UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

PHYSICS **0625/21**

Paper 2 Core **May/June 2012**

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.
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.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

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

DC (NF/JG) 43201/2

UNIVERSITY of CAMBRIDGE International Examinations

1 A car is travelling along a level road at a steady speed. Fig. 1.1 shows the speedometer in the car. A speedometer registers how fast the car is going.

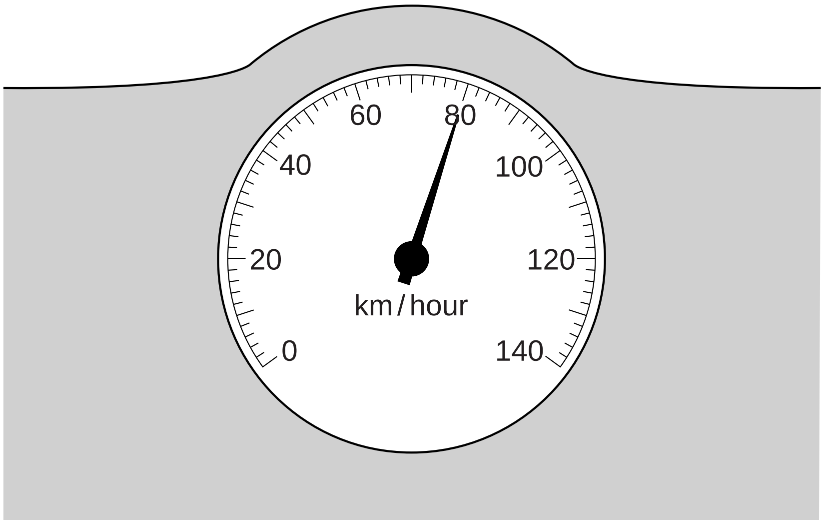

Fig. 1.1

(a) How far, in km, does the car travel in ½ hour at the speed shown in Fig. 1.1?

distance = ... km [3]

(b) (i) On the axes shown in Fig. 1.2, draw a line representing the motion of the car for the ½ hour mentioned in **(a)**. Do not go beyond ½ hour. [3]

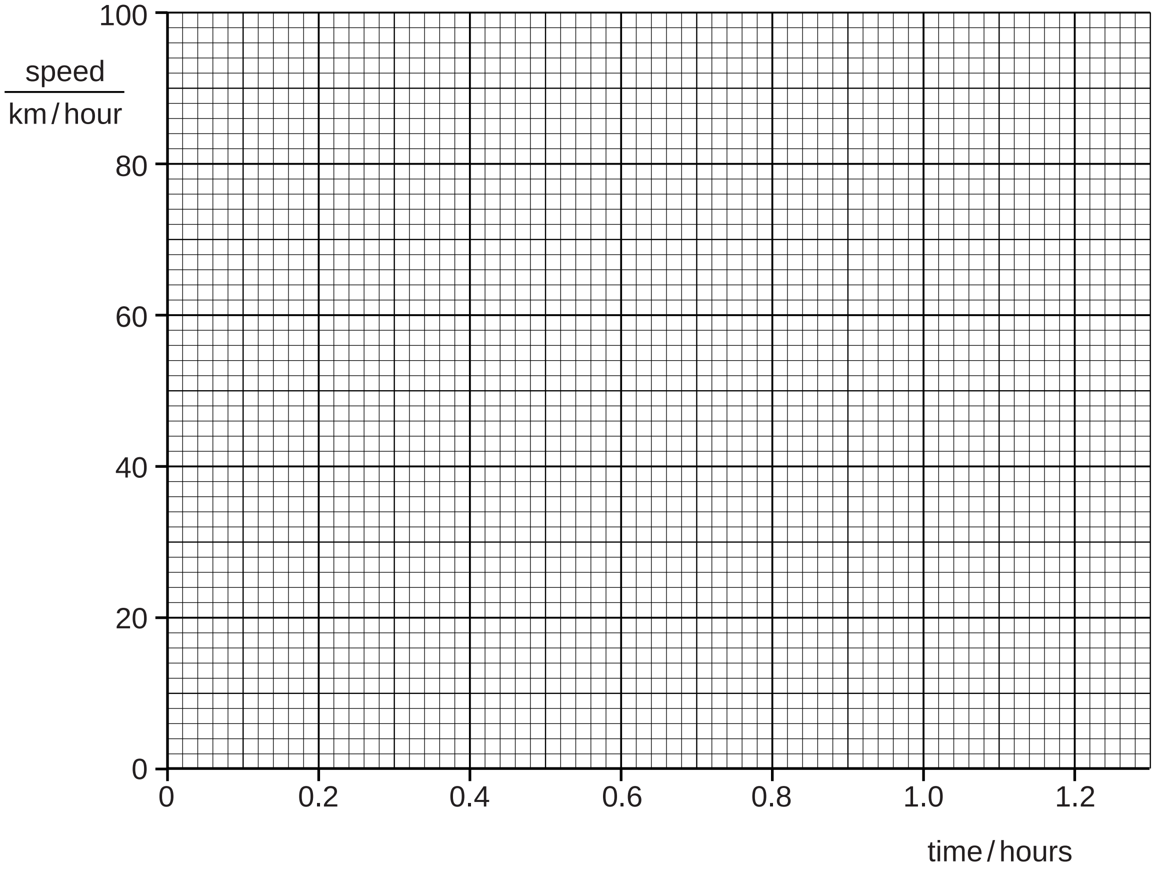

Fig. 1.2

(ii) At the end of the ½ hour, the car reaches a region where the road begins to rise up into some mountains. The car climbs the mountains for a further ½ hour.

During the climb, its speed steadily decreases to 30 km / hour. The driver then stops the car so that he can admire the view.

On Fig. 1.2, draw a line representing the climb and the stopping of the car. [4]

[Total: 10]

2 A student carries out an experiment to find the density of water, using a method that is slightly different from normal. In his method, he starts with a measuring cylinder containing some water, and then adds more water to that already in the measuring cylinder.

His experiment is illustrated in Fig. 2.1.

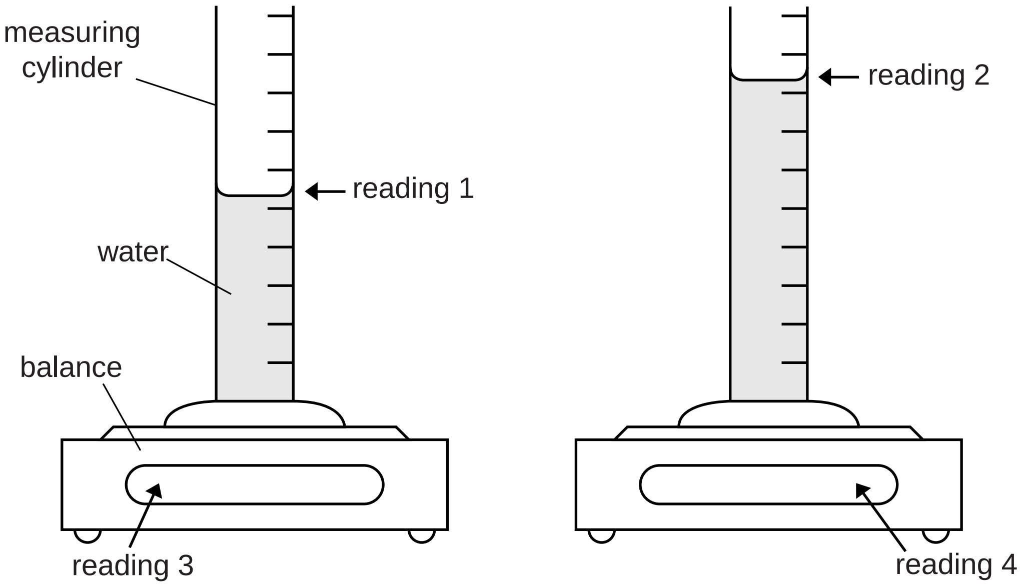

Fig. 2.1

The readings he obtains are as follows:

reading 1	53 cm^3
reading 2	84 cm^3
reading 3	205 g
reading 4	238 g

Calculate

(a) the volume of the added water,

volume = ... cm^3 [2]

(b) the mass of the added water,

mass = ... g [2]

(c) the density of water, stating clearly the equation you are using.

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density = ... [4]

[Total: 8]

  [Turn over

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3 A train is passing through a station at constant speed, as shown in Fig. 3.1. The track is horizontal.

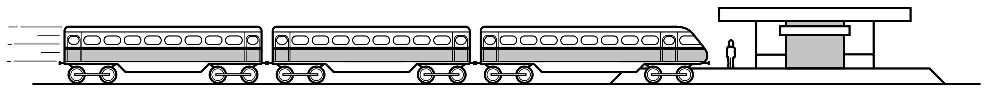

Fig. 3.1

The engine produces a forward thrust of 70 000 N. There is a 25 000 N force opposing the motion, due to friction in the wheels.

(a) Mark these forces on Fig. 3.1, using an arrow labelled 70 000 N and an arrow labelled 25 000 N. [2]

(b) The train is travelling at constant speed, so there must be another horizontal force acting on it.

(i) State the direction of this force.

....

(ii) Calculate the size of this force.

size of force = ... N

(iii) Suggest what might be causing this force.

....
[3]

(c) Once the train has passed the station, the driver increases the engine's forward thrust.

All other forces stay the same.

(i) What happens to the train? ....

(ii) Why does this happen? ....

....

....
[2]

[Total: 7]

For Examiner's Use

4 **(a)** Explain, in terms of molecules, how a gas causes a pressure on the walls of its container.

....

....

....

....

....

.... [4]

(b) Complete the following two sentences.

(i) At constant temperature, the pressure of a gas increases as its volume

....

(ii) At constant volume, the pressure of a gas increases as its temperature

....

[2]

[Total: 6]

5 **(a)** The principle of conservation of energy states that energy can neither be created nor destroyed.

What, then, *does* happen to the energy supplied to a device such as a motor or a television?

....

....

.... [1]

(b) The television in Fig. 5.1 is switched on to watch a programme. During this time, 720 kJ of electrical energy is supplied.

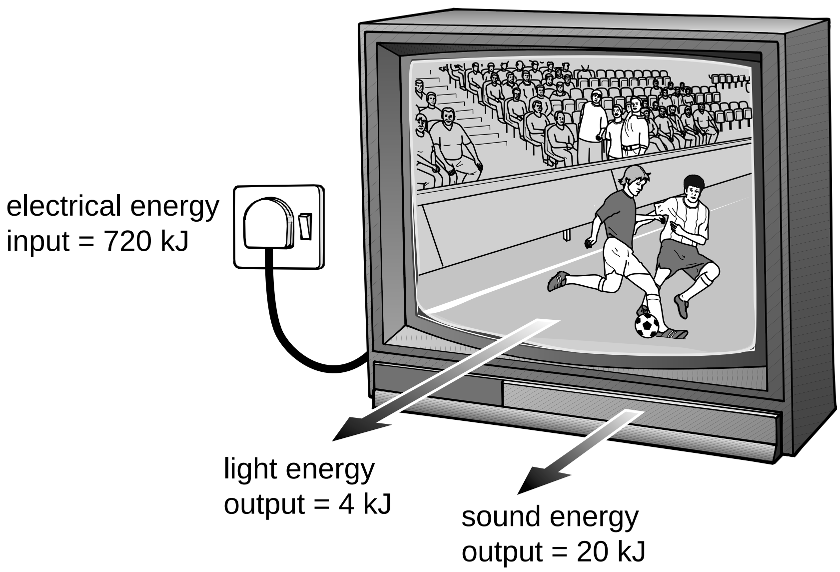

Fig. 5.1

(i) From the information on Fig. 5.1, find the total energy provided for the viewer to see and hear the television during this programme.

energy = ... kJ [1]

(ii) Suggest what happens to the rest of the energy supplied.

....

....

.... [2]

(iii) Calculate how much energy is involved in **(b)(ii)**.

energy = ... kJ [1]

(iv) Comment on the efficiency of the television.

....

....

.... [1]

[Total: 6]

6 The ray diagram in Fig. 6.1 shows one ray from the top of an object placed to the left of a converging lens.

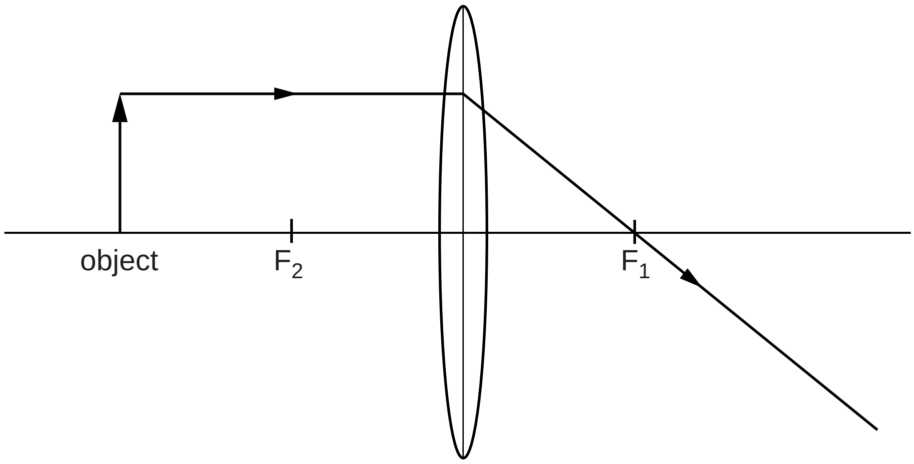

Fig. 6.1

(a) On Fig. 6.1, use your ruler to draw another ray from the top of the object until it crosses the ray printed on the diagram. [2]

(b) On Fig. 6.1, draw the image of the object. [1]

(c) Which of the following descriptions fit the image formed by the lens? Tick **3** boxes.

much larger than the object ☐

much smaller than the object ☐

same size as the object ☐

upright ☐

inverted ☐

real ☐ [3]

(d) The object is moved to a position further from the lens.

What differences are seen in the image, compared with the previous image?

....

.... [2]

[Total: 8]

For Examiner's Use

7 **(a)** Remote controllers for television sets send a beam of electromagnetic radiation to the television.

Which region of the electromagnetic spectrum is used? Tick one box.

microwaves ☐

infra-red ☐

visible ☐

ultra-violet ☐

X-rays ☐ [1]

(b) Modern warfare often uses heat-seeking missiles.

Which region of the electromagnetic spectrum is used? Tick one box.

microwaves ☐

infra-red ☐

visible ☐

ultra-violet ☐

X-rays ☐ [1]

(c) Injured legs may be checked for possible fractures using electromagnetic radiation.

Which region of the electromagnetic spectrum is used? Tick one box.

microwaves ☐

infra-red ☐

visible ☐

ultra-violet ☐

X-rays ☐ [1]

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(d) Mobile phones communicate using electromagnetic radiation.

Which region of the electromagnetic spectrum is used? Tick one box.

microwaves ☐

infra-red ☐

visible ☐

ultra-violet ☐

X-rays ☐ [1]

[Total: 4]

For Examiner's Use

8 **(a)** Complete the following sentences.

(i) An electric current exists in a wire when .... are made to flow in the wire. [1]

(ii) The current in a wire may be measured using an instrument called

.... [1]

(iii) The potential difference across a wire may be measured by connecting

.... across the wire. [1]

(b) A length of resistance wire is connected in a simple series circuit.

The current in it is 0.8 A. The potential difference across it is 9.6 V.

Calculate the resistance of the wire.

resistance = ... [4]

(c) The resistance wire in **(b)** is replaced by a greater length of wire from the same reel.

Without further calculation, state the effect this has on

(i) the resistance in the circuit,

....

(ii) the current in the new wire when there is a potential difference of 9.6 V across it, as before.

....
[2]

[Total: 9]

9 The coil in the d.c. motor in Fig. 9.1 is rotating as shown.

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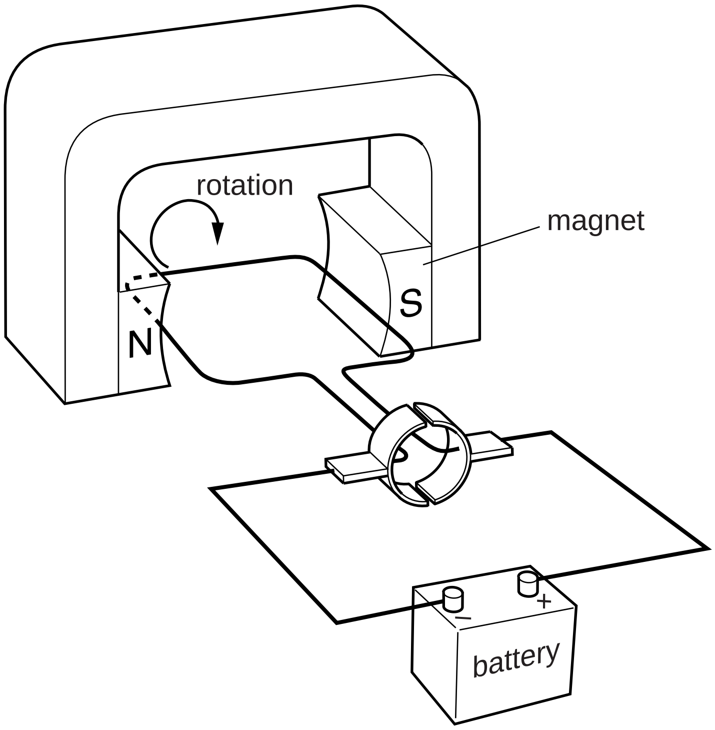

Fig. 9.1

(a) On Fig. 9.1, clearly label the coil. [1]

(b) State two things that could be done to the apparatus shown in Fig. 9.1 in order to make the coil rotate more rapidly.

1. ....

2. ....
[2]

(c) Suggest how the coil could be made to rotate in the opposite direction.

....

.... [1]

[Total: 4]

10 Fig. 10.1 shows four different types of switch.

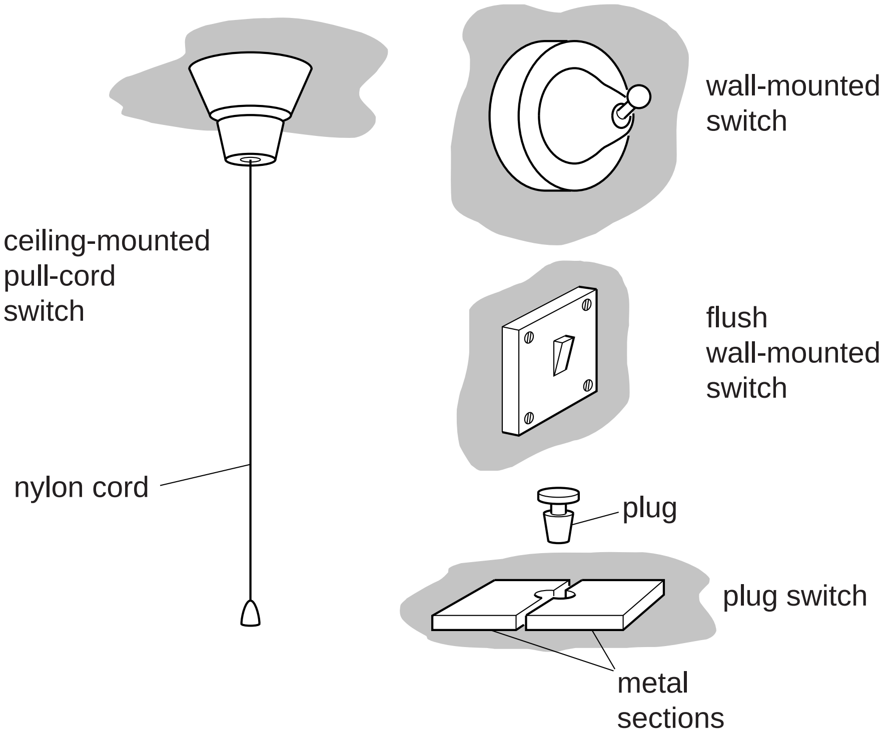

Fig. 10.1

(a) In the space below, draw the circuit symbol for a switch.

[1]

(b) (i) Which one of the switches is definitely dangerous to use with mains voltages?

....

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

....

....
[2]

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(c) A laundry, where clothes are washed, is likely to have lots of steam and condensation.

(i) Which switch is the most suitable for turning the lights on or off from within the laundry?

....

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

....

....

.... [3]

(d) The laundry is lit by three mains-voltage lamps. Fig. 10.2 shows the mains supply and the three lamps.

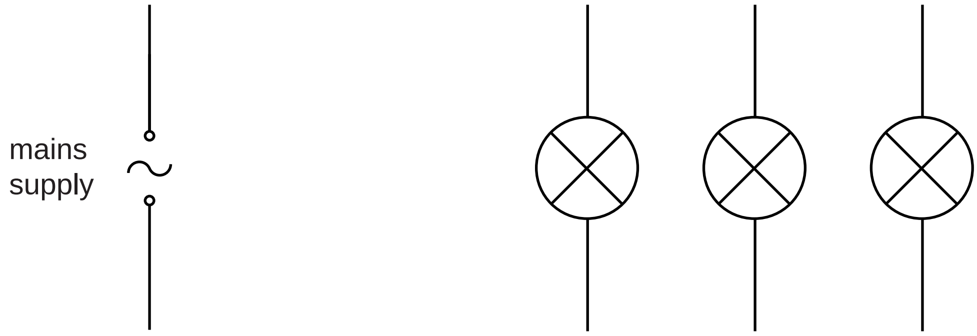

Fig. 10.2

Complete Fig. 10.2 by adding the switch and the wiring that will allow all three lamps to light at full brightness when the switch is on. [2]

[Total: 8]

11 Fig. 11.1 shows an electron beam about to enter, at point A, the electric field between two charged metal plates.

For Examiner's Use

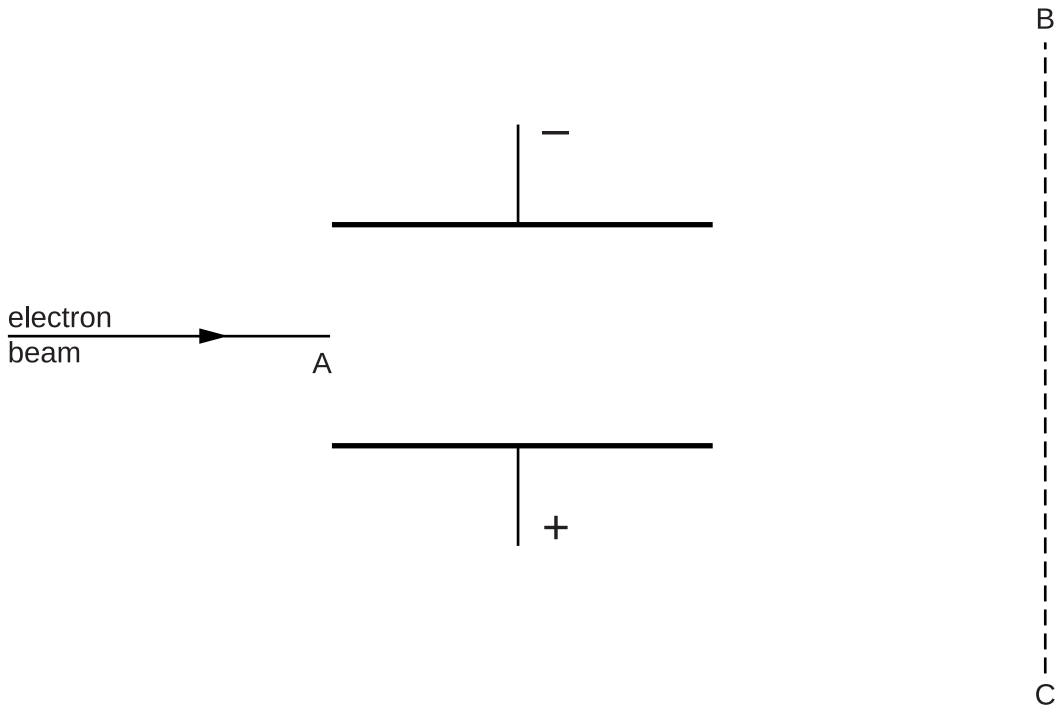

Fig. 11.1

(a) On Fig. 11.1, carefully draw the path of the electron beam between A and the line BC. [3]

(b) The voltage across the plates is reversed. State what difference this makes to the path of the electron beam.

....

.... [1]

[Total: 4]

12 The table below gives details about some radioactive substances.

substance	symbol	type of radiation emitted	half-life
barium-139	${}^{139}_{56}Ba$	beta (β)	85 minutes
silver-110	${}^{110}_{47}Ag$	beta (β)	24 seconds
technetium-99m	${}^{99}_{43}Tc$	gamma (γ)	6.0 hours
thorium-232	${}^{232}_{90}Th$	alpha (α)	1.4×10^{10} years

(a) Which of these substances has the greatest number of particles in the nucleus of its atoms?

.... [1]

(b) Which of these substances has the least number of electrons in the orbits of a neutral atom?

.... [1]

(c) Which of these substances are emitting particles?

....

.... [2]

(d) Samples of each of these substances are decaying. Each sample starts with the same number of atoms.

Which sample decays the most in one hour?

.... [1]

(e) In the investigation of a blood circulation problem, a patient is given an injection containing one of these substances. The radiation needs to be detectable from outside the body.

Which of the substances might be suitable for this use?

.... [1]

[Total: 6]

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