Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | |
| CENTRE NUMBER | |
| CANDIDATE NUMBER | |

*5561498289*

**PHYSICS** **0625/33**

Paper 3 Theory (Core) **May/June 2018**

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

This document consists of **16** printed pages.

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CAMBRIDGE International Examinations

**[Turn over**

**1** A student watches a car race around a track. He uses a stopwatch to measure the time for the car to make one lap of the track.

**(a)** The student forgets to reset the stopwatch at the start of the race. Fig. 1.1 shows the time on the stopwatch at the start and the time after going around the track once.

time at start

time after going around the track once

**Fig. 1.1**

Calculate the time the car takes to go around the track once, in seconds.

time = ..... s [2]

**(b)** The length of the track is 4.0 km. The car goes around the track 20 times. The car takes 26 minutes and 40 seconds to complete the 20 laps.

Calculate the average speed of the car in m/s.

average speed = ..... m/s [4]

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**(c)** Fig. 1.2 shows a speed-time graph for the car during part of the race.

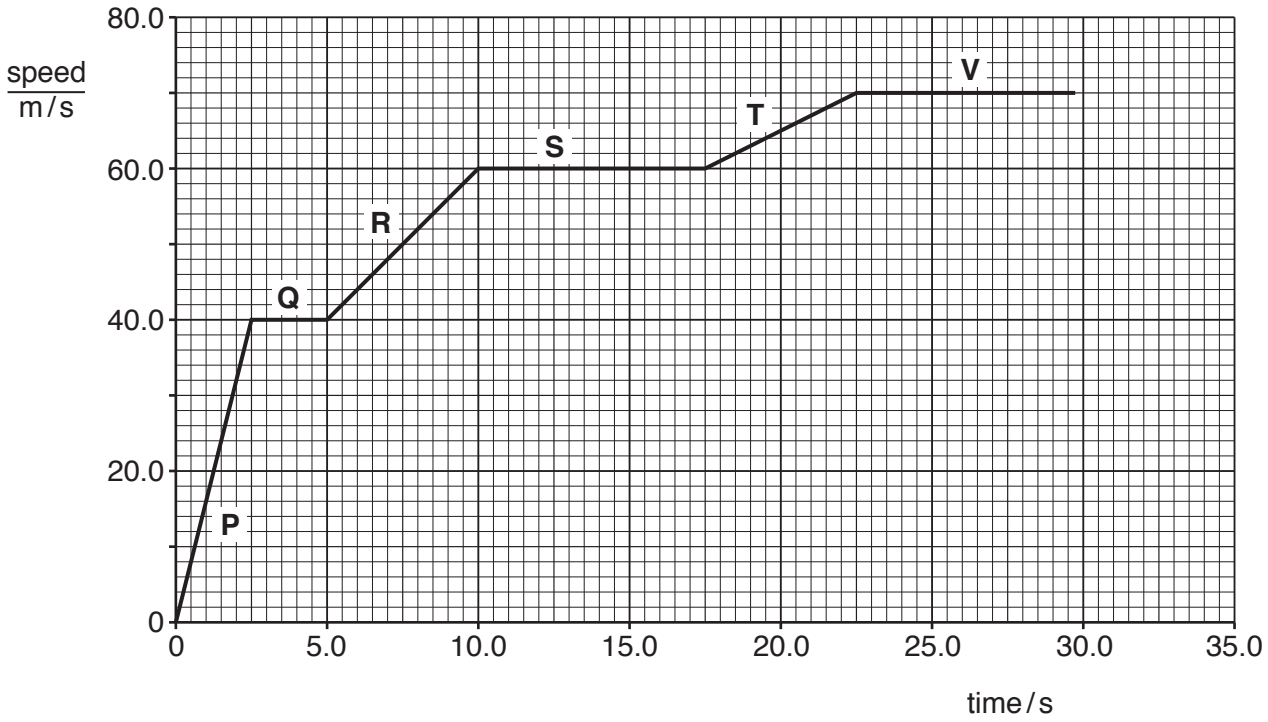


**Fig. 1.2**

**(i)** State the section of the graph that shows the greatest acceleration.

.....

Explain your answer.

.....

[2]

**(ii)** Calculate the distance travelled by the car during the first 2.5 seconds.

distance = ..... m [3]

[Total: 11]

**2** A student is using some 50 g masses.

**(a)** Calculate the weight of one 50 g mass.

weight of 50 g mass = ..... N [3]

**(b)** The student uses the 50 g masses as loads to stretch a spring.

Fig. 2.1 shows the apparatus the student uses to obtain readings for a load-extension graph.

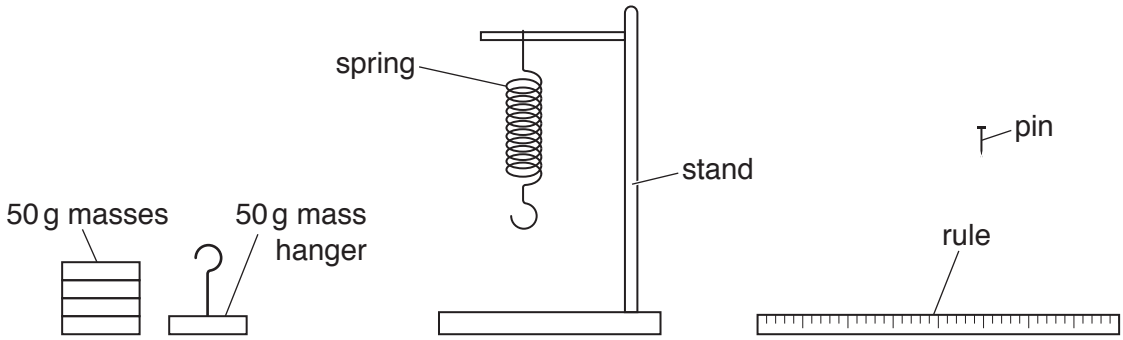


**Fig. 2.1** (NOT to scale)

Describe how the student could use the apparatus and ensure that the readings are accurate.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 7]

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**3** **(a)** The mass of a small steel ball is 120 g. The volume of the ball is 16.0 $cm^3$.

**(i)** Calculate the density of the steel ball.

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

**(ii)** The ball falls to the ground from rest. At a time of 0.2 s after it started to fall, its acceleration is 10 $m/s^2$.

State the acceleration of the ball at a time of 0.1 s after it started to fall.

.....[1]

**(b)** Fig. 3.1 shows the vertical forces that act on a large plastic ball as it is falling.

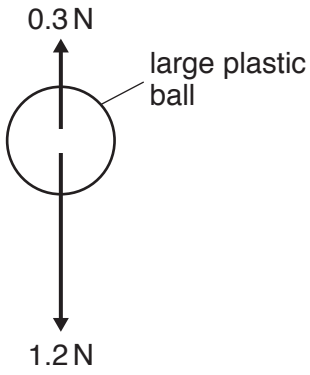


**Fig. 3.1** (not to scale)

**(i)** State the name given to each of the forces shown in Fig. 3.1.

1. .....

2. .....
[1]

**(ii)** Calculate the size of the resultant force on the ball.

resultant force = ..... N [1]

[Total: 6]

**4** A lamp is attached to a wall, as shown in Fig. 4.1.

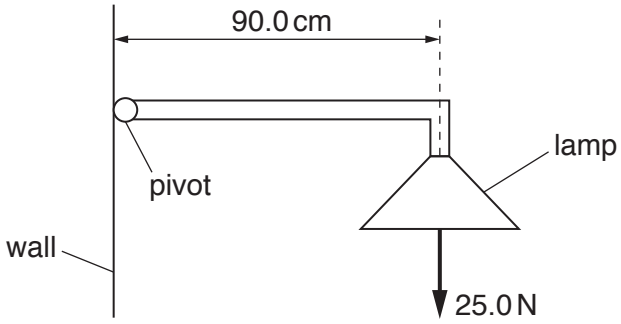


**Fig. 4.1**

Calculate the moment of the lamp about the pivot. Give the unit.

moment = ..... [4]

[Total: 4]

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**5** **(a)** Fig. 5.1 shows a metal can containing air. The can is sealed with a lid.

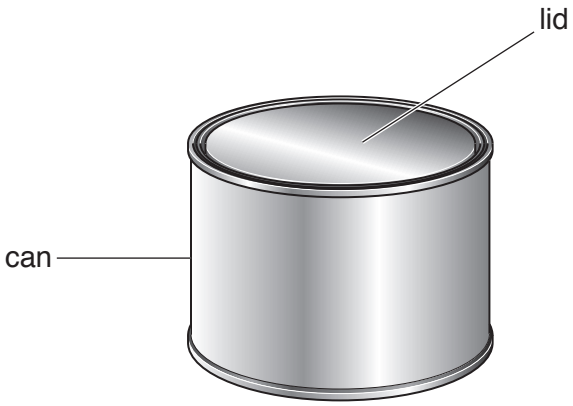


**Fig. 5.1**

The air in the can exerts a pressure of 20 000 N / $m^2$ on the lid. The area of the can lid is 0.09 $m^2$.

Calculate the force on the lid due to the air in the can.

force = ..... N [3]

**(b)** The air in the can becomes warmer.

State and explain what happens to the pressure of the air in the can. Use your ideas about gas molecules.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 6]

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**6** A student investigates the thermal energy lost from two metal cans, X and Y. The cans are identical apart from their outside colour.

The student pours the same volume of hot water into each can and seals each can. The student records the temperature of the water in each can at regular time intervals for a period of 35 minutes.

The equipment is shown in Fig. 6.1.

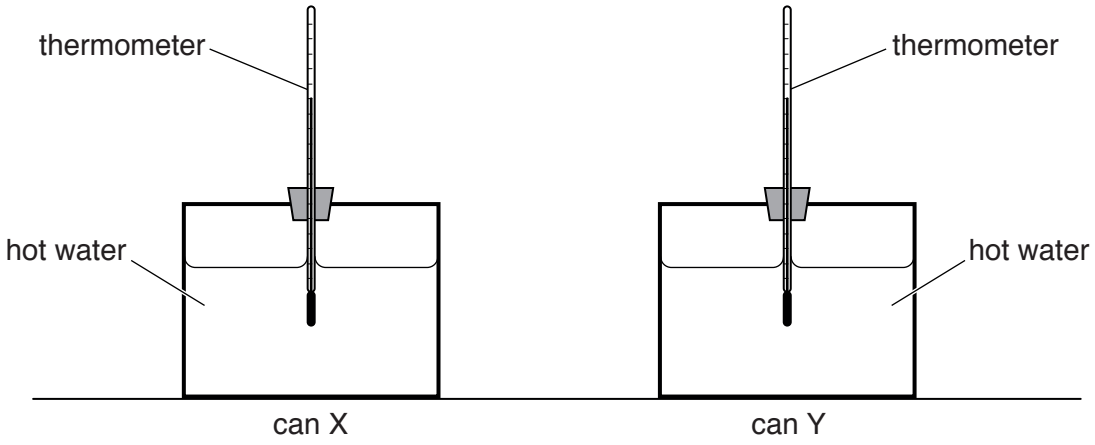


**Fig. 6.1**

Fig. 6.2 is a graph of the results from the investigation.

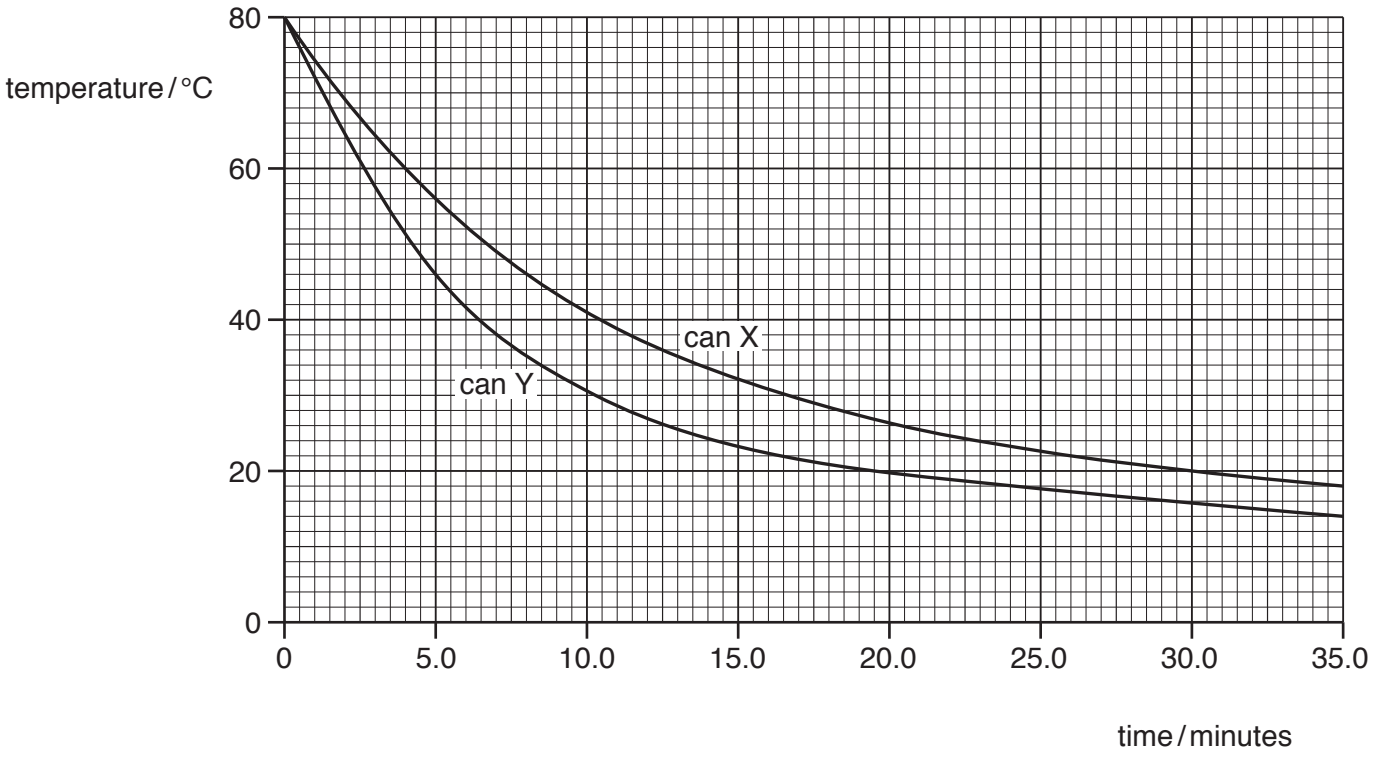


**Fig. 6.2**

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**(a)** For can X, use Fig. 6.2 to determine the drop in temperature of the water

**(i)** in the first five minutes

.....[1]

**(ii)** in the last five minutes.

.....[1]

**(b)** Explain why the water cools at a greater rate during the first five minutes of the experiment, compared with the last five minutes.

.....

.....

.....[2]

**(c)** The outside of one can is dull black and the outside of the other is shiny white.

State the colour of can Y. .....

Explain your answer.

.....

.....

.....
[2]

[Total: 6]

**7** Fig. 7.1 shows an incomplete diagram of the electromagnetic spectrum.

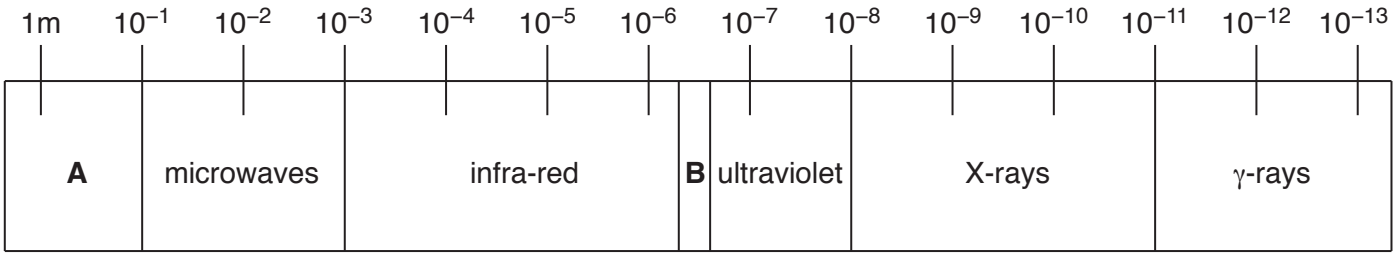


**Fig. 7.1**

**(a)** **(i)** In Fig. 7.1, section **A** and section **B** of the electromagnetic spectrum are not labelled.

State the names of these parts.

**A** .....

**B** .....

[2]

**(ii)** An electromagnetic wave has a wavelength of $1.0 \times 10^{-9}$ m. Use Fig. 7.1 to identify the type of electromagnetic wave.

.....[1]

**(b)** All electromagnetic waves travel at the same speed in a vacuum.

State one other property that is the same for all electromagnetic waves.

.....[1]

**(c)** For each purpose, state one type of electromagnetic radiation that can be used.

**(i)** remote controllers for televisions

.....[1]

**(ii)** killing bacterial cells

.....[1]

[Total: 6]

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**8** **(a)** The boxes contain words about waves.

Complete each sentence. Choose a term from each box.

**(i)**

| | | |
|---|---|---|
| an electromagnetic | a longitudinal | a transverse |

Sound travels as ..... wave. [1]

**(ii)**

| | | | |
|---|---|---|---|
| amplitude | pitch | speed | wavelength |

A loud sound has a large ..... . [1]

**(iii)**

| | | | |
|---|---|---|---|
| amplitude | pitch | speed | wavelength |

A student listens to two sounds. The sound with the higher frequency has a higher ..... . [1]

**(b)** Explain what is meant by the term *ultrasound*.

.....

.....[2]

[Total: 5]

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**9** A student magnetises a steel rod by using a permanent magnet.

**(a)** Describe a method that the student could use. You may draw a diagram to help you.

.....

.....

.....[2]

**(b)** Explain how the student could test that the steel rod has been magnetised.

.....

.....

.....

.....[2]

**(c)** Magnets can be made from soft iron or from steel.

State **one** difference between the magnetic properties of soft iron and steel.

.....

.....

.....[1]

[Total: 5]

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**10 (a)** Fig. 10.1 shows an electrical circuit.

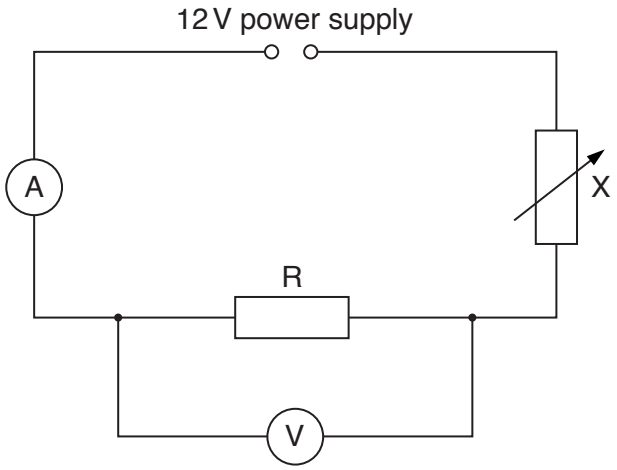


**Fig. 10.1**

**(i)** State the name for the component labelled X and state its function in this circuit.

name for component .....

function .....

.....
[2]

**(ii)** Describe how the circuit shown in Fig. 10.1 could be used to find the resistance of the fixed resistor R.

.....

.....

.....

.....

.....[3]

**(b)** An electrical heater has a resistance of 21.8 Ω when connected to a 240 V mains supply.

**(i)** Calculate the current in the heater.

current = ..... A [3]

**(ii)** Suggest a rating for the fuse to be fitted to the mains plug for the heater.

fuse rating = ..... A [1]

[Total: 9]

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**[Turn over**

**11** Fig. 11.1 shows a coil (solenoid) wrapped around a plastic tube. There is a current in the coil. The arrows show the direction of the current in the coil.

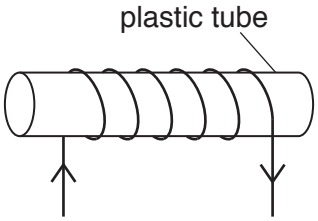


**Fig. 11.1**

**(a)** On Fig. 11.1, draw the pattern of the magnetic field lines around the coil.
Add arrows to show the direction of the magnetic field. [3]

**(b)** A long soft iron bar is placed inside the plastic tube. There is a current in the coil. This forms a device. State the name of the device.

.....[1]

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**(c)** Fig. 11.2 shows a relay operated by switch S.

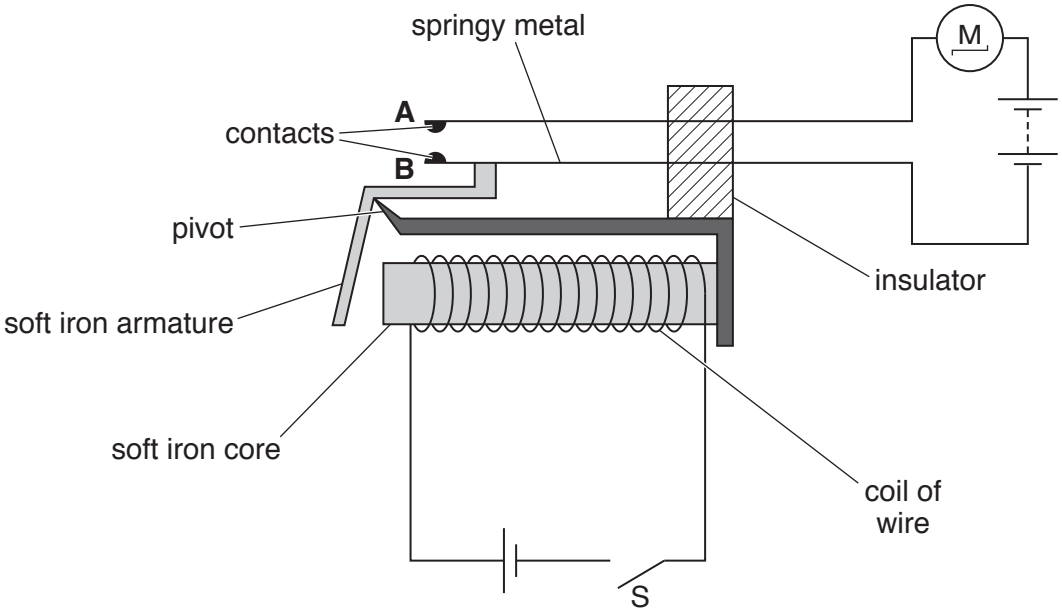


**Fig. 11.2**

Using Fig. 11.2, describe how closing the switch, S, causes the electric motor to operate.

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 8]

**12** **(a)** Fig. 12.1 shows a diagram to represent a helium atom, and an incomplete key.

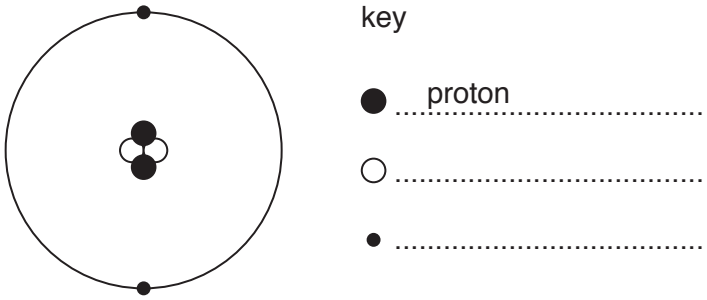


**Fig. 12.1**

Complete the key in Fig. 12.1. State the name of each particle. [2]

**(b)** The table in Fig. 12.2 compares two isotopes of helium.

| | $^{3}_{2}He$ | $^{5}_{2}He$ |
|---|---|---|
| number of protons | | |
| number of neutrons | | |

**Fig. 12.2**

For each isotope, write the number of protons and the number of neutrons in the correct places in the table. [2]

**(c)** The nucleus of the helium atom in **(a)** is the same as an $\alpha$-particle.

**(i)** Describe the penetrating ability of $\alpha$-particles.

.....

.....[1]

**(ii)** Explain why it is dangerous to swallow a source that emits $\alpha$-particles.

.....

.....

.....

.....[2]

[Total: 7]

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