UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICS **0625/02**

Paper 2 Core **October/November 2007**

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 soft pencil for any diagrams, graphs or rough working.
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	
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11	
12	
Total	

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

SP (MML 13331 4/06) T25940/5

UNIVERSITY *of* CAMBRIDGE International Examinations

For Examiner's Use

1 Fig. 1.1 shows some liquid in a measuring cylinder. The metal can next to it has a cross-sectional area which is four times that of the measuring cylinder.

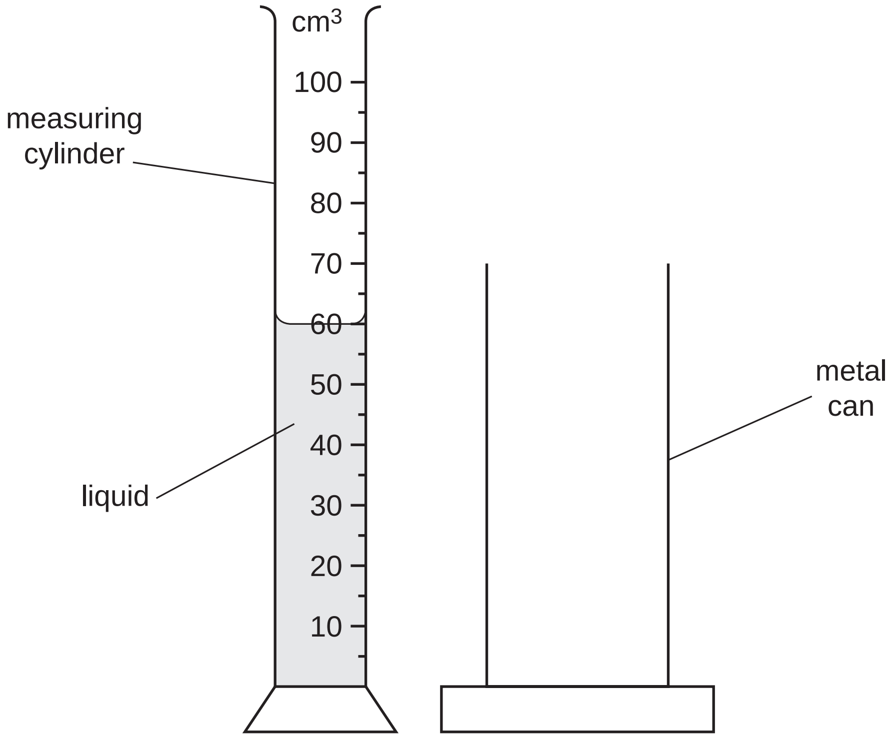

Fig. 1.1

(a) State the volume of the liquid.

volume = ... cm^3 [1]

(b) The liquid is poured into the metal can.

On Fig. 1.1, draw the surface of the liquid in the can. [2]

(c) Complete the following sentence.

The pressure of the water at the bottom of the can is ……………………………… than the pressure that the water had at the bottom of the measuring cylinder. [1]

[Total: 4]

2 A theatre measures 100 m × 80 m × 25 m. The air inside it has a density of 1.3 kg / m^3 when it is cool.

(a) Calculate the volume of the air in the theatre.

volume of air = ... m^3 [1]

(b) Calculate the mass of the air. State the equation you are using.

mass of air = ... [4]

(c) Some time after the doors are opened, the heating in the theatre is switched on.

State and explain what happens to the mass of the air in the theatre as it warms up.

statement ....

....

explanation ....

.... [2]

(d) Suggest why the temperature of the air in the balcony of the theatre (nearer the ceiling) is likely to be greater than that lower down in the theatre.

.... [1]

[Total: 8]

3 Fig. 3.1 shows a simple mercury barometer, drawn 1/10 full size.

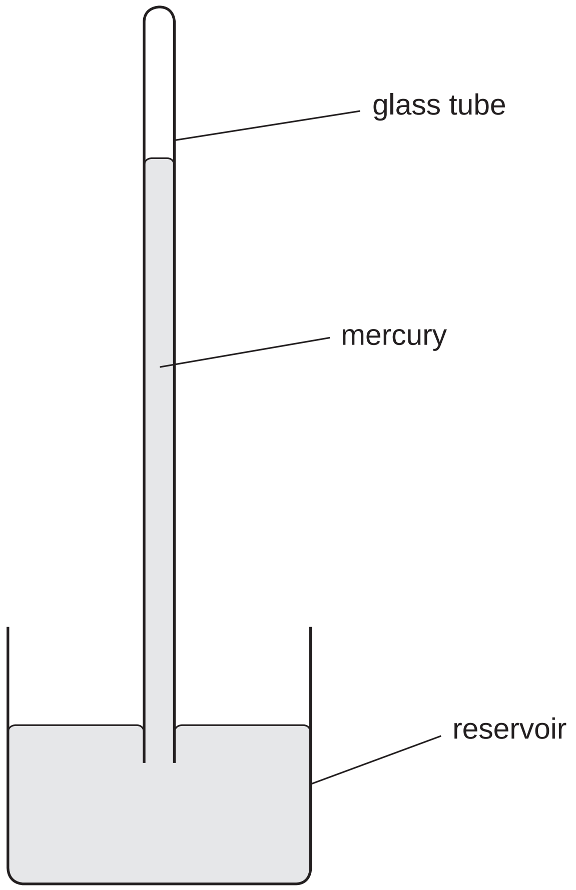

Fig. 3.1

(a) On Fig. 3.1, use your rule to make an appropriate measurement, and then use it to calculate the atmospheric pressure.

atmospheric pressure = ... cm Hg [2]

(b) State what occupies the space in the tube above the mercury.

....

.... [1]

(c) On another occasion, the atmospheric pressure is much less than that shown in Fig. 3.1.

On Fig. 3.1, mark where the mercury surfaces in the tube and in the reservoir might be. [2]

(d) The tube above the mercury gets broken and allows air to move in to and out of the tube.

Explain why the barometer no longer functions.

....

.... [2]

[Total: 7]

4 A diesel engine is used to drag a boat up a slipway (see Fig. 4.1).

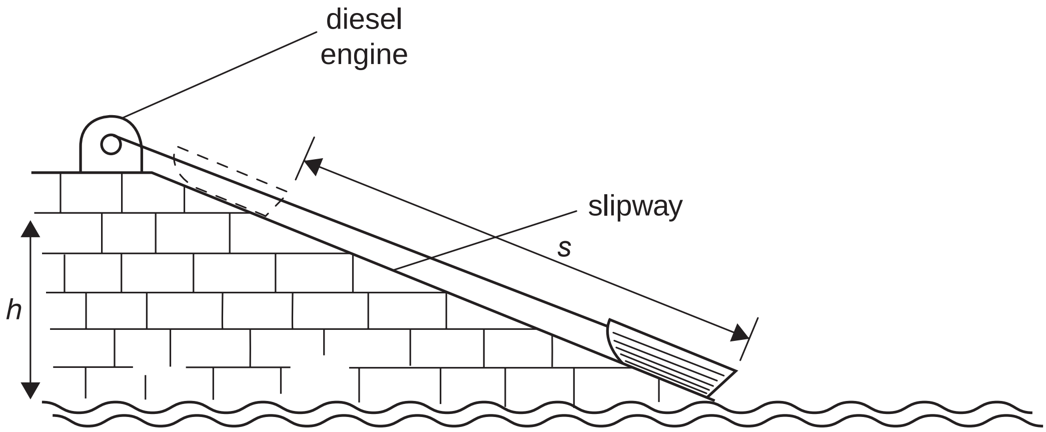

Fig. 4.1

The boat finishes in the position shown by the broken outline.

(a) On Fig. 4.1, carefully mark

(i) the weight *W* of the boat, using an arrow labelled *W*, [1]

(ii) the friction force *F* on the boat, using an arrow labelled *F*. [1]

(b) State, in terms of *W*, *F*, *h* and *s*, how you could calculate

(i) the work done lifting the weight of the boat,

....

.... [1]

(ii) the work done against the friction force,

....

.... [1]

(iii) the total work done pulling the boat up the slipway.

.... [1]

(c) What other measurement would you need to make if you wanted to calculate the useful power output of the diesel engine?

.... [1]

[Total: 6]

For Examiner's Use

5 Fig. 5.1 shows a liquid-in-glass thermometer.

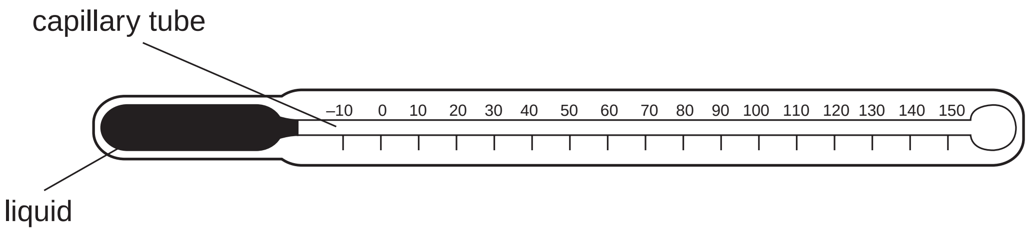

Fig. 5.1

(a) The thermometer is used for measuring temperatures in school laboratory experiments.

State the units in which the temperatures are measured. .... [1]

(b) On Fig. 5.1, mark where the liquid thread will reach when the thermometer is placed in

(i) pure melting ice (label this point ICE), [1]

(ii) steam above boiling water (label this point STEAM). [1]

(c) A liquid-in-glass thermometer makes use of the expansion of a liquid to measure temperature. Other thermometers make use of other properties that vary with temperature.

In the table below, write in two properties, other than expansion of a liquid, that can be used to measure temperature.

example	*expansion*	**OF**	*a liquid*
1.		**OF**	
2.		**OF**	

[2]

[Total: 5]

6 A motorcyclist drives along a straight road. Fig. 6.1 gives information about the first 10 s of his ride.

Fig. 6.1

(a) From the information on Fig. 6.1,

(i) describe the motion of the motorcyclist by ticking one of the following boxes,

constant speed ☐

uniform acceleration ☐

uniform deceleration ☐

[1]

(ii) estimate the average speed of the motorcyclist during the 10 s,

average speed = ... m/s [1]

(iii) calculate the distance travelled during the 10 s.

distance travelled = ... m [2]

(b) State why the distance travelled in the first 5 s is less than half of the distance travelled in the first 10 s of the journey.

....

.... [1]

[Total: 5]

7 A girl drops a small stone from a bridge into a pond.

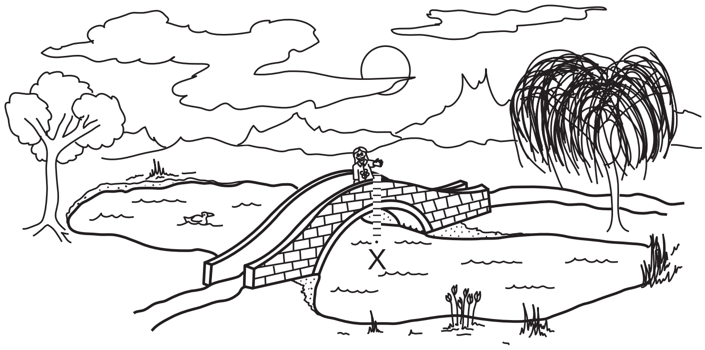

Fig. 7.1

(a) The stone hits the water surface at point X. Fig. 7.2, which is drawn full-size, shows the wavefront a fraction of a second after the stone hits the water.

(i) The wave travels at 5 cm / s.
Calculate how far the wave travels in 0.3 s.

distance travelled = ... cm [1]

(ii) On Fig. 7.2, draw the position of the wavefront 0.3 s after that already shown. [2]

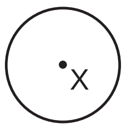

Fig. 7.2

(b) A ringing bell also sends out waves in all directions.

State two ways in which these waves are different from the waves in part **(a)**, other than the fact that one is created in air and the other in water.

1. ....

2. .... [2]

[Total: 5]

8 An object OX is placed in front of a converging lens. The lens forms an image IY.

Fig. 8.1 shows two rays from the object to the image.

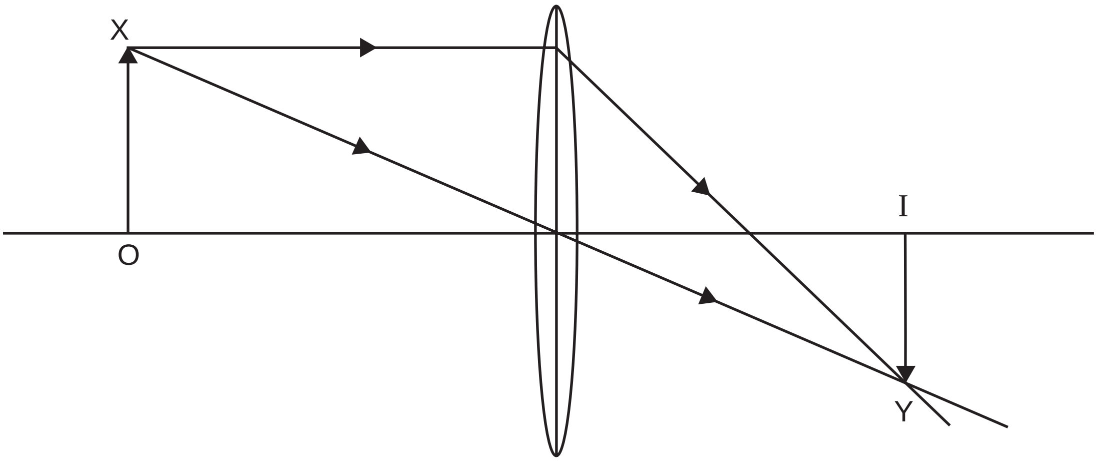

Fig. 8.1

(a) On Fig. 8.1,

(i) clearly mark and label the principal focus and the focal length of the lens, [3]

(ii) draw a third ray from X to Y. [1]

(b) The following list contains descriptions that can be applied to images.

Tick any which apply to the image shown in Fig. 8.1.

real	☐
virtual	☐
enlarged	☐
diminished	☐
inverted	☐
upright	☐
image distance less than object distance	☐
image distance more than object distance	☐

[4]

(c) State two things that happen to the image in Fig. 8.1 when the object is moved further away from the lens.

1. ....

2. .... [2]

[Total: 10]

9 A thermistor connected to a variable voltage supply is immersed in a beaker of water.

The beaker of water is heated slowly, using a Bunsen burner, as shown in Fig. 9.1.

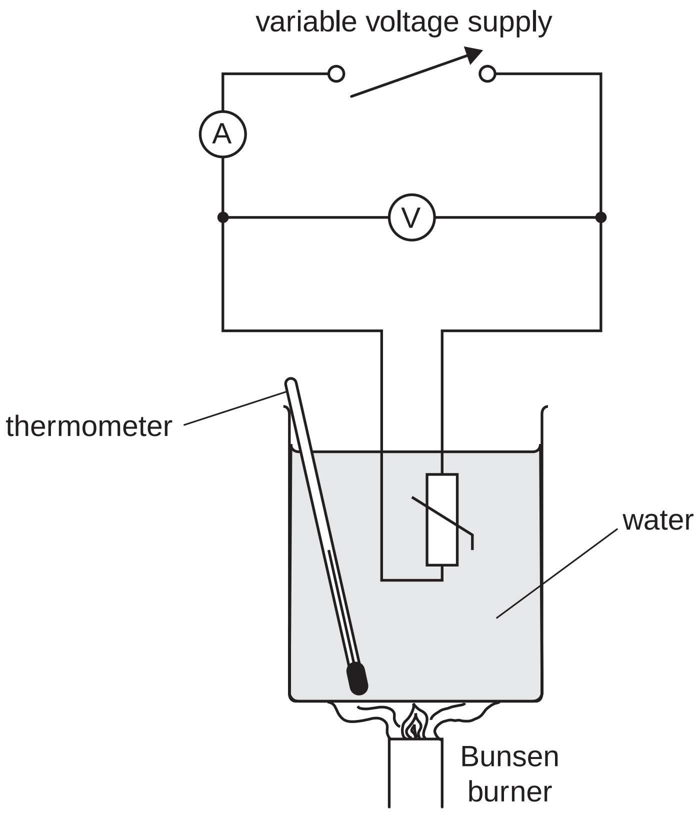

Fig. 9.1

At different temperatures, the voltage is adjusted until the current is 25 mA and the value of the voltage is noted.

The results are shown below.

temperature / °C	15	30	45	60	75	90
voltage / V	18.8	8.8	4.7	2.6	1.5	1.2

(a) On the axes of Fig. 9.2, shown on page 13, plot a graph of voltage against temperature. [4]

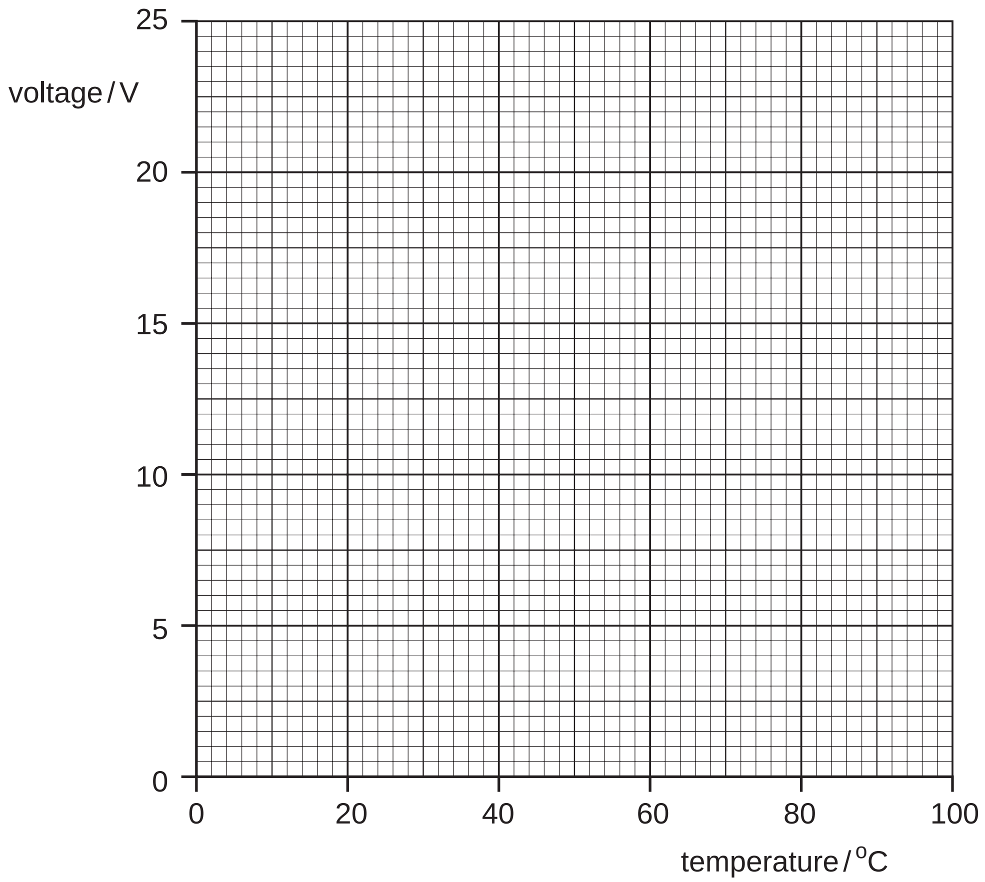

Fig. 9.2

(b) From the graph, find the voltage needed to give a current of 25 mA

(i) at 40 °C, voltage needed = ... V [1]

(ii) at 80 °C. voltage needed = ... V [1]

(c) Use your results in **(b)** to calculate the resistance of the thermistor

(i) at 40 °C,

resistance at 40 °C = ...

(ii) at 80 °C.

resistance at 80 °C = ...

[5]

(d) Use your results in **(c)** to complete the following sentence about thermistors of the sort used in this experiment.

The thermistor in this experiment is a device whose resistance ………………………… as the temperature increases. [1]

[Total: 12]

10 A coil of insulated wire is connected in series with a battery, a resistor and a switch.

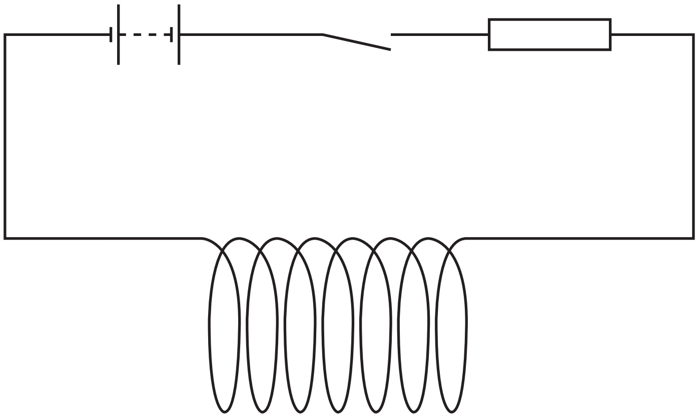

Fig. 10.1

(a) The switch is closed and the current in the coil creates a magnetic field.

(i) On Fig. 10.1, draw the shape of the magnetic field, both inside and outside the coil. [4]

(ii) A glass bar, an iron bar and a perspex bar are placed in turn inside the coil.

Which one makes the field stronger? .... [1]

(b) Two thin iron rods are placed inside the coil as shown in Fig. 10.2. The switch is then closed.

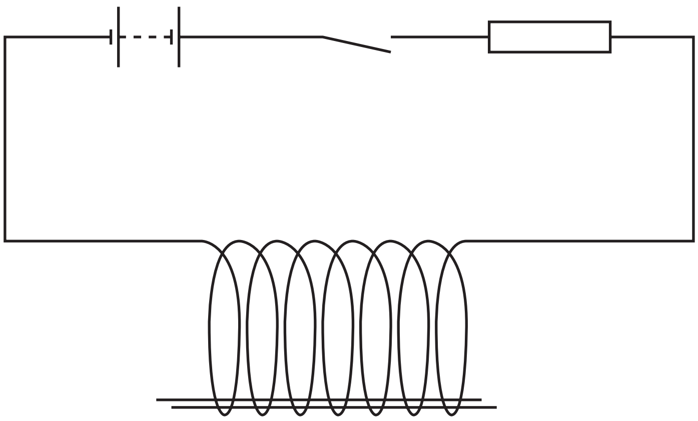

Fig. 10.2

The iron rods move apart. Suggest why this happens.

....

.... [3]

[Total: 8]

11 The activity of a sample of radioactive material is determined every 10 minutes for an hour. The results are shown in the table.

time / minutes	0	10	20	30	40	50	60
activity / count / s	461	332	229	162	106	81	51

(a) From the figures in the table, estimate the half-life of the radioactive material.

half-life = ... minutes [1]

(b) A second experiment is carried out with another sample of the same material. At the start of the experiment, this sample has twice the number of atoms as the first sample.

Suggest what values might be obtained for

(i) the activity at the start of the second experiment,

.... count / s [1]

(ii) the half-life of the material in the second experiment.

.... minutes [1]

(c) Name one type of particle that the material might be emitting in order to cause this activity.

.... [1]

[Total: 4]

12 A beam of cathode rays is travelling in a direction perpendicularly out of the page. The beam is surrounded by four metal plates P_1, P_2, P_3 and P_4 as shown in Fig. 12.1.

On Fig. 12.1, the beam is shown as the dot at the centre.

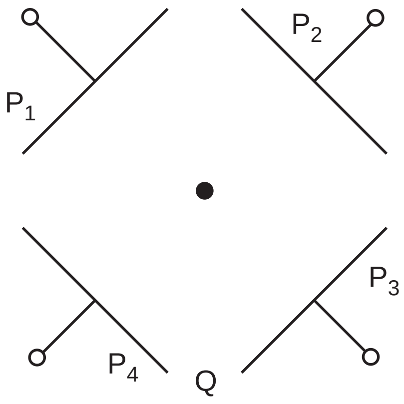

Fig. 12.1

(a) Cathode rays are produced by thermionic emission.

What is the name of the particles which make up cathode rays?

.... [1]

(b) A potential difference is applied between P_1 and P_3, with P_1 positive with respect to P_3.

State what happens to the beam of cathode rays.

.... [2]

(c) The potential difference in **(b)** is removed. Suggest how the beam of cathode rays can now be deflected down the page towards Q.

....

.... [2]

(d) Cathode rays are invisible. State one way to detect them.

.... [1]

[Total: 6]