Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

1097389924

PHYSICS **0625/32**

Paper 3 Theory (Core) **October/November 2019**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **19** printed pages and **1** blank page.

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Cambridge Assessment International Education

1 Fig. 1.1 shows a water tank that is leaking. Drops of water fall from the tank at a constant rate.

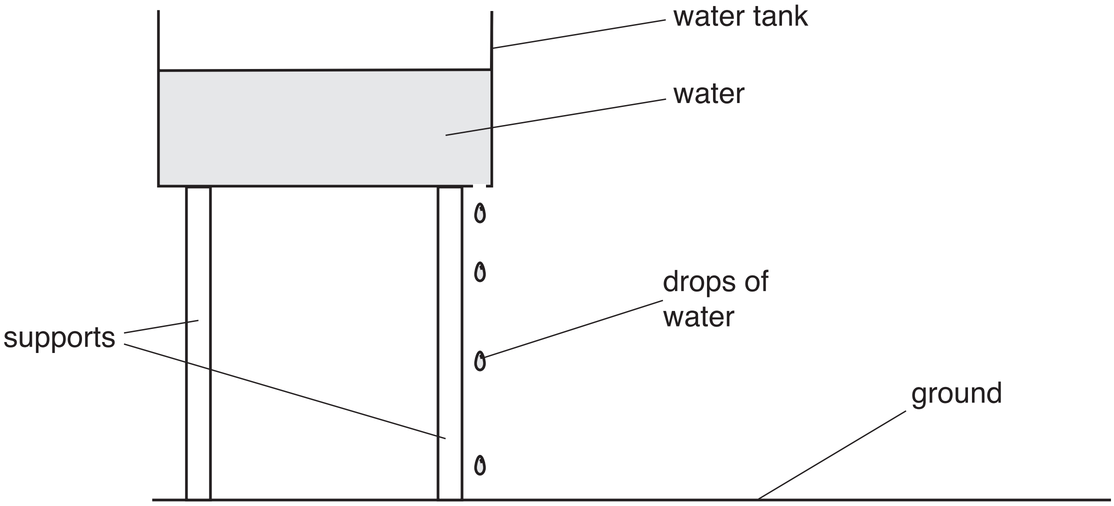


Fig. 1.1 (NOT to scale)

(a) A student uses a stopwatch to determine the time between two drops hitting the ground.

He sets the stopwatch to zero. He starts the stopwatch when the first drop hits the ground.

He stops the stopwatch after a further 30 drops have hit the ground.

The reading on the stopwatch is recorded and shown in Fig. 1.2.

Fig. 1.2

(i) State the time taken for 30 drops to hit the ground.

time = ... s [1]

(ii) Calculate the average time between two drops hitting the ground.

time = ... s [2]

(iii) Explain why the student measures the time for 30 drops to hit the ground instead of measuring the time for one drop to hit the ground.

....

.... [1]

(b) Fig. 1.1 shows that the drops get further apart as they get close to the ground.

State why the drops get further apart.

....

.... [1]

(c) In another experiment the student determines the speed of a falling weight at different times. The speed–time graph for his results is shown in Fig. 1.3.

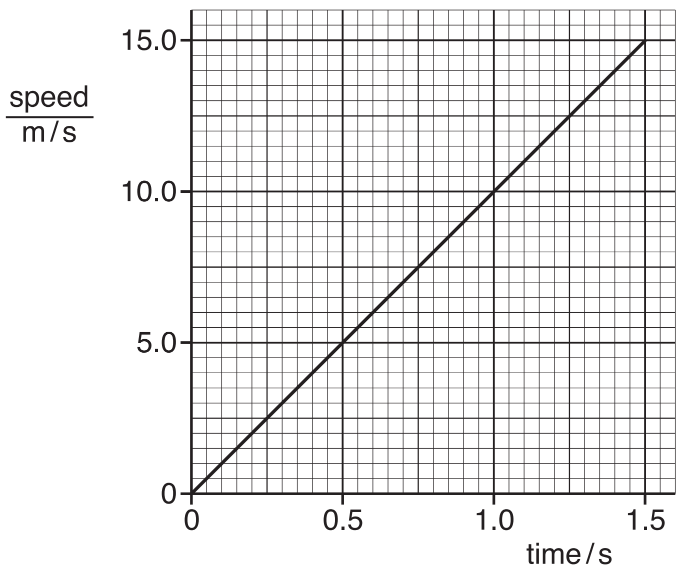


Fig. 1.3

Calculate the distance fallen by the weight in the first 1.5 s.

distance = ... m [3]

[Total: 8]

2 **(a)** A student has an irregularly shaped piece of metal, a beaker of water and a measuring cylinder, as shown in Fig. 2.1.

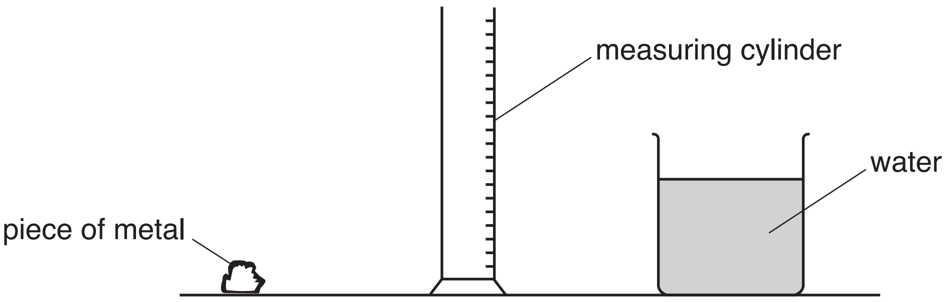


Fig. 2.1

Describe how the student can accurately determine the volume of the piece of metal using the equipment provided.

....

....

....

....

....

.... [4]

(b) The student measures the mass of the piece of metal. Its mass is 146 g.

(i) State the name of the instrument used to measure the mass.

.... [1]

(ii) The volume of the piece of metal is 20 cm^3.
Calculate the density of the metal. State the unit.

density = ... [4]

[Total: 9]

3 **(a)** Fig. 3.1 shows the horizontal forces acting on a swimmer.

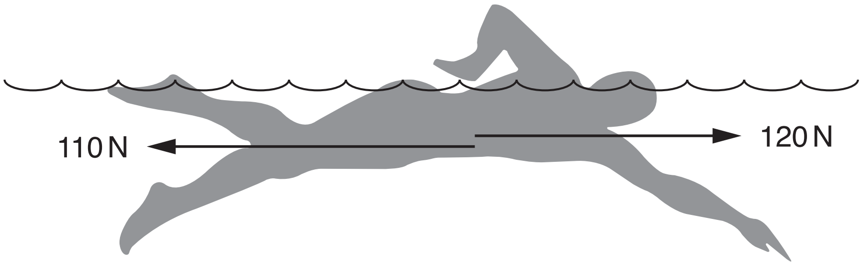


Fig. 3.1

(i) Calculate the size and direction of the resultant horizontal force on the swimmer.

size of resultant horizontal force = ... N

direction of resultant horizontal force = ...

[1]

(ii) State the name of the 110 N force on the swimmer.

.... [1]

(iii) Fig. 3.2 shows the horizontal forces acting on the swimmer as he moves forwards a short time later.

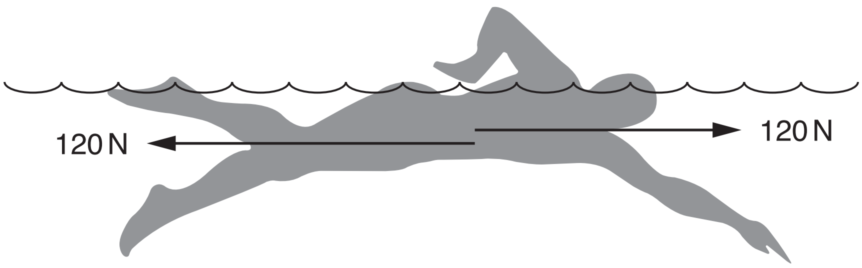


Fig. 3.2

Describe and explain the motion of the swimmer.

....

.... [2]

(b) Another swimmer weighs 700 N. He stands on a diving board, as shown in Fig. 3.3.

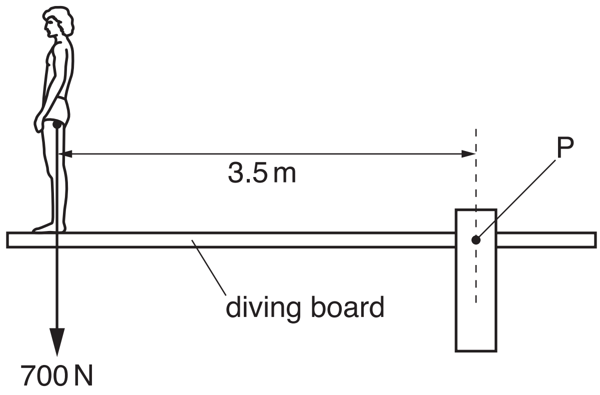


Fig. 3.3

Calculate the moment of the swimmer's weight about point P.

moment = ... N m [3]

[Total: 7]

4 **(a)** Fig. 4.1 shows a metal triangle suspended from a thread.

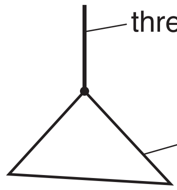


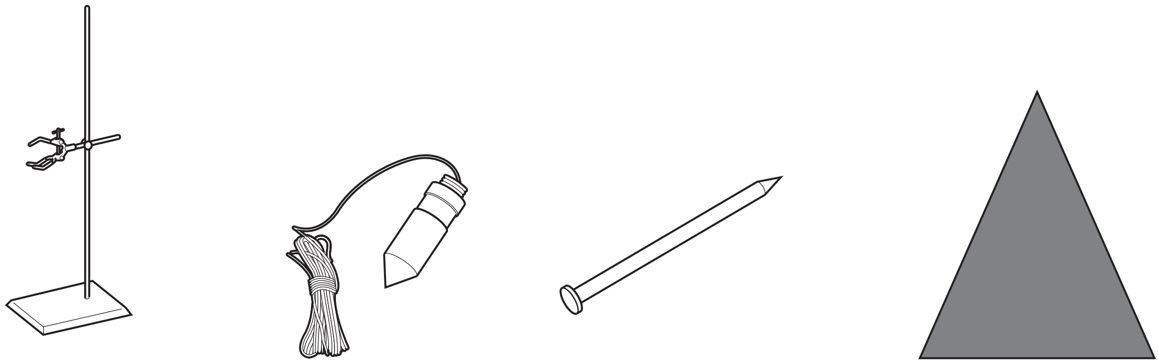
Fig. 4.1

Complete the sentence. Choose the correct word or phrase from the box.

above	below	to the left of	to the right of

The metal triangle will come to rest with its centre of mass directly .... the point of suspension. [1]

(b) A student finds the centre of mass of a shape made of thin card. Fig. 4.2 shows the equipment.



clamp stand and clamp | plumbline | nail or pin | shape made of thin card

Fig. 4.2 (NOT to scale)

Describe how the student finds the centre of mass of the card. Choose from these sentences.

A A line is drawn on the card showing the position of the string.

B A pin held in a clamp is put through the hole in the card.

C The centre of mass is where the lines cross on the card.

D The process is repeated using holes near the other two edges.

Complete the flow chart. Write the letter for the correct sentence in each box.

A small hole is made near one edge of the card

↓

[ ]

↓

The plumbline is attached to the pin

↓

[ ]

↓

[ ]

↓

[ ]

[3]

[Total: 4]

5 **(a)** Energy sources used to generate electricity are shown in the box.

gas	oil	tides	waves	wind

Which energy sources are non-renewable?

Draw a ring around **each** energy source that is non-renewable. [1]

(b) The diagram shows a geothermal power station.

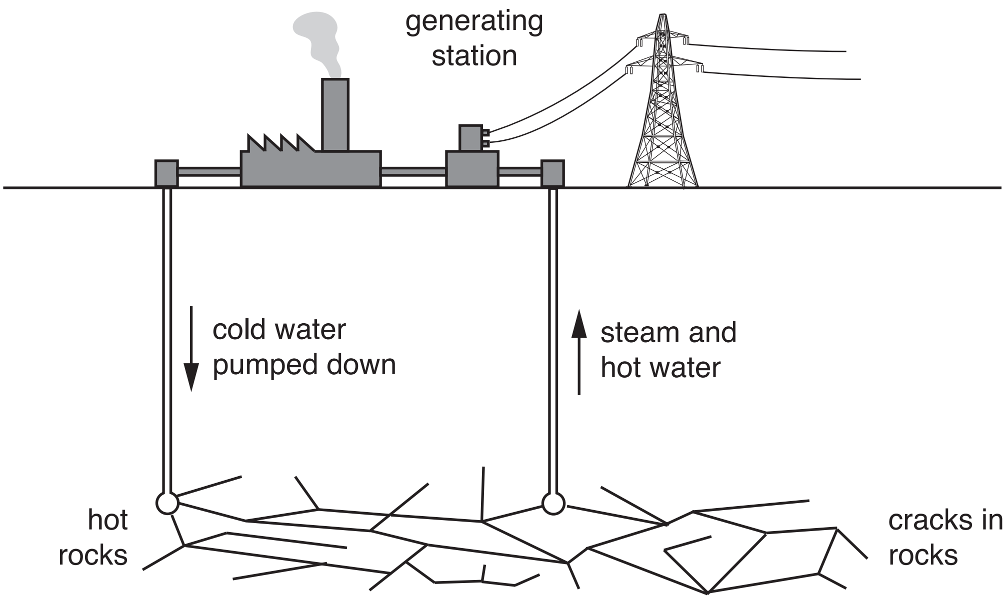


Fig. 5.1

Describe how the geothermal power station generates electricity.

....

....

....

....

....

.... [4]

[Total: 5]

6 **(a)** Fig. 6.1 shows a liquid-in-glass thermometer.

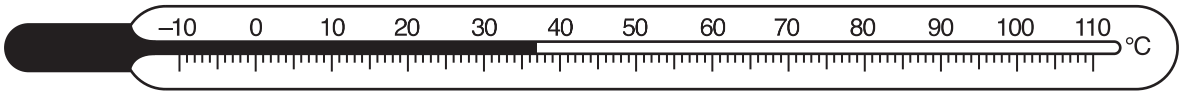


Fig. 6.1

(i) State the name of a liquid used in liquid-in-glass thermometers.

.... [1]

(ii) The thermometer is calibrated using two fixed points.

State the values of these fixed points.

.... °C and .... °C [1]

(b) A student heats some water in a metal can, as shown in Fig. 6.2.

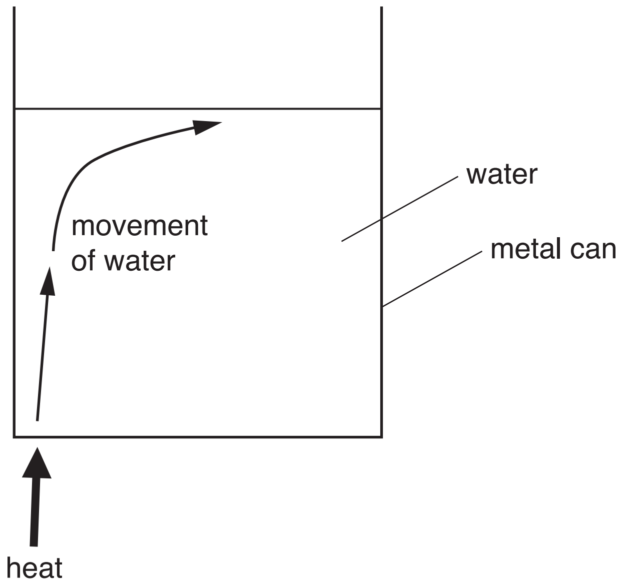


Fig. 6.2

(i) Complete the sentence. Choose a word from the box.

conduction	convection	radiation

Thermal (heat) energy moves through the metal can by .... [1]

(ii) Describe how thermal energy is transferred throughout the water. Include your ideas about density changes.

....

....

....

....

....

....

.... [3]

[Total: 6]

7 All matter is made up of atoms and molecules.

(a) Describe the arrangement, separation and motion of gas molecules.

arrangement ....

separation ....

motion ....
[3]

(b) The motion of smoke particles in air can be observed using a smoke cell and microscope. Fig. 7.1 shows the arrangement.

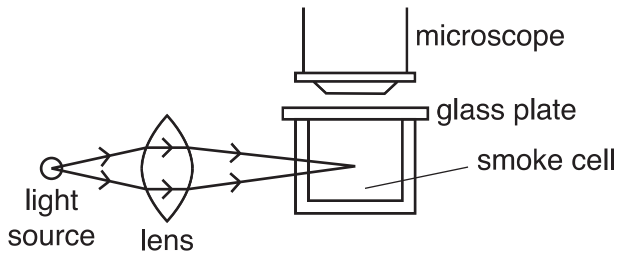


Fig. 7.1

Smoke is placed inside the glass smoke cell. Light enters from the side of the smoke cell.

A student looks through the microscope. She sees tiny spots of light moving. Each spot of light is a smoke particle.

Fig. 7.2 represents the path of a smoke particle seen in the eyepiece of the microscope.

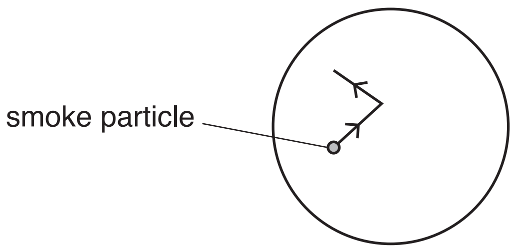


Fig. 7.2

(i) On Fig. 7.2, continue the path of the smoke particle. [2]

(ii) State the term used to describe the movement of the smoke particle.

.... [1]

[Total: 6]

8 Fig. 8.1 is a partially completed ray diagram.

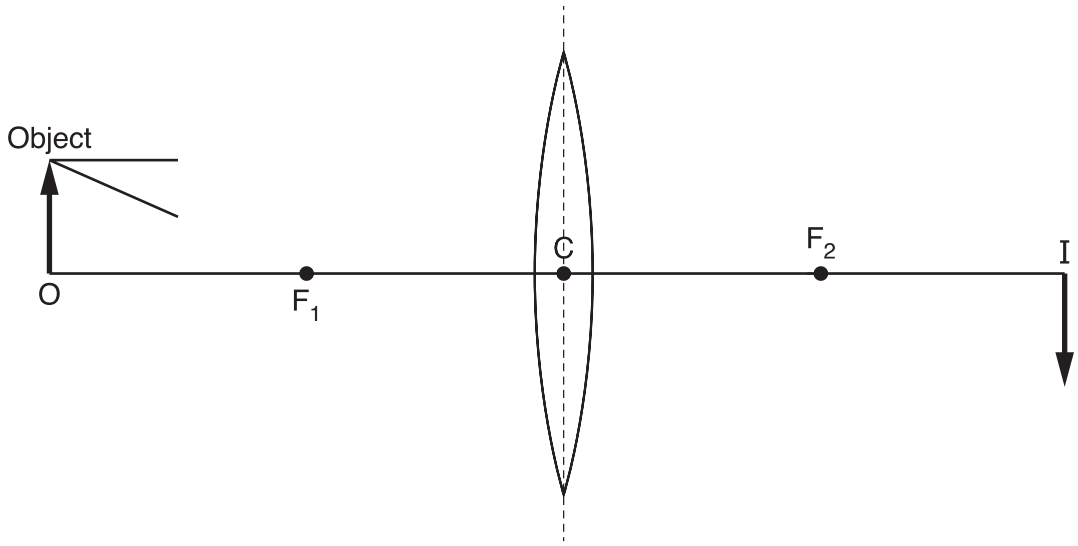


Fig. 8.1

The object is at O and its image is at I.

(a) Which distance is the focal length of the lens? Tick **one** box.

☐ C to F_1

☐ O to C

☐ F_2 to I

☐ O to I [1]

(b) On Fig. 8.1, extend the **two** rays from the arrowhead on the object until both reach the position of the image. [3]

(c) The object is moved a small distance **away** from the lens. State the effect, if any, this has on the position and size of the image.

position ....

size ....

[2]

[Total: 6]

9 A boat race starts on the sea, but close to land. Fig. 9.1 shows the boats at the start of the race.

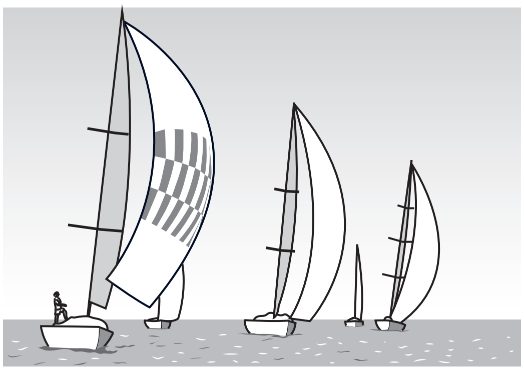


Fig. 9.1

On the land, a cannon produces a loud bang to start the race. There is a flash of light at the same time as the bang.

(a) **(i)** At the start of the race, the sailors watch for the flash of light from the cannon.

Suggest why the sailors watch for the flash of light rather than listen for the bang.

....

.... [1]

(ii) One of the sailors is 500 m from the cannon. She measures a time difference of 1.6 seconds between seeing the flash of light and hearing the bang.

Calculate the speed of sound.

speed of sound = ... m/s [3]

(iii) The value of the speed of sound obtained in **(a)(ii)** is lower than expected.

Suggest a reason for this difference.

....

.... [1]

(b) The race is held close to a part of the coast with high cliffs. A sailor hears a second bang shortly after the first bang.

State the term for the second bang and explain how it is produced.

term ....

explanation ....
[2]

[Total: 7]

10 A circuit is made from two lamps, a cell and a switch, as shown in Fig. 10.1.

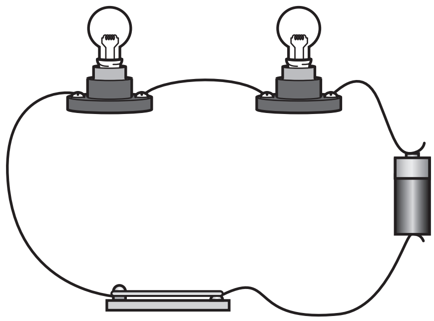


Fig. 10.1

(a) **(i)** Draw the circuit symbol for a cell.

[1]

(ii) State the term used for the arrangement of lamps in the circuit in Fig. 10.1.

.... [1]

(iii) The switch is closed and the lamps light.

State the name of the charged particles that are flowing through the wires

.... [1]

(b) Fig. 10.2 represents a different type of circuit.

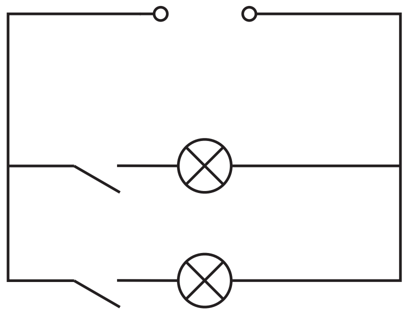


Fig. 10.2

(i) Compare Fig. 10.1 and Fig. 10.2. State **two** advantages of the type of circuit shown in Fig. 10.2 with the type of circuit shown in Fig. 10.1.

1. ....

2. ....
[2]

(ii) The potential difference across the power source in Fig. 10.2 is 3.0 V. The combined resistance of the two lamps is 12 Ω. Calculate the size of the current in the circuit.

current = ... A [3]

[Total: 8]

11 **(a)** Identify which of the following metals can be permanently magnetised. Place a tick (✓) in the box next to any correct metal.

☐ aluminium

☐ copper

☐ steel

☐ tungsten

[1]

(b) Two metal rods are thought to be permanent magnets. Describe the test you would carry out to confirm that both rods are permanent magnets.

....

....

.... [2]

(c) **(i)** Describe how to make an electromagnet. You may draw a labelled diagram to help your answer.

....

....

....

.... [3]

(ii) Suggest **two** factors that affect the strength of the magnetic field of an electromagnet.

1 ....

2 ....

[2]

[Total: 8]

12 A radioactive substance decays by emitting an α-particle.

(a) The nuclide notation for an α-particle is

$${}^{4}_{2}\alpha$$

(i) State the term given to the number 4, written in the nuclide notation.

.... [1]

(ii) State the term given to the number 2, written in the nuclide notation.

.... [1]

(b) Fig. 12.1 shows the decay curve for a radioactive material.

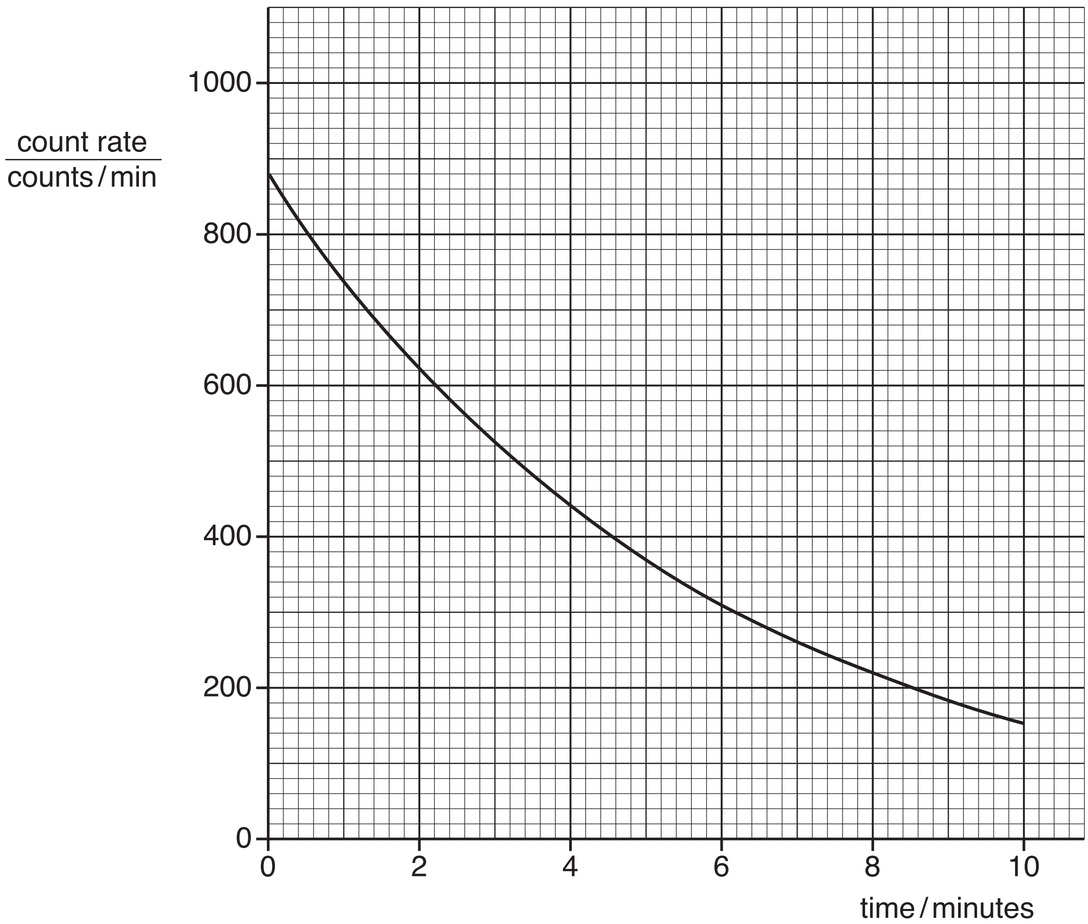


Fig. 12.1

(i) Use information from the graph in Fig. 12.1 to determine the half-life of the material. Clearly show how you used the graph to obtain your answer.

half-life = ... minutes [3]

(ii) Another radioactive material with the same half-life has an initial count rate of 600 counts / min. On Fig. 12.1 sketch the decay curve for this material. [1]

[Total: 6]

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