UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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PHYSICS **0625/22**

Paper 2 Core **October/November 2013**

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.

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

1 A slope is made by resting one end of a plank of wood on a block, as shown in Fig. 1.1.

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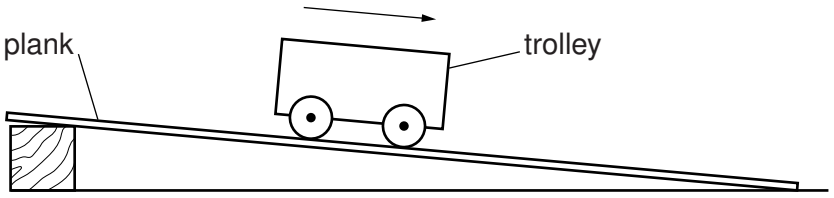

Fig. 1.1

Three students each use a digital stopwatch to time a small trolley rolling down the full length of the slope.

The times on their stopwatches as the trolley reached the bottom of the slope are shown in Fig. 1.2.

student 1  time = ... s

student 2  time = ... s

student 3  time = ... s

Fig. 1.2

(a) On the line next to each stopwatch, write the time measured by each student. [1]

(b) Calculate the average time measured for the trolley to roll down the slope. Show your working.

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average time = ... s [2]

(c) What other measurement must be taken in order to be able to calculate the average speed of the trolley?

..... [1]

(d) Suggest one change that might be made to the arrangement in Fig. 1.1 so that the same trolley takes less time to roll down the full length of the slope.

..... [1]

[Total: 5]

[Turn over

2 A lorry travels at constant speed for 50 s and then steadily slows down, taking another 50 s to come to a stop.

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Fig. 2.1 is the speed-time graph for the 100 s.

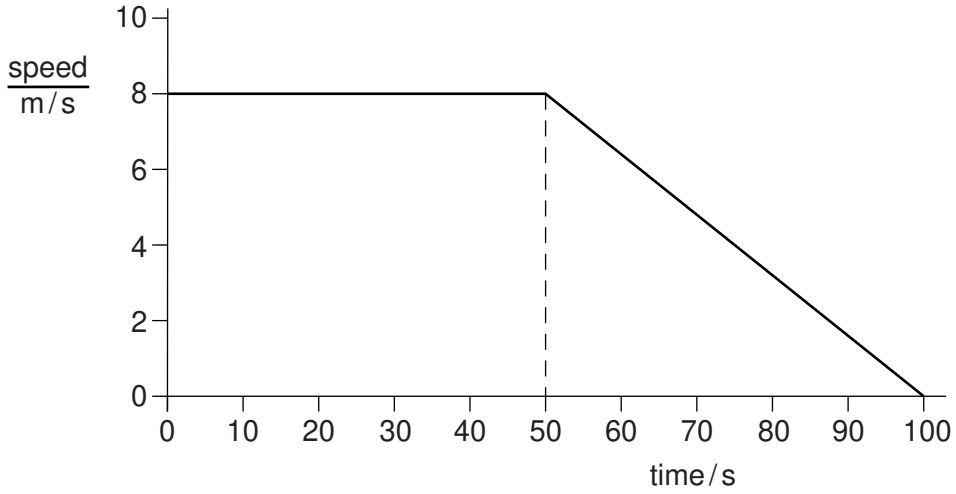

Fig. 2.1

(a) Calculate the distance travelled by the lorry in the first 50 s.

distance = ... m [3]

(b) Calculate the distance travelled between 50 s and 100 s.

distance = ... m [2]

(c) Calculate the total distance travelled.

distance = ... m [1]

(d) (i) A car takes 60 s to travel the distance calculated in **(c)** at a constant speed.

Calculate the speed of the car.

For Examiner's Use

speed = ... [3]

(ii) On Fig. 2.1, draw the speed-time graph for the 60 s at this constant speed. [2]

[Total: 11]

3 (a) (i) State one example of a fuel in which chemical energy is stored.

..... [1]

(ii) State one example of a renewable source of energy.

..... [1]

(iii) State one energy resource that involves liquid water (not steam).

..... [1]

(b) State two reasons why it is important that nations investigate energy resources other than fossil fuels (coal, oil, natural gas).

1. .....

.....

2. .....

.....

[2]

[Total: 5]

[Turn over

4 **(a)** Fig. 4.1 shows a boy in four positions on a flat floor.

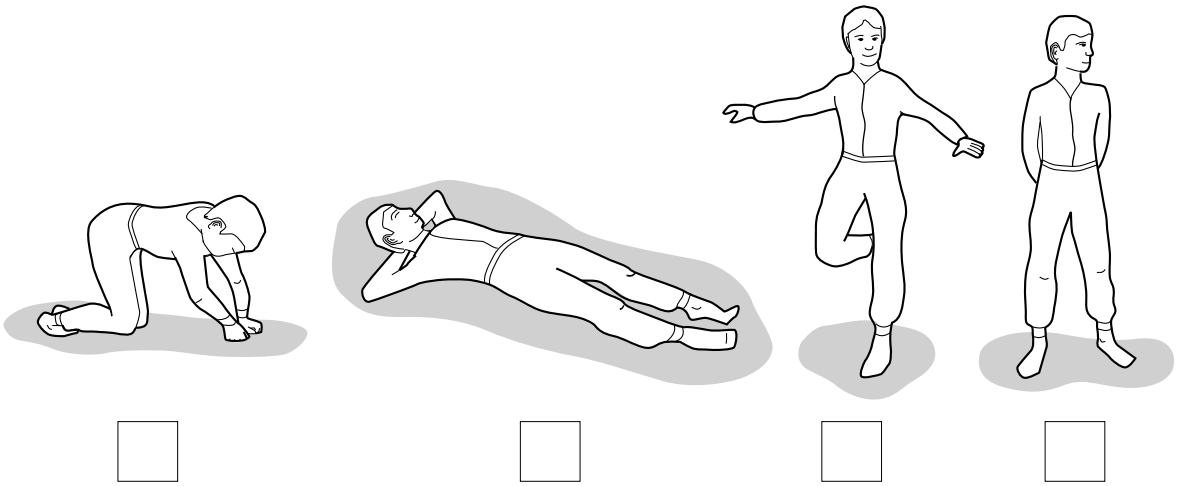

Fig. 4.1

(i) Put a tick in the box under the position where the boy is exerting the **least** pressure on the floor.

(ii) State the reason for your answer to **(a)(i)**.

.....

.....

[2]

(b) The pressure of carbon dioxide in a container is being measured by means of a mercury manometer. This is shown in Fig. 4.2.

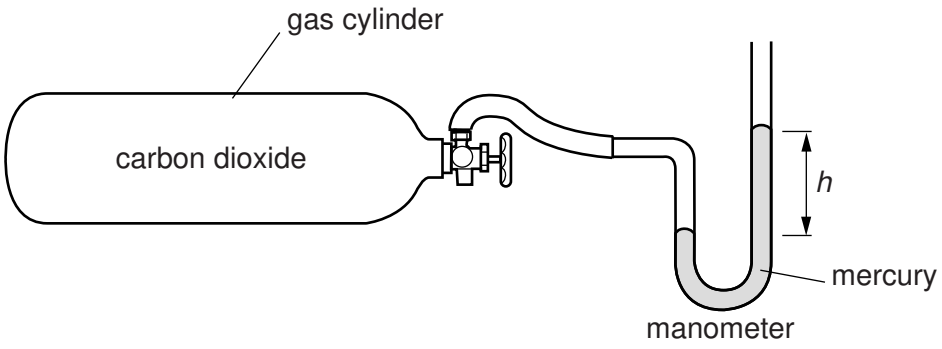

Fig. 4.2

(i) How does the pressure of the carbon dioxide compare with atmospheric pressure? Complete the sentence below.

The pressure of the carbon dioxide is ..... the atmospheric pressure. [1]

(ii) The atmospheric pressure increases.

State what happens to the value of the distance *h*, shown on Fig. 4.2.

..... [1]

[Total: 4]

5 Fig. 5.1 shows a wave on a water surface, at a particular instant.

For Examiner's Use

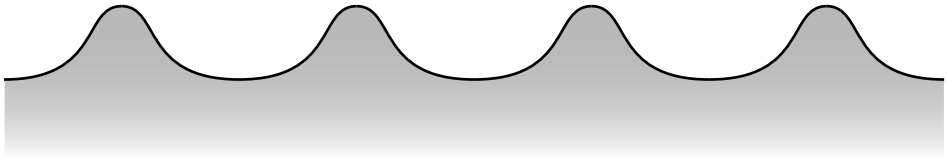

Fig. 5.1

(a) On Fig. 5.1, measure carefully, in mm, the wavelength of the wave.

wavelength = ... mm [2]

(b) State what is meant by

(i) the *frequency* of a wave,

.....

.....

(ii) the *amplitude* of a wave.

.....

.....

[3]

(c) A large barrier, of height greater than the height of the wave in Fig. 5.1, is put in the path of the wave.

What, if anything, does this do to the wave? Tick one box.

It diffracts the wave.	☐
It does nothing to the wave.	☐
It reflects the wave.	☐
It refracts the wave.	☐

[1]

[Total: 6]

6 **(a)**

A certain mass of water at 20 °C is heated using a 30 W immersion heater. Initially the temperature rises at 4 °C per minute. Eventually, the temperature stops rising at 100 °C.	The same mass of glycerol at 20 °C is heated using the same 30 W immersion heater. Initially the temperature rises at 8 °C per minute. Eventually, the temperature stops rising at 290 °C.

State and explain

(i) which has the greater boiling point, water or glycerol,

statement .....

explanation .....

.....

(ii) which has the greater thermal capacity, the water or the glycerol.

statement .....

explanation .....

.....

[3]

(b) Fig. 6.1 shows a cross-section through a room.

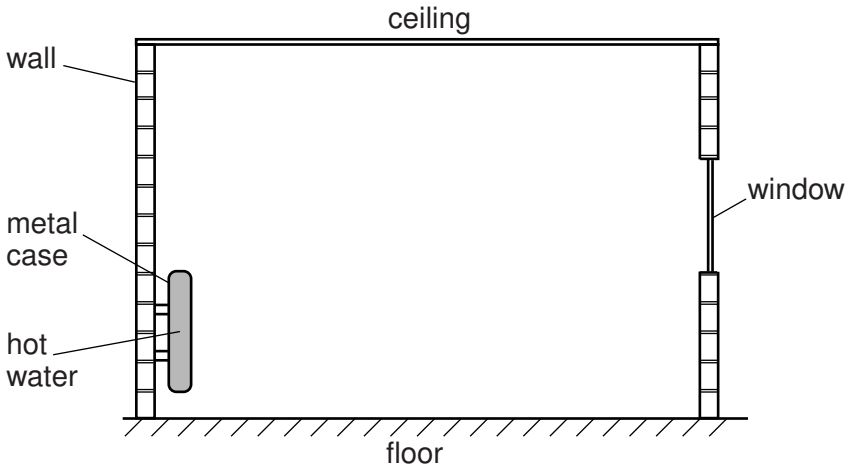

Fig. 6.1

The room is heated by a heater containing hot water. The heater is mounted on one wall, as shown.

For Examiner's Use

(i) By what process does thermal energy pass through the metal case of the heater in Fig. 6.1?

..... [1]

(ii) State the two main processes by which the thermal energy from the heater is transferred to the whole room.

1. .....

2. .....
[2]

(iii) One of the processes in **(b)(ii)** involves the air moving.

On Fig. 6.1, draw arrows to show how the air moves in the room. [2]

[Total: 8]

7 Fig. 7.1 shows circuit symbols for four electrical components.

For Examiner's Use

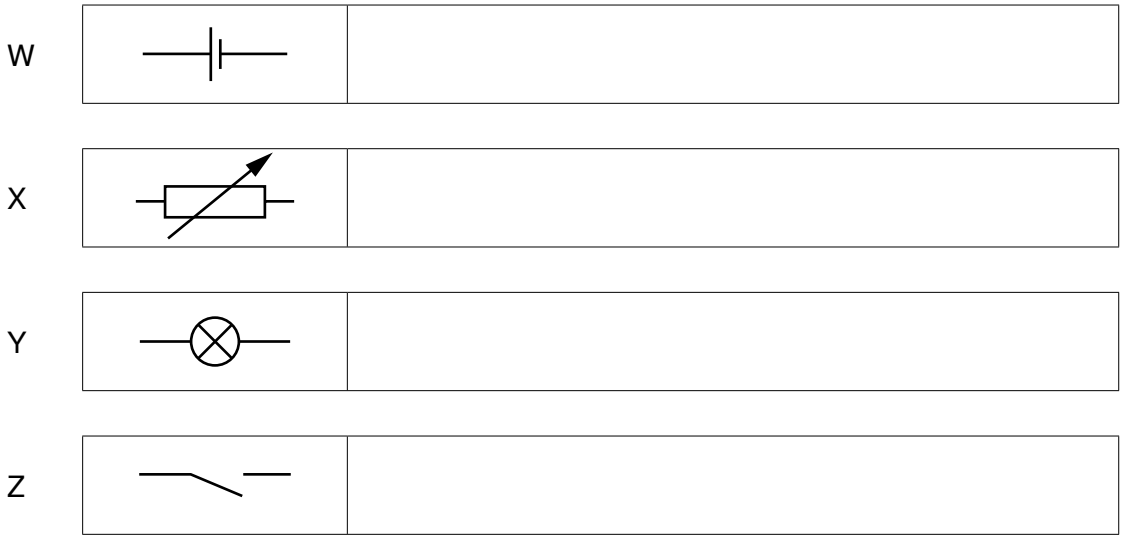

Fig. 7.1

(a) In the box next to each component, write the name of that component. [4]

(b) In the space below, draw a circuit diagram that shows these four components connected in series with an ammeter.

[2]

(c) The reading on the ammeter is gradually increased.

Which one of the components is adjusted in order to do this? Tick one box.

W ☐

X ☐

Y ☐

Z ☐

[1]

[Total: 7]

8 An IGCSE Physics student is set a puzzle by his teacher.

For Examiner's Use

He is given four rods, A, B, C and D, all painted white. He is told that two rods are permanent magnets, another rod is made of iron and the final rod is made of copper. His teacher asks him to find out, by experiment, which rod is which.

Fig. 8.1 shows the results the student obtains when he puts the rods next to each other.

A	B	repel
A	C	attract
B	D	no effect

Fig. 8.1

(a) Which two rods are magnets? ..... and ..... [1]

(b) Which is the iron rod? ..... [1]

(c) Which is the copper rod? ..... [1]

(d) What will be the result of putting

(i) B and C end to end, ...

(ii) C and D end to end? .....

[2]

[Total: 5]

9 Fig. 9.1 shows a thick, vertical copper rod AB, of negligible resistance, connected into an electrical circuit. AB passes through a hole in a horizontal card PQRS.

For Examiner's Use

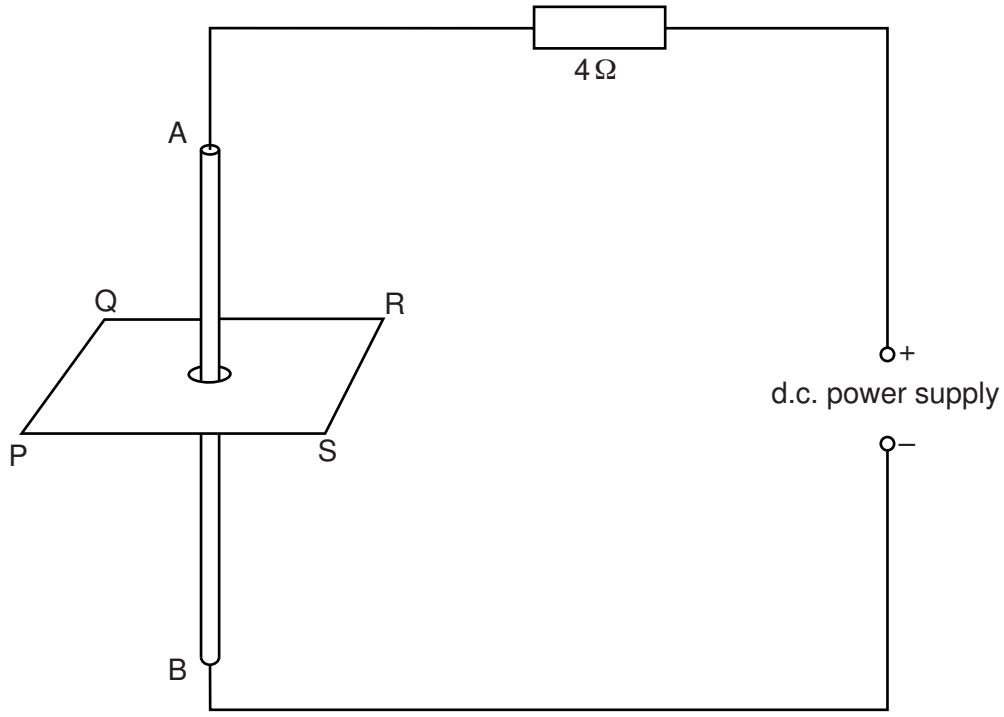

Fig. 9.1

(a) The d.c. power supply produces a current in the circuit, which causes a magnetic field around AB.

(i) Fig. 9.2 shows the view from above of the card PQRS, with the hole through which AB passes.

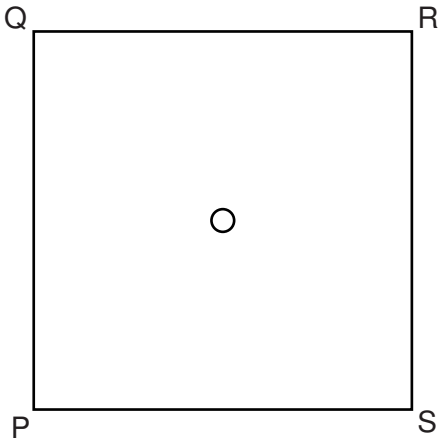

Fig. 9.2

On Fig. 9.2, draw the pattern of the magnetic field around AB. Include at least **four** magnetic field lines. [3]

(ii) Describe briefly how the pattern of the magnetic field may be shown experimentally.

For Examiner's Use

.....

.....

.....

..... [2]

(b) The d.c. power supply contains a circuit breaker that operates at a current of 5 A.

(i) What is the purpose of the circuit breaker?

.....

.....

.....

..... [1]

(ii) The power supply is set at 12 V and then switched on. The resistor has a resistance of 4 Ω.

1. Calculate the current in the circuit of Fig. 9.1.

current = ... A

2. Deduce what, if anything, happens to the circuit breaker.

.....

.....

[4]

[Total: 10]

10 Fig. 10.1 shows a ray of light incident on a plane mirror at point A.

For Examiner's Use

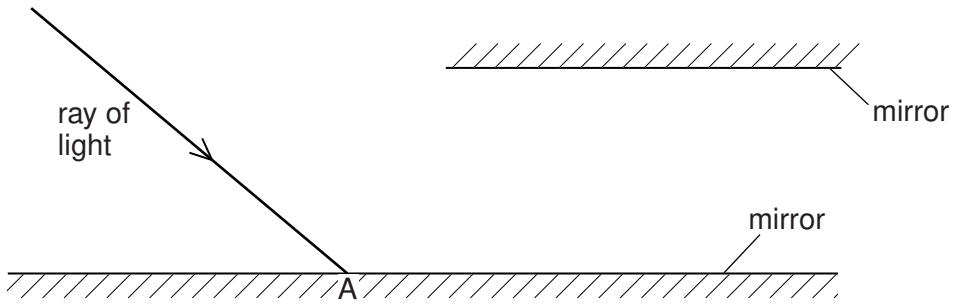

Fig. 10.1

(a) The construction in this question requires you to draw rays carefully.

On Fig. 10.1,

(i) draw the normal to the mirror at A,

(ii) draw the ray reflected at A,

(iii) label the angles of incidence i and reflection r at A, using the letters i and r.

[3]

(b) Which of the following equations correctly links i and r? Tick one box.

$i + r = 90°$ ☐

$i + r = 180°$ ☐

$i = r$ ☐

[1]

(c) A second mirror is positioned as shown in Fig. 10.1, parallel to the first mirror.

(i) Continue the ray reflected from A, to show what happens to it after it reaches the second mirror. [2]

(ii) State how the direction of the ray, after it has reflected from both mirrors, compares with its original direction.

..... [1]

[Total: 7]

For Examiner's Use

11 **(a)** Radon-220 is a radioactive gas. It decays by emitting α-particles. An α-particle is a helium nucleus.

(i) What four particles together make up an α-particle?

.....

(ii) Suggest one reason why the fact that radon-220 is a gas makes it potentially more dangerous than an α-emitting solid source of similar activity.

.....

.....

[4]

(b) In the situations illustrated in Fig. 11.1, the radioactive source is emitting α-particles, β-particles and γ-rays. The detector is sensitive to all three types of radiation. The apparatus is in air.

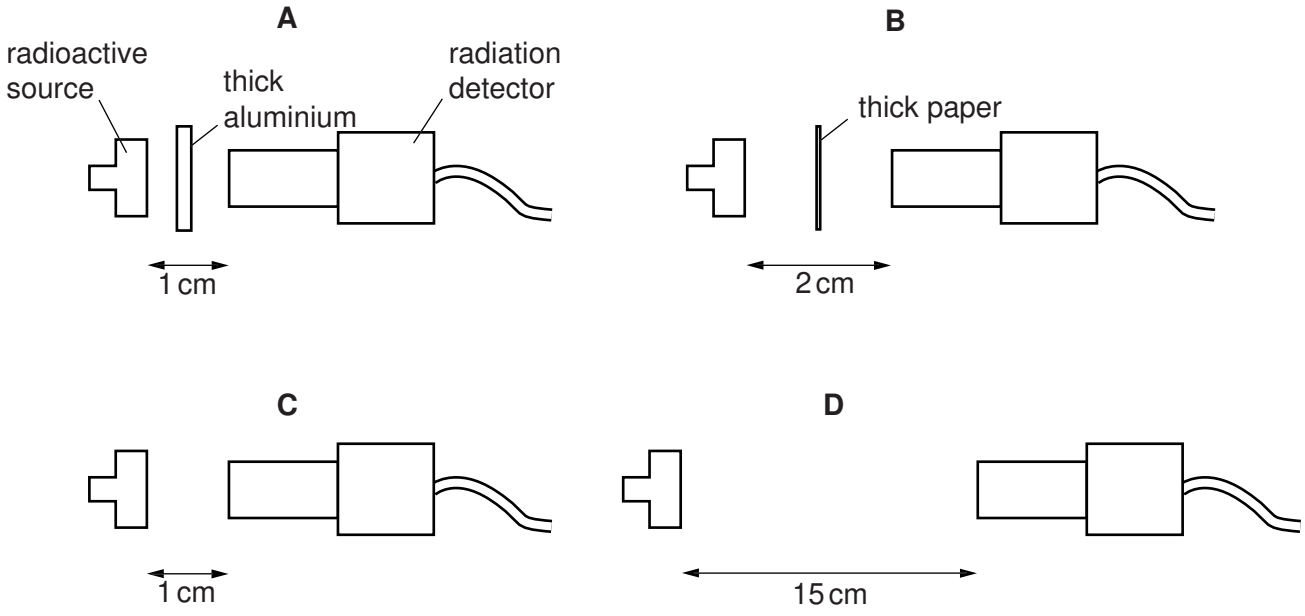

Fig. 11.1 (not to scale)

Ignore background radiation.

State one of the situations, **A**, **B**, **C** or **D** where

(i) α-particles are detected, ...

(ii) only β-particles and γ-rays are detected, ...

(iii) only γ-rays are detected, ...

(iv) α-particles, β-particles and γ-rays are all detected. .....

[4]

[Total: 8]

[Turn over

12 Fig. 12.1 shows a locked box.

For Examiner's Use

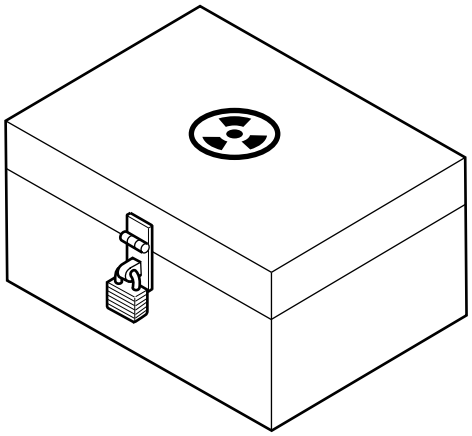

Fig. 12.1

(a) Suggest what is stored in this box.

..... [1]

(b) Suggest why the box is locked.

.....

..... [1]

(c) The interior of the box is lined with thick lead.

Suggest the reason for this.

.....

.....

..... [2]

[Total: 4]