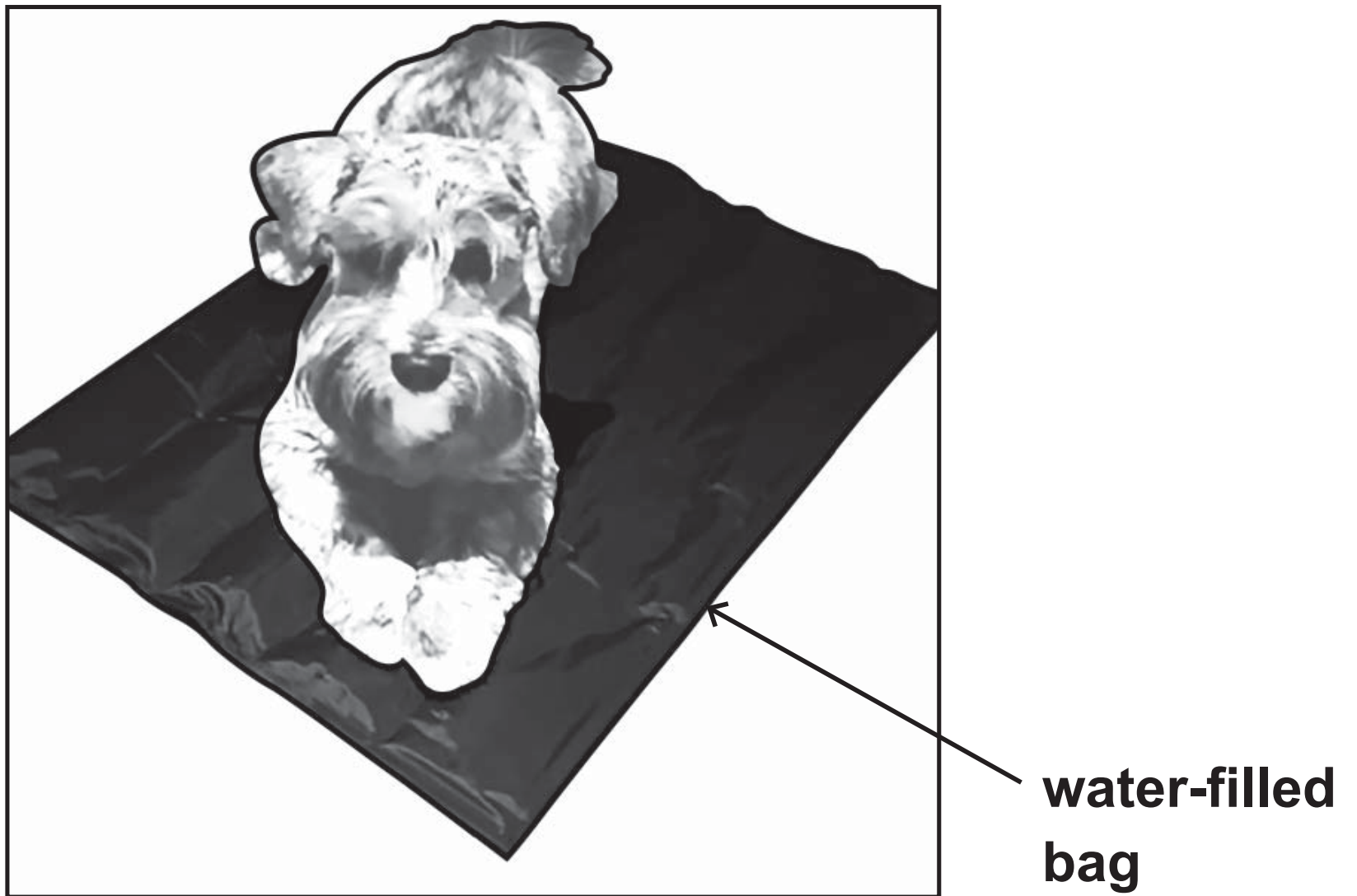
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(TOTAL FOR QUESTION 5 = 5 MARKS)

(Questions continue on next page)

- 6 A dog sits on a water-filled bag to keep cool.



- (a) The table shows some data about the dog and the water in the bag.

| | |
|--|------|
| mass of water in kg | 8.7 |
| power output of dog by heating in W | 75 |
| specific heat capacity of water in J/kg °C | 4200 |
| initial temperature of water in °C | 16 |

(Question continues on next page)

(Turn over)

The dog sits on the bag for 22 minutes.

- (i) Calculate the energy transferred from the dog to the water by heating in 22 minutes. (3 marks)

energy = _____ J

- (ii) State an assumption you have made when calculating the energy transferred. (1 mark)

(Question continues on next page)

(Turn over)

- (iii) Calculate the temperature of the water after 22 minutes. (4 marks)

temperature = _____ °C

- (b) Discuss why conduction is the main way that thermal energy is transferred from the dog to the water. (3 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 6 = 11 MARKS)

(Questions continue on next page)

7 (a) Give two pieces of evidence for the Big Bang theory. (2 marks)

(b) Explain how this evidence supports the Big Bang theory. (4 marks)

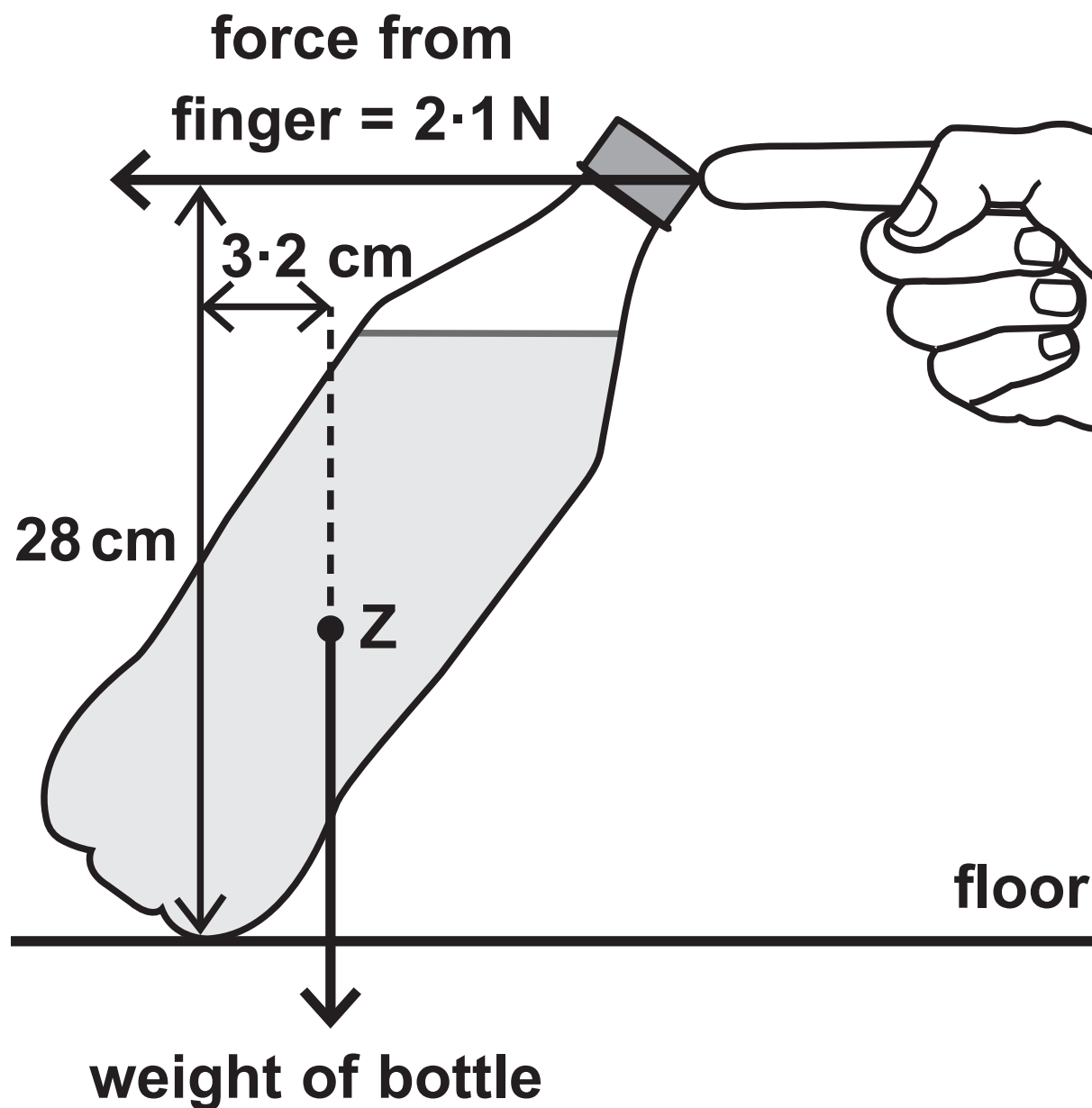
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(Turn over)

(TOTAL FOR QUESTION 7 = 6 MARKS)

(Questions continue on next page)

- 8 The diagram shows a bottle supported by a finger.



not to
scale

- (a) State the name of point Z. (1 mark)

-
- (b) (i) State the formula linking moment, force and perpendicular distance from the pivot. (1 mark)

(ii) The bottle does not move.

Calculate the weight of the bottle. (4 marks)

weight of bottle = _____ N

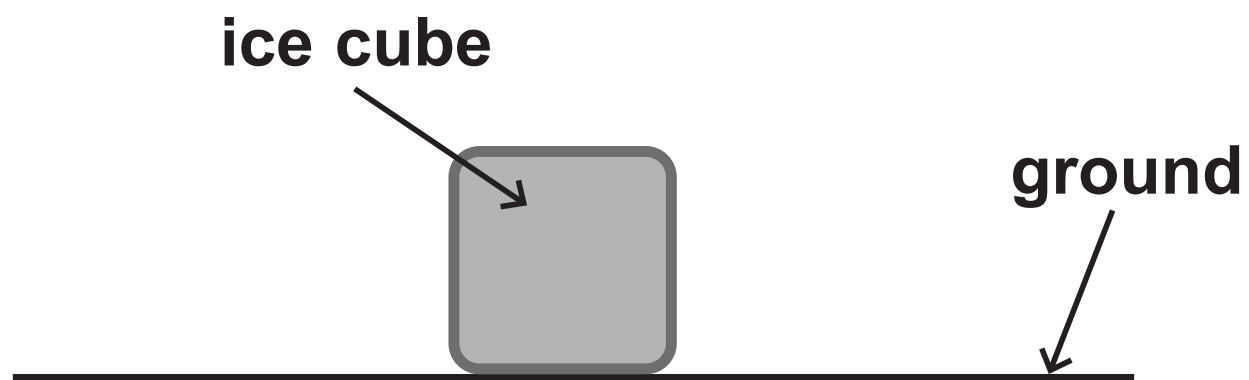
(TOTAL FOR QUESTION 8 = 6 MARKS)

(Questions continue on next page)

(Turn over)

9 This is a question about a melting ice cube.

(a) The diagram shows an ice cube placed on the ground.



- (i) The mass of the ice cube is 3.7 g and its area of contact with the ground is $2.6 \times 10^{-4} \text{ m}^2$.

Calculate the pressure the ice cube exerts on the ground. (4 marks)

pressure = _____ Pa

(Question continues on next page)

(Turn over)

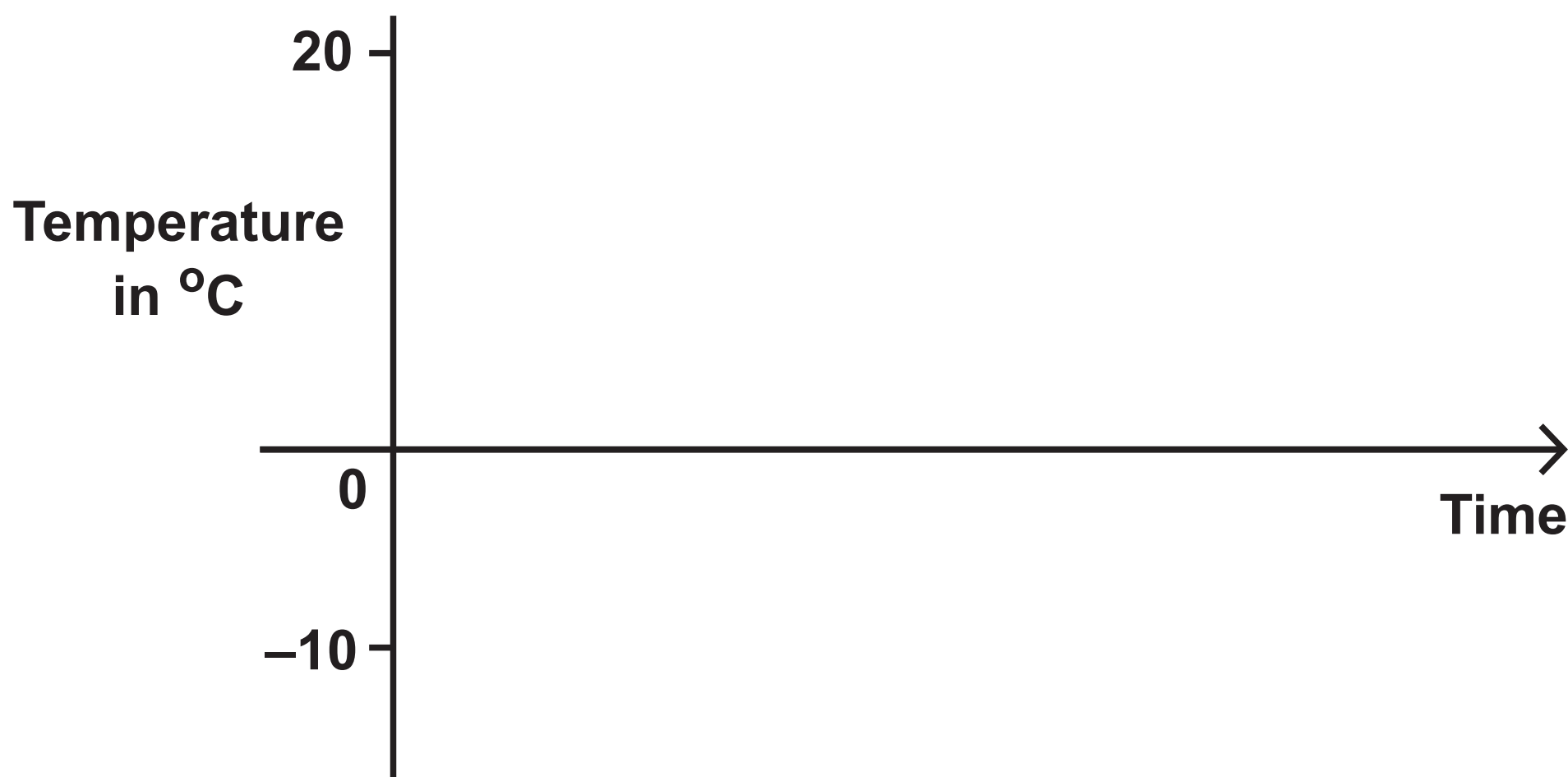
- (ii) The ice cube melts and becomes a puddle with a larger cross-sectional area.

Explain how the pressure of the ice cube on the ground changes when it melts. (2 marks)

(Question continues on next page)

(b) Ice melts at a temperature of 0°C .

On the axes, sketch how the temperature of the ice cube changes as it rises from a temperature of -10°C to a temperature of 20°C . (3 marks)



(c) Explain the changes that occur when a solid melts.

Refer to particles in your answer. (2 marks)

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 9 = 11 MARKS)

TOTAL FOR PAPER = 70 MARKS
END