Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5732576862

PHYSICS **0625/32**

Paper 3 Theory (Core) **February/March 2021**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.
- Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

© UCLES 2021

1 Fig. 1.1 shows a box dropped from an aeroplane. The box contains supplies.
A parachute is attached to the box. The parachute is opened when the time is 6.0 s.

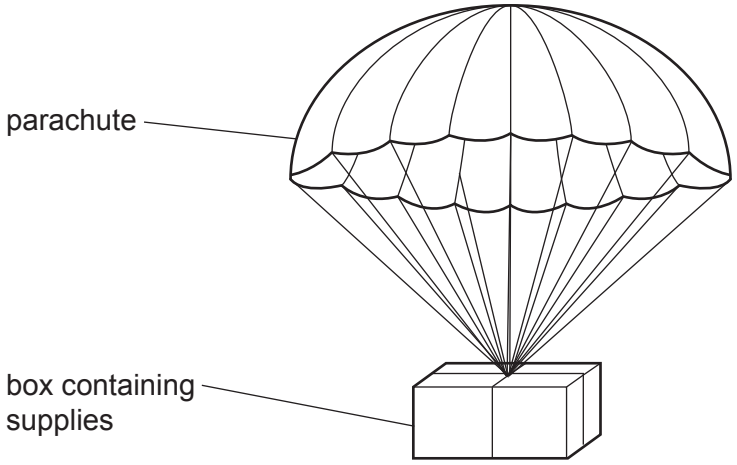


Fig. 1.1

The graph in Fig. 1.2 shows the vertical speed of the box as it falls.

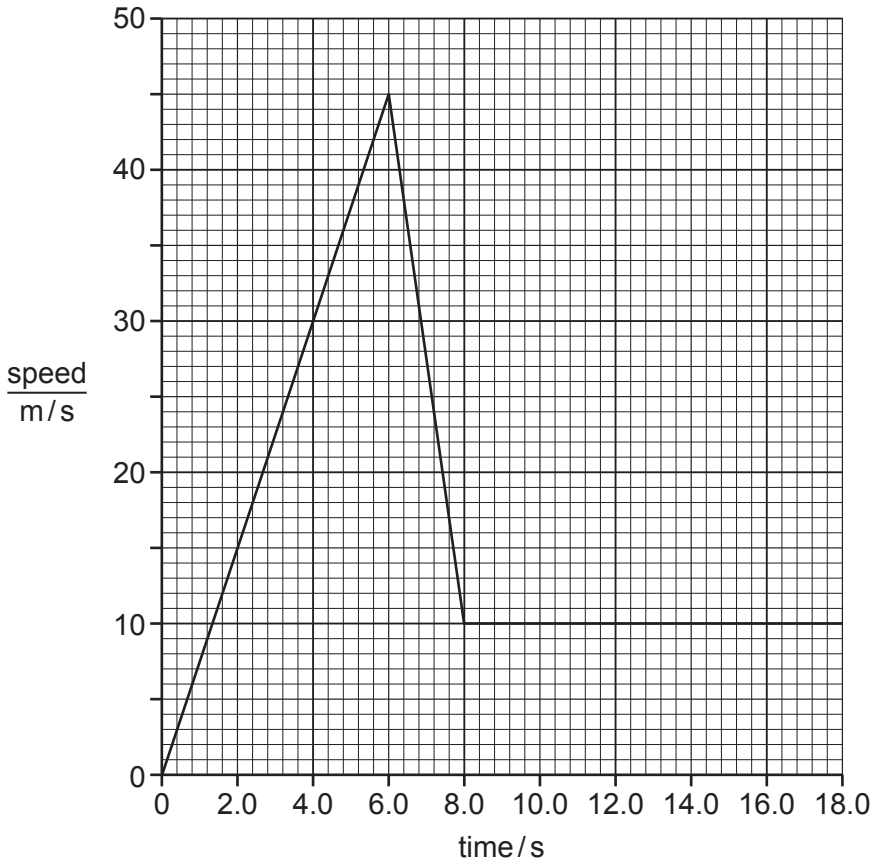


Fig. 1.2

© UCLES 2021

(a) State and explain what happens to the kinetic energy of the box during the first 6.0 s of its descent.

.....

.....

..... [2]

(b) State and explain what happens to the gravitational potential energy of the box during the first 6.0 s.

.....

.....

..... [2]

(c) **(i)** Use the graph in Fig. 1.2 to determine the speed of the object when the object is moving with a constant speed.

speed of the object at constant speed = ... m / s [2]

(ii) State the size of the resultant vertical force on the box when it is falling at a constant speed.

..... [1]

(d) Use the graph in Fig. 1.2 to determine the distance travelled by the box during the first 6.0 s.

distance travelled in first 6.0 s = ... m [3]

(e) Without calculation, describe how Fig. 1.2 shows that the deceleration of the box is greater than the acceleration of the box.

.....

..... [1]

[Total: 11]

2 Fig. 2.1 shows a measuring cylinder containing water.

Fig. 2.2 shows the same measuring cylinder after a stone has been lowered into it.

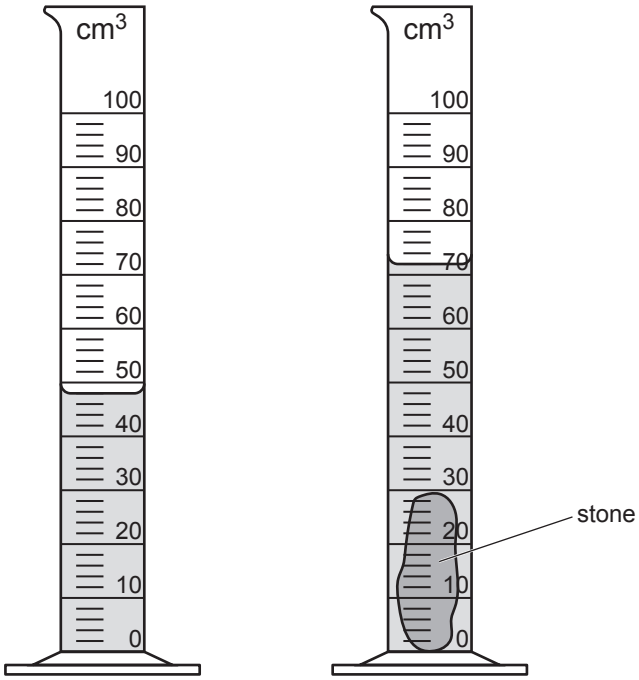


Fig. 2.1 **Fig. 2.2**

(a) Calculate the volume of the stone.

volume = ... cm^3 [2]

(b) Another stone has a mass of 98.4 g. The volume of this stone is 41.0 cm^3.

Calculate the density of the stone.

density = ... g/cm^3 [3]

(c) The stone with a mass of 98.4 g has a weight of 0.984 N.
Explain the difference between mass and weight.

.....

.....

..... [2]

[Total: 7]

© UCLES 2021

3 Fig. 3.1 shows the forces acting on a uniform balanced beam. The beam is pivoted at its centre.

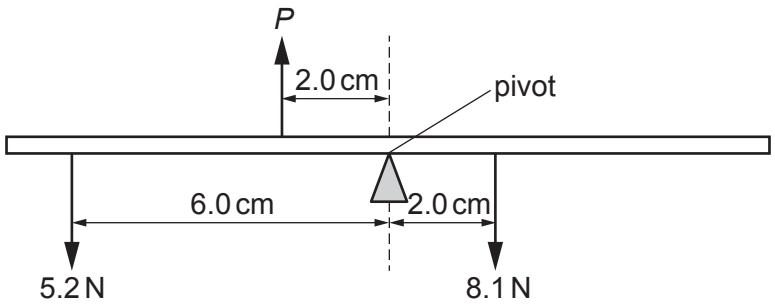


Fig. 3.1

(a) Calculate the moment of the 5.2 N force about the pivot and show that its value is close to 30 Ncm.

[3]

(b) The beam is balanced. Calculate force *P*.

force *P* = ... N [4]

[Total: 7]

© UCLES 2021

4 Fig. 4.1 shows an outline of the main parts of a geothermal power station used to generate electricity. Some parts of the power station are labelled.

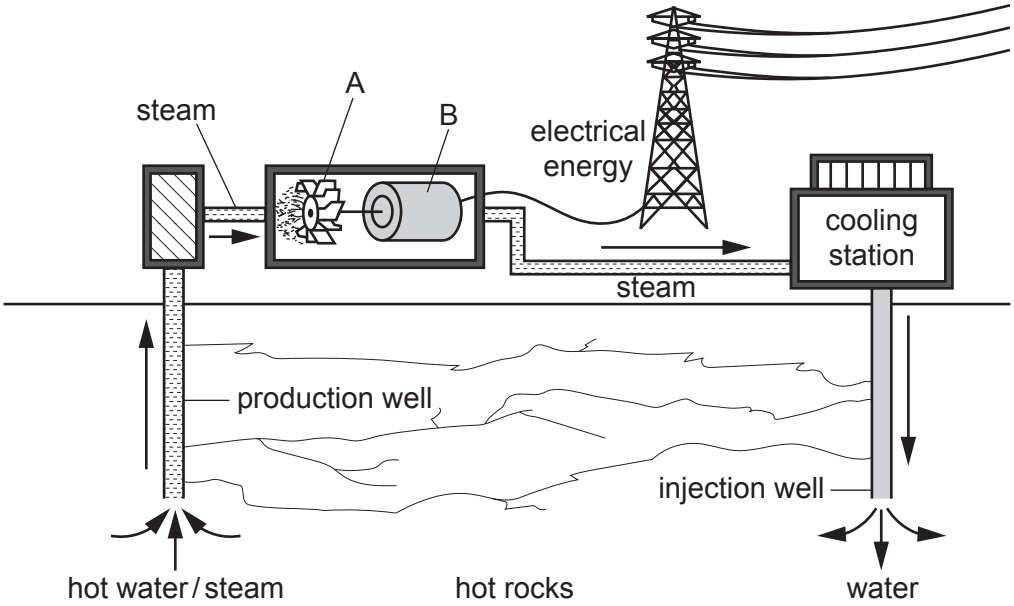


Fig. 4.1 (Not to scale)

(a) State the names of the parts of the power station labelled A and B.

part A .....

part B .....
[2]

(b) Geothermal energy is one source of renewable energy.

State **two** other sources of renewable energy.

1. .....

2. .....
[2]

(c) State **two** environmental advantages, other than being renewable, of a geothermal power station compared to a coal-fired power station.

1. .....

2. .....
[2]

[Total: 6]

5 Fig. 5.1 shows a metal block on a flat surface.

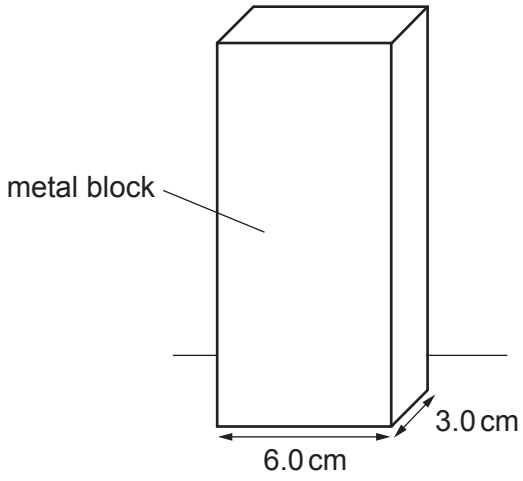


Fig. 5.1

(a) (i) The mass of the metal block is 1.6 kg.

Calculate the weight of the metal block.

weight = ... N [2]

(ii) Calculate the pressure on the flat surface due to the metal block.

pressure = ... N/cm^2 [3]

(b) In an experiment, the metal block is heated and the temperature of the metal block increases by 100 °C.

State the effect, if any, of the temperature increase on:

1. the volume of the metal block .....
2. the mass of the metal block .....
3. the density of the metal block .....

[3]

[Total: 8]

6 Fig. 6.1 shows the path of a ray of red light through a glass block in air.

The critical angle for the red light as it travels from glass into air is 43°.

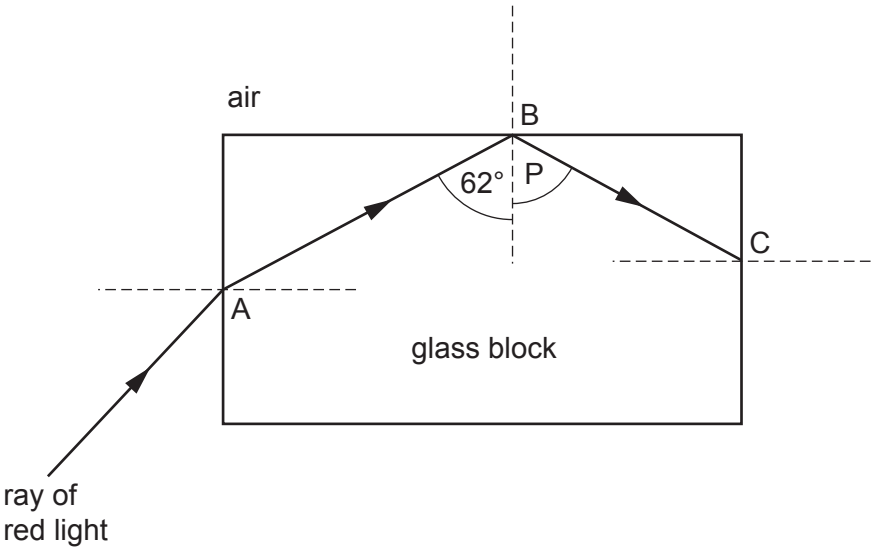


Fig. 6.1

(a) (i) On Fig. 6.1, label the angle of incidence at A. Use the letter X to label the angle. [1]

(ii) State the name of the process which occurs at A.

..... [1]

(iii) State the name given to the dashed line at A.

..... [1]

(b) (i) On Fig. 6.1, one of the angles at B is 62°. State the value of the angle labelled P.

..... [1]

(ii) State the name of the process which occurs at B.

..... [2]

(c) On Fig. 6.1, draw the path of the ray of red light as it travels from C into the air. [1]

[Total: 7]

© UCLES 2021

7 Fig. 7.1 shows a transverse wave.

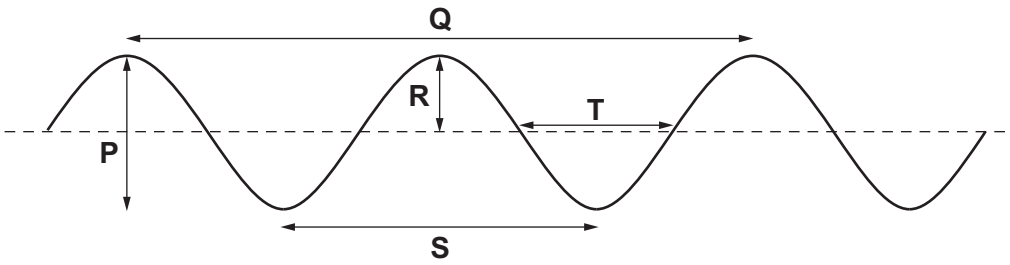


Fig. 7.1

(a) Give the label letter **P**, **Q**, **R**, **S or T** for the arrow which represents:

1. the amplitude of the wave ..... [1]

2. the wavelength of the wave. ..... [1]

(b) A student stands next to a pond and observes water waves on its surface. She counts 12 complete waves passing a point in the pond in a time of 8.0 s.

Calculate the frequency of the water waves.

frequency = ... Hz [3]

(c) Fig. 7.1 shows a transverse wave. Describe the difference between transverse and longitudinal waves.

You may draw a labelled diagram.

.....

.....

.....

..... [3]

[Total: 8]

8 **(a)** Fig. 8.1 shows the magnetic field pattern around a bar magnet.

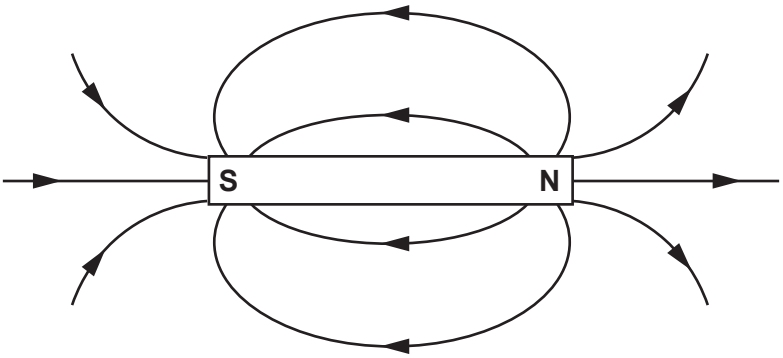


Fig. 8.1

(i) Describe an experiment to identify the pattern and direction of magnetic field lines around a bar magnet as shown in Fig. 8.1.

You may add to Fig. 8.1 as part of your answer.

.....

.....

.....

.....

..... [3]

(ii) State a material that can be used to make a permanent bar magnet.

..... [1]

© UCLES 2021

(b) A student uses two bar magnets to create a uniform magnetic field. He places a current-carrying wire at right angles to the magnetic field, as shown in Fig. 8.2.

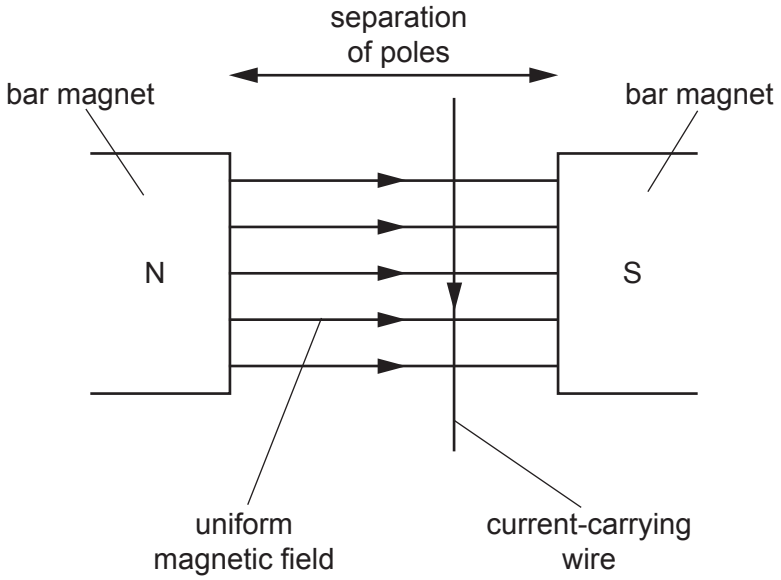


Fig. 8.2

There is a force on the current-carrying wire.

(i) The student wants to reverse the direction of the force on the wire.

State **one** change that reverses the direction of the force on the wire.

..... [1]

(ii) The student increases the separation of the poles of the permanent magnets.

State and explain how increasing the separation affects the force on the current-carrying wire.

.....

..... [2]

[Total: 7]

9 Fig. 9.1 shows an electric circuit.

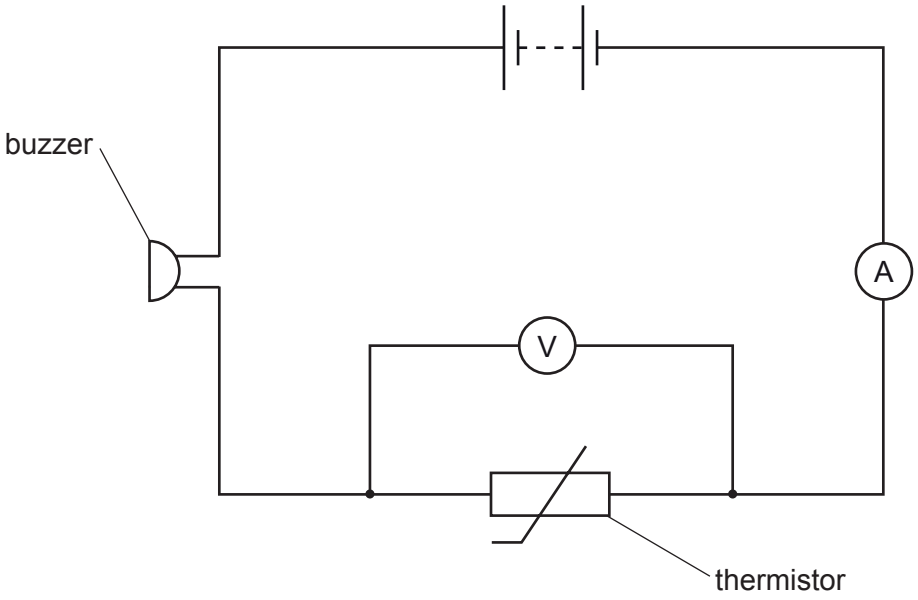


Fig. 9.1

(a) When the circuit is in a cool room, the voltmeter reading is 5.6 V and the ammeter reading is 0.040 A.

Calculate the resistance of the thermistor.

resistance of thermistor = ... Ω [3]

(b) The temperature of the thermistor increases and the buzzer turns on.

State and explain how the increase in temperature affects the current in the thermistor.

.....

..... [2]

(c) Suggest a possible use for the circuit shown in Fig. 9.1.

..... [1]

[Total: 6]

© UCLES 2021

10 A student uses a laptop computer. The student notices that the cable connecting the power adapter for a laptop to the mains electricity supply is damaged as shown in Fig. 10.1.

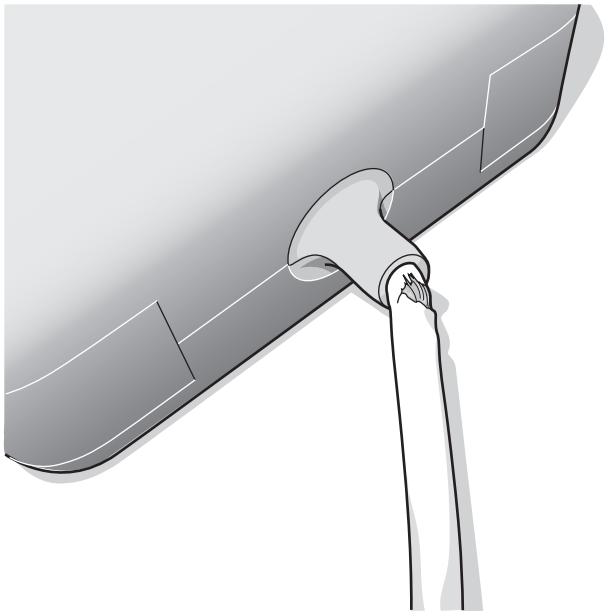


Fig. 10.1

(a) State the hazard of using mains equipment with damaged insulation.

..... [1]

(b) Describe how a fuse protects a mains electrical appliance.

.....

.....

..... [3]

(c) The laptop computer uses a transformer to change the voltage of the mains electricity supply.

The input (primary) voltage is 120 V.

The input (primary) coil has 2000 turns and the output (secondary) coil has 200 turns.

Calculate the output (secondary) voltage from the transformer.

output (secondary) voltage = ... V [3]

(d) State the name of the material used in the core of the transformer.

..... [1]

[Total: 8]

11 Carbon-12 is a stable isotope of carbon. Its nuclide notation is shown in Fig. 11.1.

Carbon-14 is an unstable isotope of carbon. Its nuclide notation is shown in Fig. 11.2.

$^{12}_{6}C$

Fig. 11.1

$^{14}_{6}C$

Fig. 11.2

(a) Determine the numbers of electrons, protons and neutrons in an atom of carbon-12 and the numbers of electrons, protons and neutrons in an atom of carbon-14.

Complete Table 11.1.

Table 11.1

	carbon-12	carbon-14
number of electrons		
number of protons		
number of neutrons		

[3]

© UCLES 2021

(b) Fig. 11.3 shows the decay curve for a sample of carbon-14.

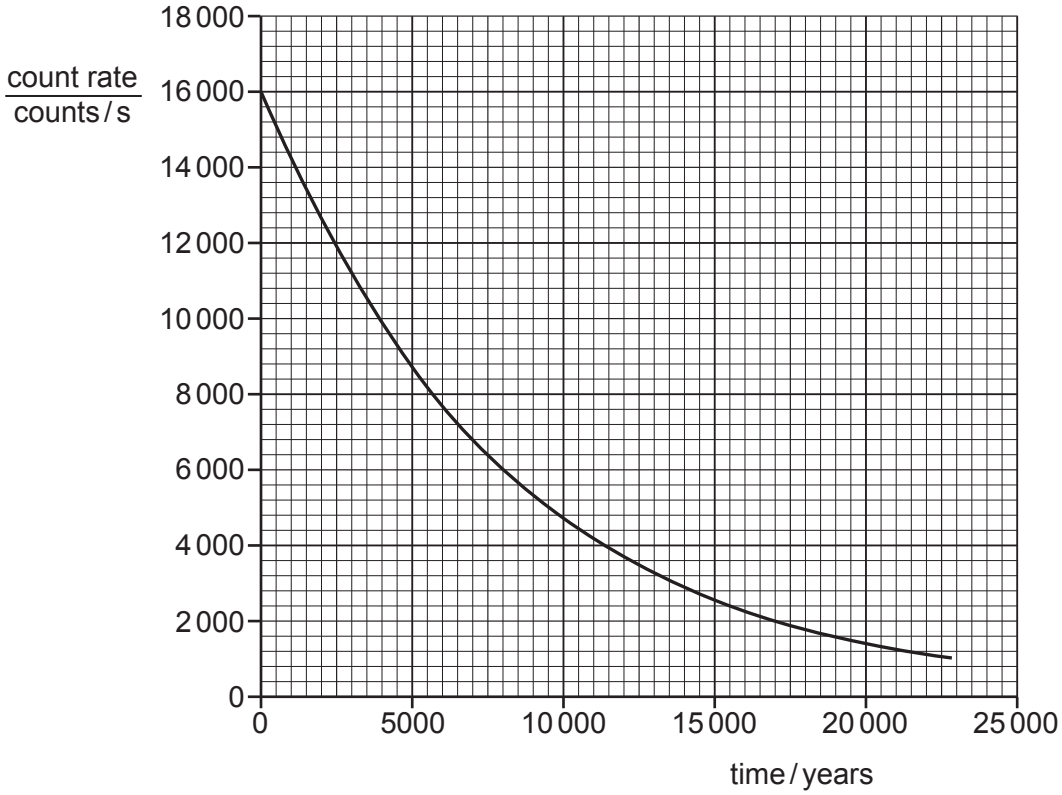


Fig. 11.3

Use the graph to determine the half-life of carbon-14.

half-life = ... years [2]

[Total: 5]

© UCLES 2021

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

© UCLES 2021