Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/02**

Paper 2 Theory

October/November 2004

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 in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
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.
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).

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

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This document consists of **15** printed pages and **1** blank page.

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1 Fig. 1.1 shows the top part of a measuring cylinder containing some liquid.

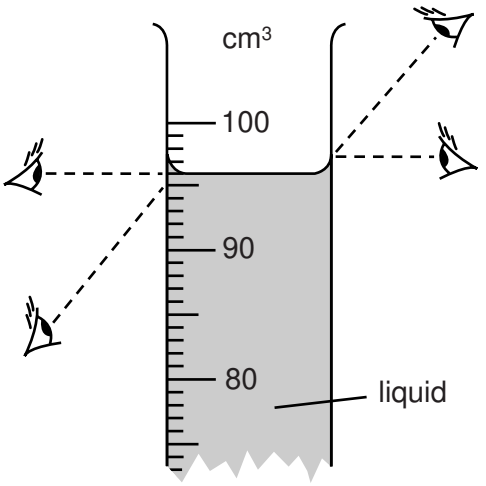

Fig. 1.1

(a) What is the volume of liquid in the measuring cylinder?

volume = ...cm^3 [1]

(b) Fig. 1.1 indicates four ways the observer's eye could look when taking the reading from the measuring cylinder. Put a circle around the eye position that gives the correct reading. [1]

(c) In order to fill the measuring cylinder up to the 100 cm^3 mark, 80 drops of the liquid are added to the liquid already in the measuring cylinder.
Calculate the average volume of one drop.

average volume of a drop = ...cm^3 [4]

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2 **(a)** In Fig. 2.1, the sealed drum containing gas has a mercury manometer connected to it in order to indicate the gas pressure.

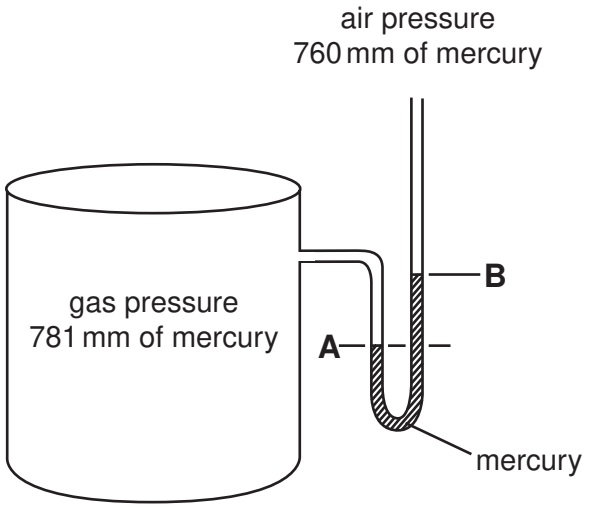

Fig. 2.1

For convenience, gas pressure is often expressed in mm of mercury.
The gas pressure is 781 mm of mercury and air pressure is 760 mm of mercury.

(i) State the difference in height between levels **A** and **B** on the manometer.

difference in height = ……..mm

(ii) The temperature of the gas rises.

State what happens to

1. the gas pressure, ...

2. the level **A**, ...

3. the level **B**. .....

[3]

(b) The air in part **(a)** is also pressing on a large window pane in the wall of the room where the drum is situated.

(i) State how the air pressure on the window pane compares with the air pressure on the mercury surface at **B** in Fig. 2.1.

.....

(ii) State how the force exerted by the air on the window pane compares with the force exerted by the air on the mercury surface at **B**.

.....

[2]

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3 A packaging company purchases corrugated cardboard boxes in which to pack its goods. The boxes are not made up when they are delivered, but are flat, as shown in Fig. 3.1.

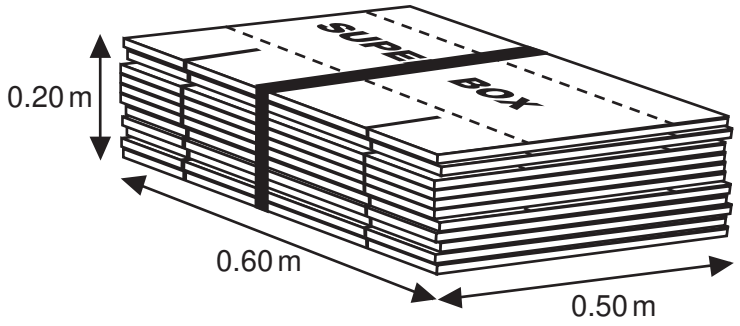

Fig. 3.1

(a) A bundle of these boxes measures 0.60 m x 0.50 m x 0.20 m and has a mass of 7.2 kg.

(i) Calculate the volume of the bundle of boxes.

volume = ...[3]

(ii) Calculate the density of the corrugated cardboard.

density = ...[4]

(b) Corrugated cardboard is made up of 3 sheets of thick paper stuck together. Fig. 3.2 shows an enlarged view of the edge of a sheet of corrugated cardboard.

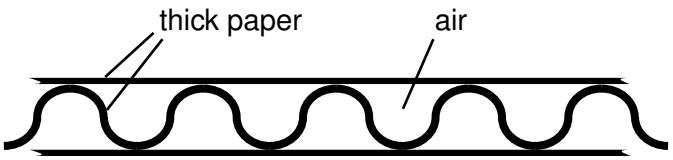

Fig. 3.2

(i) Here is an incomplete sentence about the paper.

The density of the paper is..... that of the corrugated cardboard.

Which of the words below correctly complete the sentence? Tick one box.

greater than ☐ the same as ☐ less than ☐

(ii) Explain your answer to **(b) (i)**.

.....

.....

[2]

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4 Logs of wood are burning in a camp-fire on the ground. A person is sitting nearby.

Fig. 4.1

(a) (i) State two types of energy that the burning logs possess.

1. .....

2. .....

(ii) State the main method of heat transfer by which energy from the fire reaches the person sitting nearby.

.....

[3]

(b) A spark jumps out of the fire.

(i) State the name of the type of energy that the spark possesses due to its movement.

.....

(ii) The spark lands on the person's hand.
State which method of heat transfer causes the person to feel the spark.

.....

(iii) The pain caused by the spark makes the person stand up.

1. State the type of energy that has increased, now that he is standing.

.....

2. State the type of energy stored in his body that enabled him to stand.

.....

[4]

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5 In order to observe Brownian motion, some smoke is mixed with air trapped in a small glass box. The box is strongly illuminated from the side, and the smoke is viewed from above through a microscope. This is illustrated in Fig. 5.1.

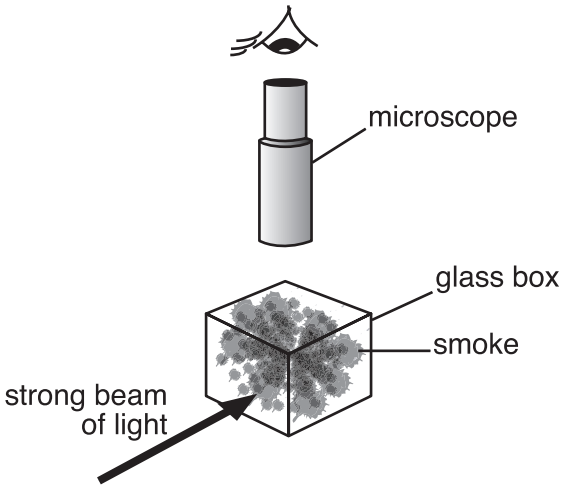

Fig. 5.1

(a) Describe what is seen when the microscope is focussed on the smoke particles.

.....

.....

.....[3]

(b) State what causes the effect described in **(a)**.

.....

.....

.....

.....[4]

(c) The temperature of the glass box and its contents is increased. Suggest what change is seen through the microscope.

.....

.....[1]

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6 **(a)** Here is a list of solid materials. Put a tick in the box alongside those materials which are good conductors of heat.

aluminium	☐
copper	☐
cork	☐
gold	☐
polystyrene	☐
wood	☐

[3]

(b) State the word we use to describe materials that are poor conductors of heat.

.....[1]

(c) From the list of materials given in **(a)**, state which would be suitable to use for

(i) the base of a cooking pot,.....

(ii) the covering on the handle of a kettle. .....

[2]

(d) Water is a poor conductor of heat. A beaker of water is heated as shown in Fig. 6.1.

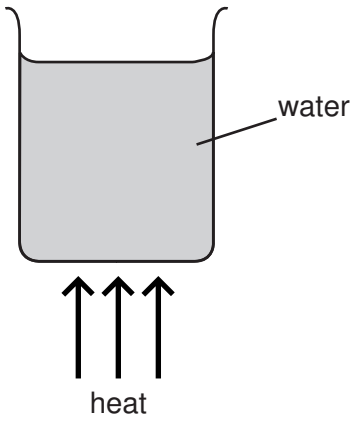

Fig. 6.1

All the water heats up quite quickly.
State the process by which heat spreads most rapidly through the water.

.....[1]

(e) State why the heating element is always placed near the bottom of an electric kettle.

.....

.....[1]

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7 A girl is walking along a path 1600 m from the rock-face of a quarry (a place where stone is obtained).

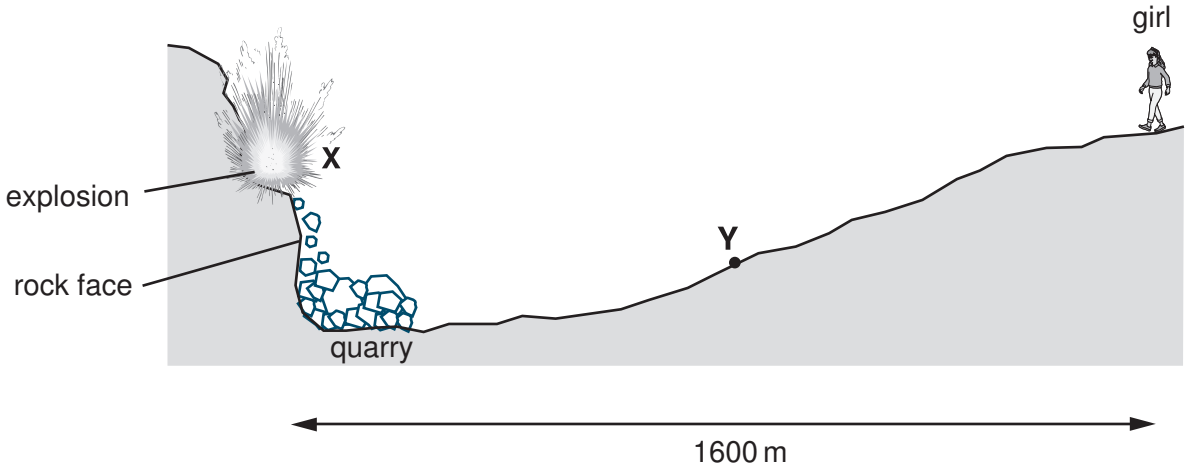

Fig. 7.1

(a) The quarry workers set off an explosion at **X** to break up some rock. The girl measures the time interval between seeing the flash and hearing the bang.
The time is 5.0 s.

(i) Calculate the speed of the sound.

speed of sound = ……..m/s [3]

(ii) State what assumption you have made in your working in **(i)**.

.....[1]

(b) Suppose the explosion had taken place at **Y** instead of **X**.
State two ways in which the girl's observations would have been different.

1. .....

2. .....[2]

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8 Two light conducting balls **A** and **B** are hanging side by side, as shown in Fig. 8.1.

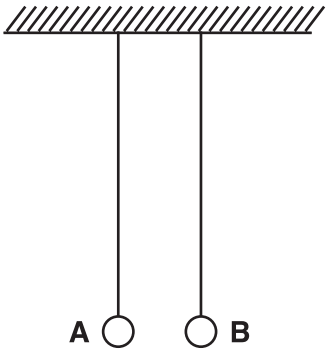

Fig. 8.1

A and **B** are given a series of different charges, as indicated in the table below.
In the third column of the table, write what is seen to happen in each case.
Use the words **repulsion** or **attraction** or **nothing**, as appropriate.

charge on **A**	charge on **B**	what is seen to happen
positive	positive	
negative	negative	
positive	negative	
zero	positive	
negative	zero	

[5]

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[Turn over

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9 **(a)** Two 10 Ω resistors are connected in series in a circuit, as shown in Fig. 9.1.

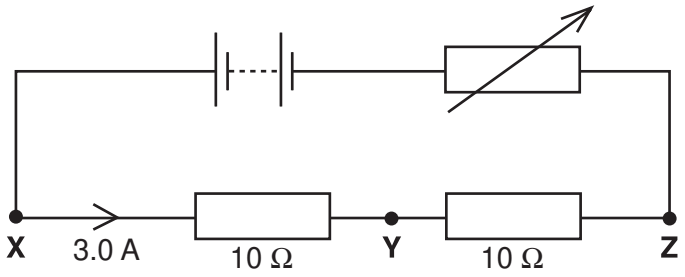

Fig. 9.1

The current at point **X** is 3.0 A.

(i) State the current at

1. point **Y**, ...A

2. point **Z**. .....A

(ii) Calculate the combined resistance of the two 10 Ω resistors.

combined resistance = ……..Ω
[3]

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(b) The 10 Ω resistors are now arranged in parallel, as shown in Fig. 9.2.

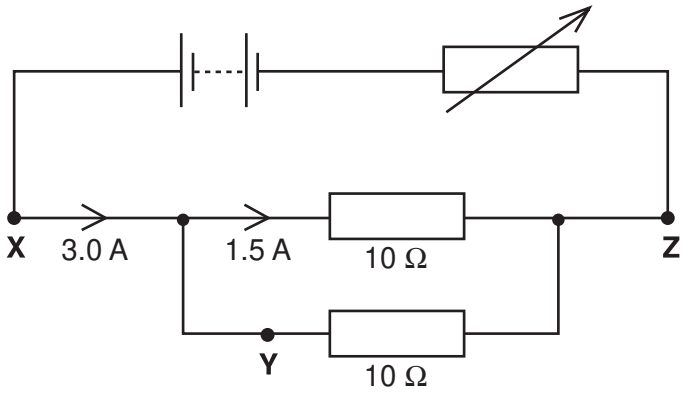

Fig. 9.2

(i) The current at **X** is adjusted to 3.0 A. The current through one resistor is 1.5 A.

1. What is the current at **Y**? Tick one box.

0 A	☐
1.5 A	☐
3.0 A	☐
4.5 A	☐

2. State the value of the current at **Z**. .....A

(ii) What is the combined resistance of the two 10 Ω resistors? Tick one box.

0 Ω	☐
5 Ω	☐
10 Ω	☐
20 Ω	☐

[3]

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10 Atoms contain protons, neutrons and electrons.

State which of these three

(a) has a negative charge, ...[1]

(b) is uncharged, ...[1]

(c) has a much smaller mass than the others, ...[1]

(d) is outside the nucleus, ...[1]

(e) are nucleons, ...[2]

(f) are lost from the nucleus during α-particle emission. .....[2]

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11 The ray diagram in Fig. 11.1 shows a lens forming an image II′ of an object OO′.

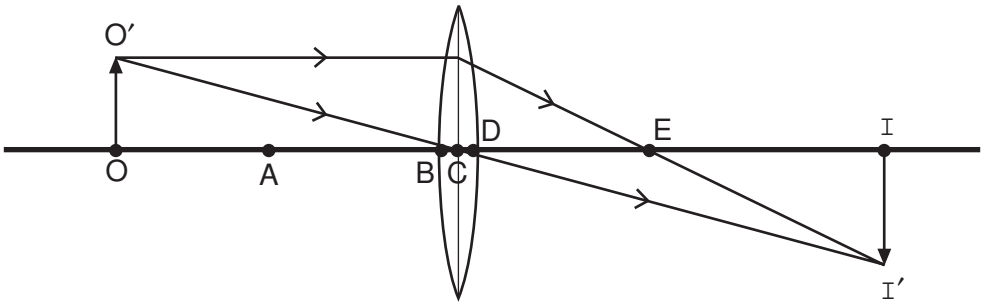

Fig. 11.1

(a) State

(i) which of the marked points is a principal focus of the lens, ...

(ii) which distance is the focal length of the lens. .....

[2]

(b) Which of the following words describe the image?

Tick all that are correct.

real	☐
virtual	☐
inverted	☐
upright	☐
enlarged	☐
diminished	☐

[3]

(c) On Fig. 11.1, draw one other ray that goes from O′, the top of the object, to the image.

[1]

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12 (a) A small pin is fixed to the edge of a bench. A triangular piece of card with a small hole in each corner is hung on the pin from corner A and allowed to settle, as shown in Fig. 12.1. A plumb-line is then hung from the pin and the vertical line AP is marked on the card.

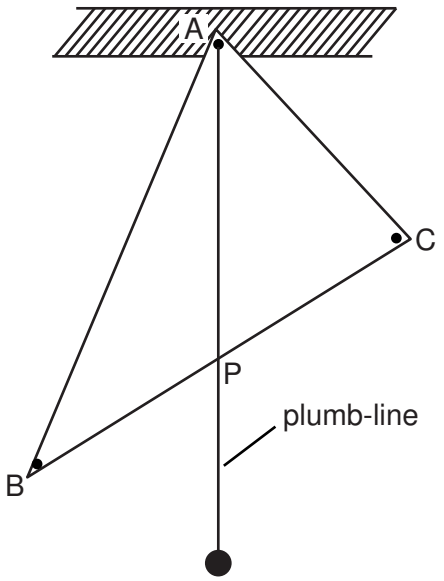

Fig. 12.1

This procedure is then repeated with the card hanging from C and the vertical line CQ is marked.
After this, the card is as shown in Fig. 12.2.

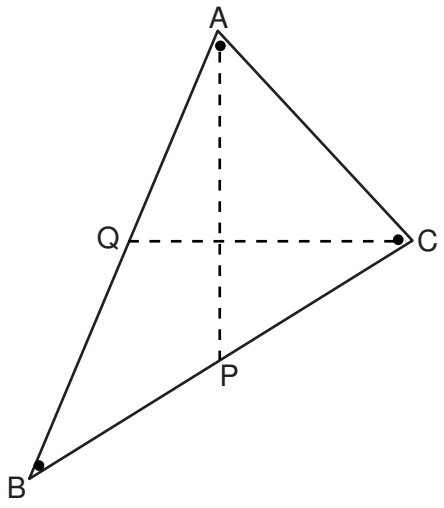

Fig. 12.2

On Fig. 12.2,

(i) draw the vertical line that would be obtained if the card were hung from B,

(ii) clearly mark the centre of mass of the card using a dot labelled G. [2]

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(b) Fig. 12.3a shows a glass ornament standing on a shelf. Fig. 12.3b shows an identical ornament filled with coloured glass beads.

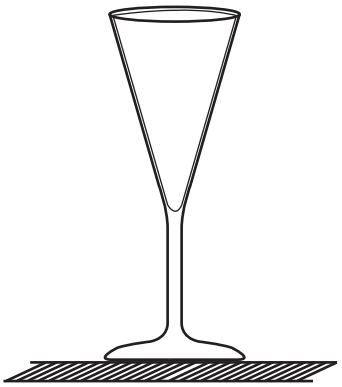

Fig. 12.3a

Fig. 12.3b

State which ornament is more stable, and why.

.....

.....[2]

(c) Fig. 12.4 shows two wooden blocks standing on a hinged board with a rough surface.

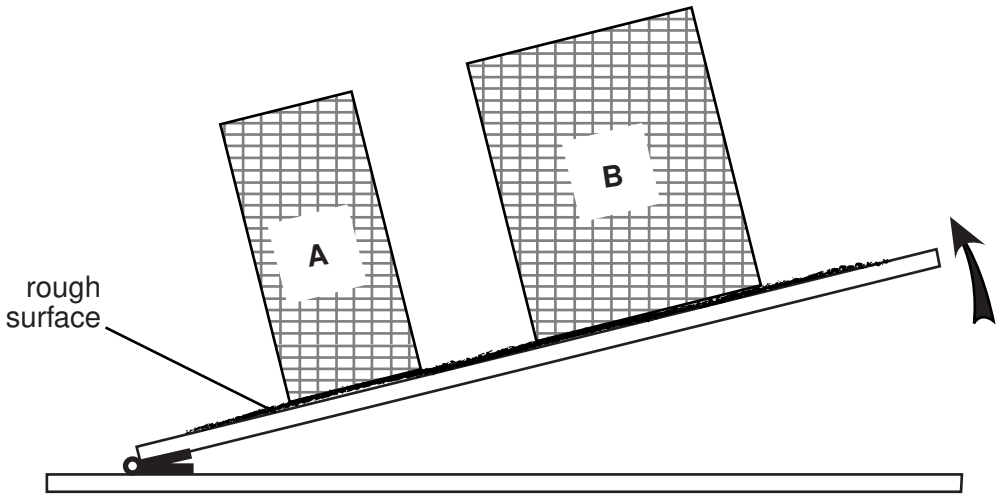

Fig. 12.4

The board is slowly tilted. The blocks do not slip. State which block falls over first, and explain why.

.....

.....[2]

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