Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/21**

Paper 2 Core **May/June 2015**

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 kg to be 10 N (i.e. 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.

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

This document consists of **18** printed pages and **2** blank pages.

1 A student has a stack of 20 identical coins.

Fig. 1.1 shows the student measuring the height of the stack using a ruler.

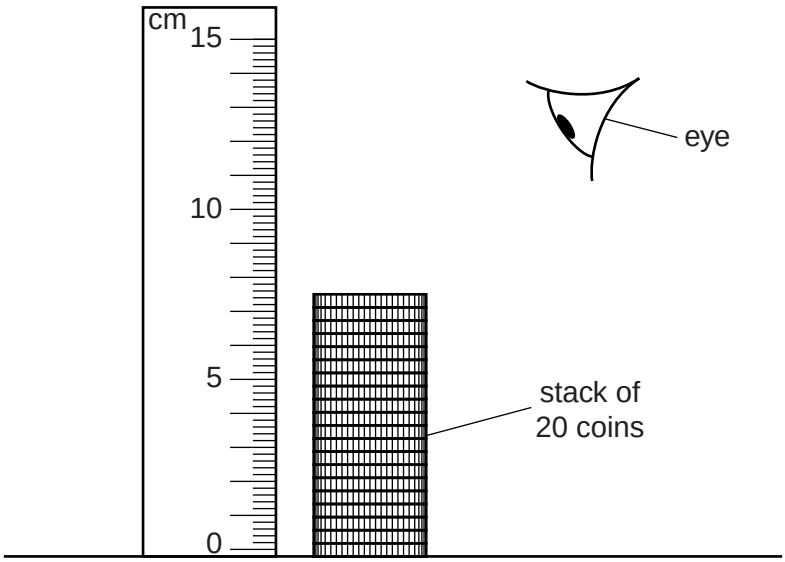

Fig. 1.1

(a) With his eye at the position shown, the student's measurement of the height of the stack is 6.8 cm.

Suggest two reasons why the student's measurement is inaccurate.

1. .....

.....

2. .....

.....

[2]

(b) Another student correctly determines the height of the stack as 7.7 cm.

Calculate the average thickness of one coin.

thickness = ... cm [2]

(c) The mass of a single coin is 12 g.

State this mass in kg.

mass = ... kg [1]

[Total: 5]

2 **(a)** A car is travelling at a constant speed of 80 km / h.

Calculate the distance travelled by the car in half an hour.

distance = ... km [1]

(b) The car in Fig. 2.1 is travelling along a road on which there is a speed detector.

The speed detector consists of two parallel strips attached to the road and connected to a timer.

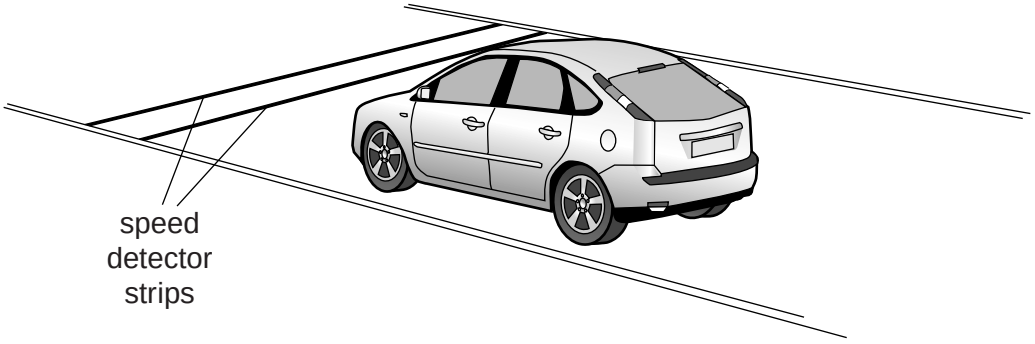

Fig. 2.1

The speed detector strips are 0.50 m apart. The time interval between the car hitting the first strip and the second strip is 0.040 s.

Calculate the average speed of the car between the strips.

speed = ... m / s [3]

(c) (i) A car is travelling at a speed of 15 m / s. The driver applies the brakes and brings the car to a stop.

Fig. 2.2 represents the last part of the journey.

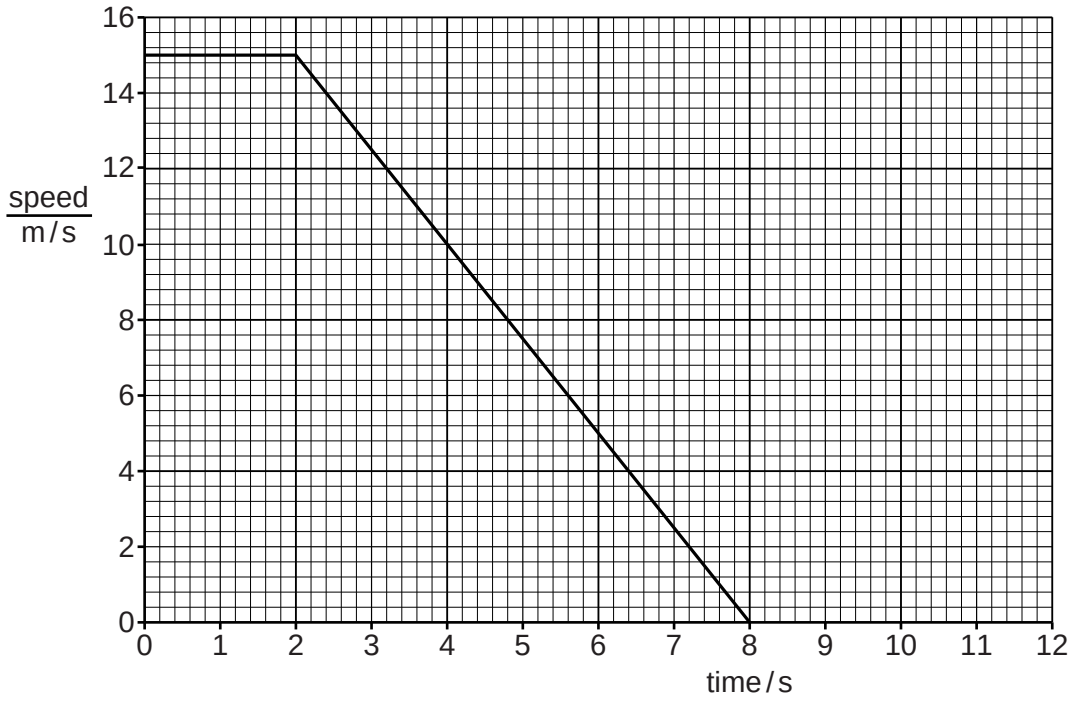

Fig. 2.2

Calculate the distance travelled by the car as it slows down.

distance = ... m [2]

(ii) On another occasion, the car is travelling at the same speed of 15 m / s when the driver sees a hazard ahead. She uses emergency braking to stop the car in 2.0 seconds.

On Fig. 2.2, draw the speed-time graph for the emergency stop. [1]

[Total: 7]

3 A student is sitting on a chair as shown in Fig. 3.1.

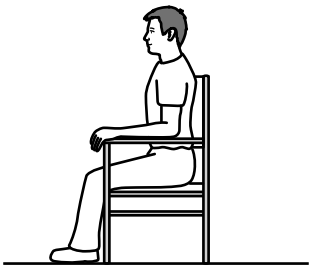

Fig. 3.1

(a) (i) Estimate the mass of the student. ..... [1]

(ii) Which statement is correct for the mass of the chair on the Moon and the mass of the chair on the Earth?

Tick the box next to the correct statement.

- ☐ The mass of the chair is greater on the Moon.
- ☐ The mass of the chair is less on the Moon but not zero.
- ☐ The mass of the chair is the same on the Moon.
- ☐ The mass of the chair is zero on the Moon.

[1]

(b) The student tips his chair back to the position shown in Fig. 3.2.

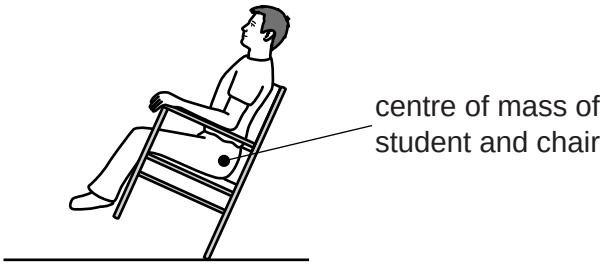

Fig. 3.2

(i) State and explain how the pressure exerted by the chair on the floor in Fig. 3.2 compares with the pressure exerted by the chair in Fig. 3.1.

statement .....

explanation .....

.....

.....

[3]

(ii) Explain why the chair will topple over backwards. You may draw on Fig. 3.2 as part of your answer.

.....

.....

..... [2]

[Total: 7]

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4 Fig. 4.1 shows a battery-operated alarm clock.

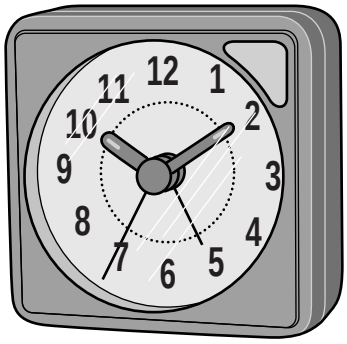


Fig. 4.1

Use words from the box to complete the sentences.

chemical	electrical	kinetic	light	sound	thermal

The battery stores ..... energy. When the battery is first connected, electrical energy is transferred to ..... energy of the clock's hands. Some of the electrical energy is transferred to the surroundings as ..... energy. When the alarm bell rings, electrical energy is transferred to ..... energy. [4]

[Total: 4]

5 **(a)** Fig. 5.1 shows four traces produced by an oscilloscope for different sounds. For each trace the same settings of the oscilloscope were used.

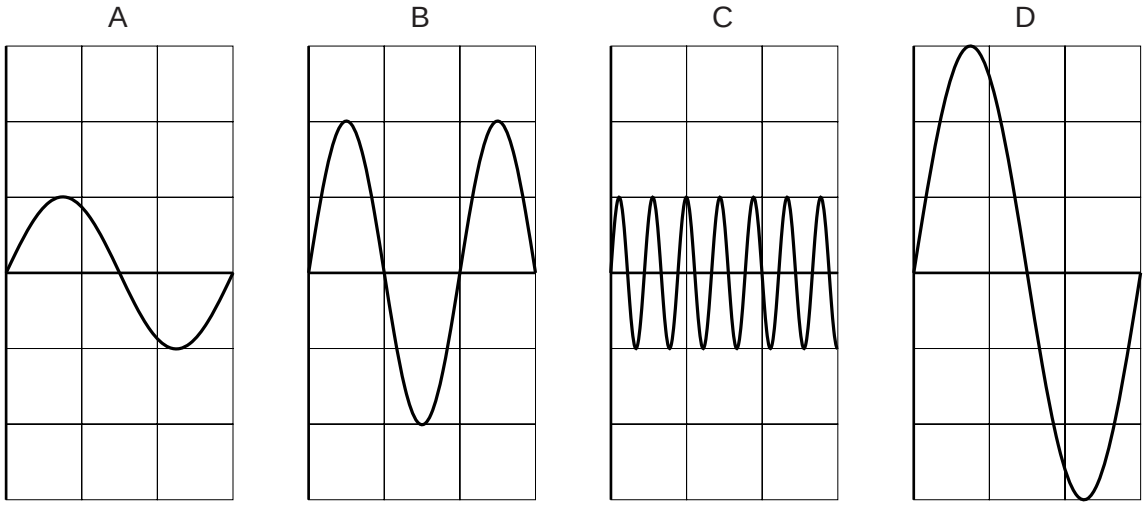


Fig. 5.1

(i) In the box, write the letter A, B, C or D of the trace showing the sound with the highest pitch.

[1]

(ii) Complete the statement using the letters of the traces.

The two traces that have the same amplitude are ..... and ..... . [1]

(b) Students are provided with a 100 m tape measure and stopwatches. The teacher has a starting pistol.

Describe an experiment that they can carry out to determine the speed of sound in air.

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[Total: 7]

6 A round-bottomed flask is connected to a mercury manometer. The air inside the flask is warm. The arrangement is shown in Fig. 6.1.

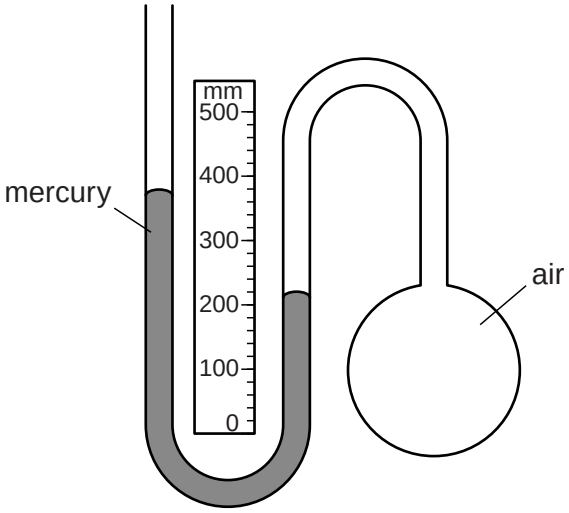


Fig. 6.1

(a) (i) State the scale reading for the left-hand column.

left-hand column = ... mm

State the scale reading for the right-hand column.

right-hand column = ... mm
[1]

(ii) Atmospheric pressure is equal to 760 mm of mercury.

Calculate the pressure of the air inside the flask.

pressure = ... mm of mercury [3]

(b) The air inside the flask cools.

(i) State what happens to the pressure of the air inside the flask as the air cools.

..... [1]

(ii) In terms of the air molecules, state **two** ways in which the air changes as it cools.

.....

.....

.....

..... [2]

[Total: 7]

7 Fig. 7.1 shows a domestic hot water system.

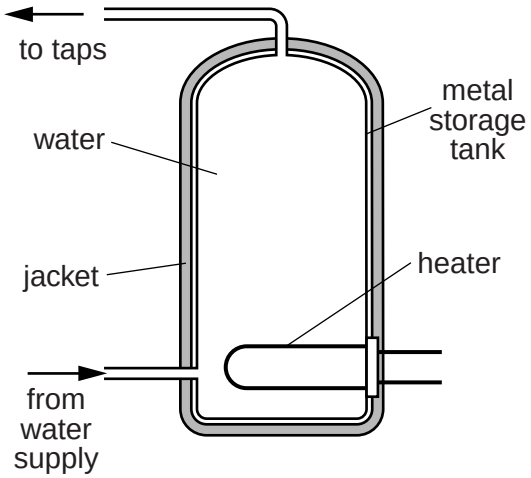


Fig. 7.1

(a) The heater is placed at the bottom of the storage tank.

(i) Name the process by which water in contact with the heater becomes hot.

..... [1]

(ii) **1.** Explain how the water at the top of the storage tank becomes hot. Include the word *density* in your answer.

.....

.....

.....

.....

..... [3]

2. State the name given to this process.

..... [1]

(b) Hot water storage tanks are often covered in a material such as polystyrene or a 'jacket' made from a woollen material.

(i) State the purpose of this covering.

..... [1]

(ii) Suggest **two** reasons why the use of such a material is important.

1. .....

2. .....
[2]

[Total: 8]

8 **(a)** A ray of red light passes through a glass block, as shown in Fig. 8.1.

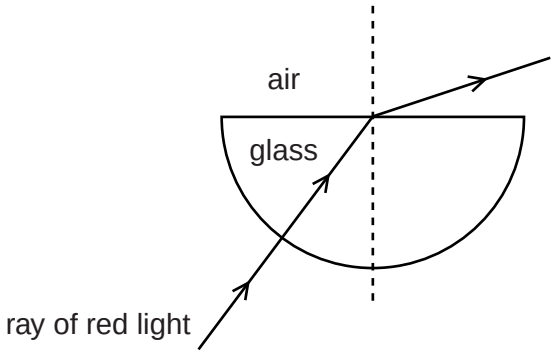


Fig. 8.1

(i) On Fig. 8.1, clearly label the angle of refraction. [1]

(ii) State the name given to the dashed line drawn at 90° to the boundary.

..... [1]

(b) A roadside reflector is made of plastic. It reflects the light from car headlamps.

Fig. 8.2 shows part of the path of a ray of light through the reflector.

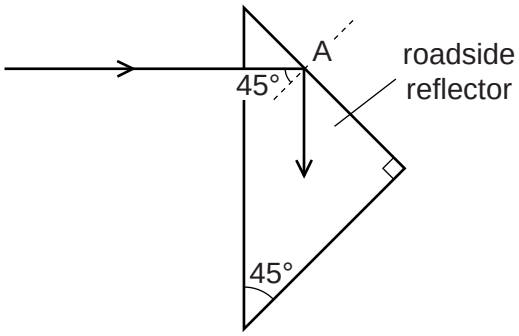


Fig. 8.2

The critical angle for the plastic is less than 45°.

(i) On Fig. 8.2, complete the path of the ray of light. [1]

(ii) State the term used to describe this type of reflection.

..... [1]

(iii) Explain why the ray turns though 90° at A.

.....

..... [1]

[Total: 5]

9 In cold weather, houses are often heated with an electrical heater.

Fig. 9.1 shows a simplified electrical circuit for a household heater.

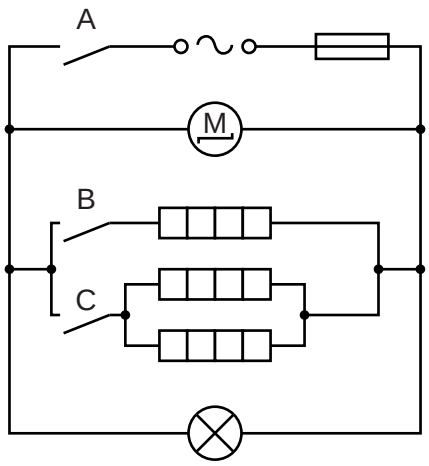


Fig. 9.1

(a) What does the symbol  represent?

..... [1]

(b) The heater has three identical heating elements, a fan driven by a motor and a lamp.

Name the components that are working when switch A only is closed.

..... [1]

(c) The heater has two switches, B and C, to give high, medium and low heat settings.

Identify how each heat setting is obtained. Complete the table by adding ticks to represent a closed switch.

heater settings	switch B	switch C
high		
medium		
low		

[3]

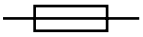
(d) Write down the equation that relates resistance, potential difference (p.d.) and current.

..... [1]

(e) The current in one of the heating elements is 5.0 A. The resistance of the heating element is 50 Ω.

Calculate the p.d. across the heating element. Include the appropriate unit.

p.d. = ... [2]

(f) Explain how the component with the symbol  protects the circuit.

.....

.....

.....

..... [2]

[Total: 10]

10 **(a)** The box below contains the names of some metals.

copper	gold	iron	lead	silver	steel

Circle the metals which may be attracted to a magnet. [2]

(b) A student has 3 metal bars which all look the same. Two of the metal bars are magnets and one is not.

Explain how the student can identify the two magnets without using any other equipment.

.....

.....

.....

..... [2]

(c) From the metals given in **(a)**, state the name of the metal that can be used to make a permanent magnet.

..... [1]

(d) Fig. 10.1 shows a vertical wire passing through a horizontal piece of card.

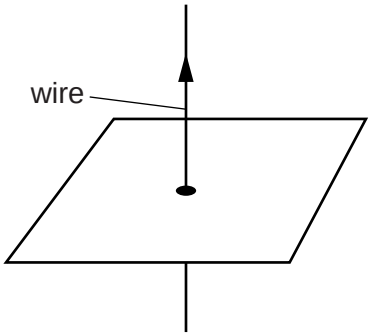


Fig. 10.1

There is a direct current (d.c.) in the wire. The current produces a magnetic field around the wire.

(i) Name a piece of equipment that can be used to investigate the magnetic field produced by the current-carrying wire.

..... [1]

(ii) Fig. 10.2 shows the wire and the card viewed from above.

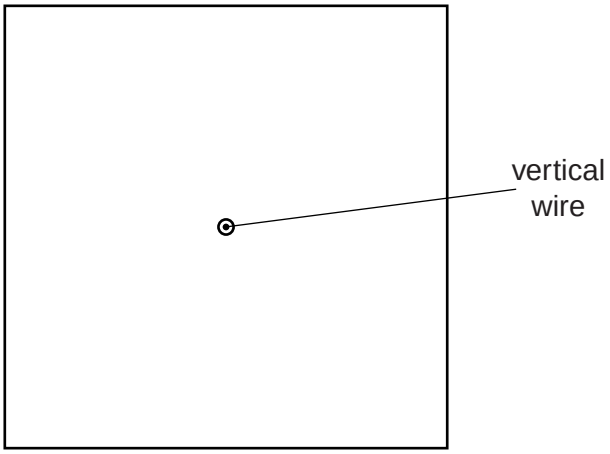


Fig. 10.2

On Fig. 10.2, carefully draw **two** complete field lines produced by the current-carrying wire. [1]

[Total: 7]

11 Fig. 11.1 represents the electromagnetic spectrum.

γ-rays	X-rays	ultra-violet	visible light			radio waves

Fig. 11.1

(a) Identify one feature that is the same for all radiations that form the electromagnetic spectrum.

.....

..... [1]

(b) Fill in the blank spaces between visible light and radio waves by adding the names of the radiations. [2]

(c) State the radiation that has the shortest wavelength.

..... [1]

(d) **(i)** Describe a common use of X-rays.

.....

..... [1]

(ii) State a precaution taken by those who work with X-rays.

.....

..... [1]

[Total: 6]

12 Some water is contaminated with a radioactive element.

In a laboratory, the count rate from a sample of the contaminated water is measured every 10 days. The results are shown in the table.

time / days	0	10	20	30	40	50	60	70
count rate / counts / s	3250	2300	1650	1200	980	550	400	320

(a) On Fig. 12.1, complete the graph by plotting the first three points and drawing the best-fit curve. [2]

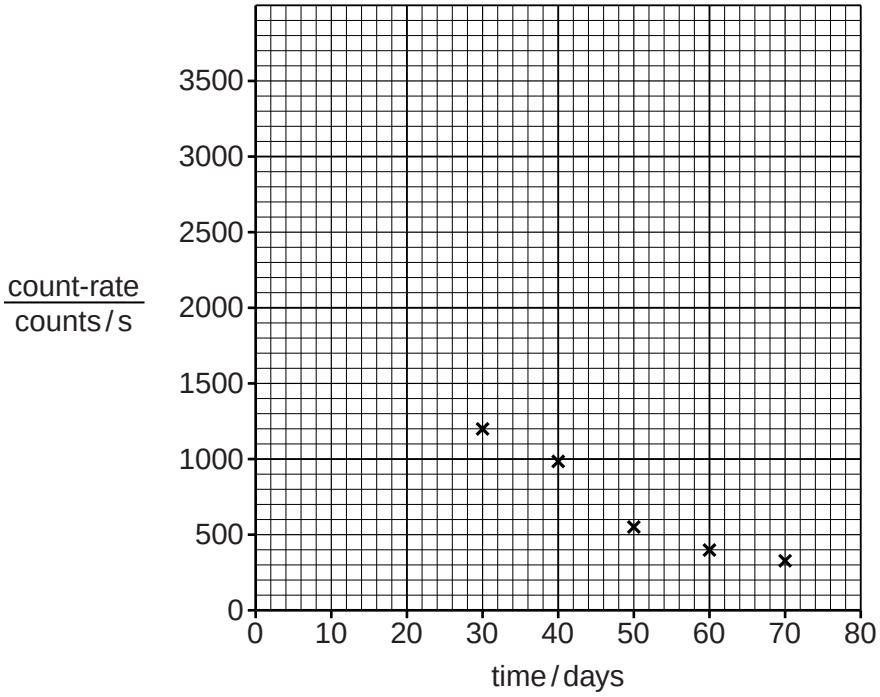


Fig. 12.1

(b) One of the readings is incorrect due to an error.

Circle this point on the graph and estimate the correct count rate for this day.

count rate = ... [2]

(c) Use the graph to determine the half-life of the radioactive element. Ignore background radiation.

half-life = ... [3]

[Total: 7]

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