	Centre Number	Candidate Number
Candidate Name ____________________		

International General Certificate of Secondary Education

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/2

PAPER 2

OCTOBER/NOVEMBER SESSION 2001 1 hour

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

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).

FOR EXAMINER'S USE

This question paper consists of 15 printed pages and 1 blank page.

SB (NH/CG) S10760/3

For Examiner's Use

1 A piece of string wraps around a cylinder 8 times.

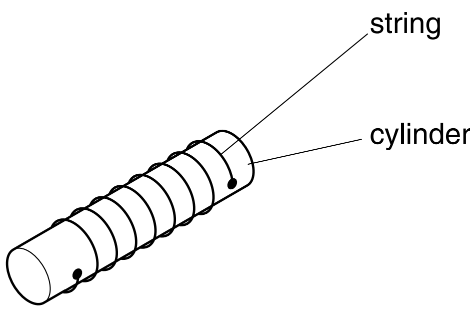

Fig. 1.1

Fig. 1.2 shows the string laid along a 30 cm rule.

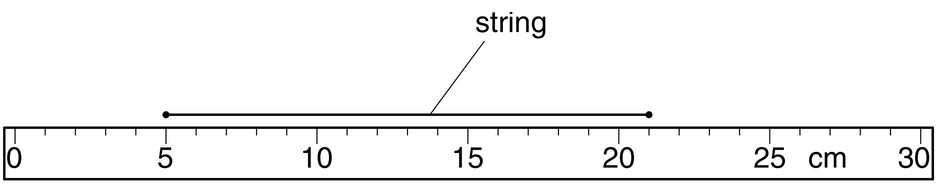

Fig. 1.2

(a) How long is the string?

length of string = ... cm [1]

(b) Calculate the circumference (distance once round) the cylinder.

circumference of cylinder = ... cm [2]

2 A trainee designer makes a jug for holding drinks. The jug is shown in Fig. 2.1.

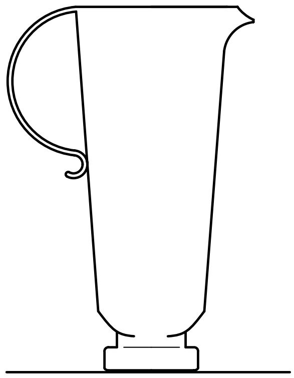

Fig. 2.1

Unfortunately, it is very easy to knock the jug over, so the trainee designer has to change the shape of the jug.

State **two** things he could do to improve the stability of the jug.

1. ....

2. ....[2]

3 **(a)** How can a metal bar be made to expand in all directions?

....[1]

(b) What happens to the spacing between the atoms in an iron bar when it expands?

....[1]

(c) State **one** example where expansion of a solid can be useful.

....[1]

(d) State **one** example where expansion of a solid causes problems which need to be overcome.

....[1]

For Examiner's Use

4 **(a)** A ray of light passes through a rectangular glass block, as shown in Fig. 4.1. It emerges at point **X**.

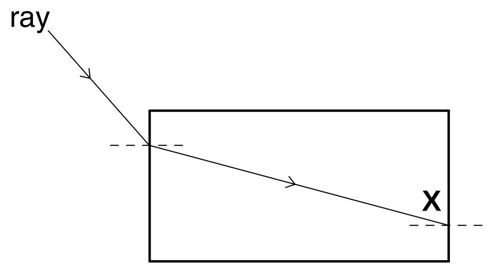

Fig. 4.1

On Fig. 4.1, draw the ray which emerges from the block at **X**. [2]

(b) The glass of which the block is made has a critical angle of 42°.

Another ray passes into the block as shown in Fig. 4.2.

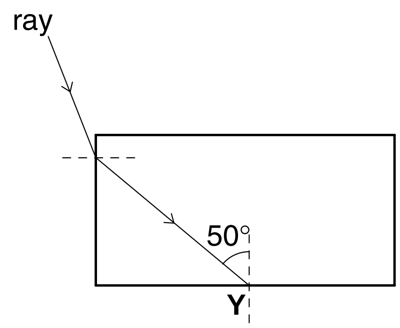

Fig. 4.2

(i) On Fig. 4.2, show what happens to the ray at **Y**.

(ii) Why does this happen?

....

....[3]

(c) A third ray enters the block perpendicularly, as shown in Fig. 4.3.

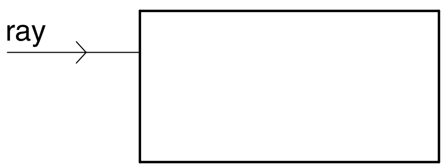

Fig. 4.3

On Fig. 4.3, draw the ray as it passes through the block and out into the air again. [2]

For Examiner's Use

5 **(a)** Fig. 5.1 shows a student's attempt at drawing a diagram to illustrate the formation of a spectrum by using a glass prism.

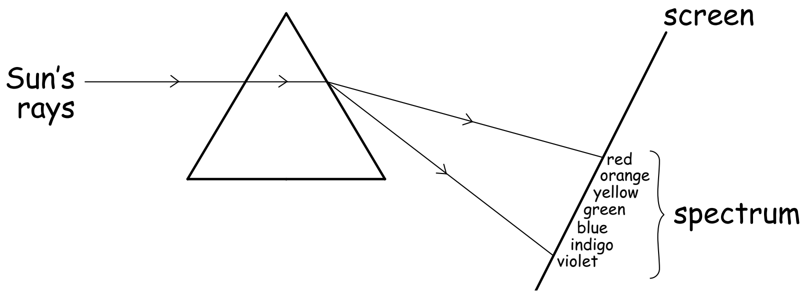

Fig. 5.1

The student labelled the colours in the correct positions but made two mistakes in showing the passage of the rays through the prism. What are these mistakes?

1. ....

2. ....[2]

(b) The prism in Fig. 5.1 can transmit infra-red radiation.

(i) What instrument could the student use to detect the presence of the infra-red radiation?

....

(ii) Use the letters **I.R.** to show where the infra-red radiation would strike the screen.

....[2]

(c) Infra-red radiation is one example of an invisible part of the electromagnetic spectrum.

Give the names of **two** other invisible parts of the electromagnetic spectrum.

1. ....

2. ....[2]

6 **(a)** Three metal rods look the same.

One is made of aluminium.
One is made of unmagnetised iron.
One is a permanent magnet.

Describe how a small bar magnet could show which rod is

(i) made of aluminium,

....

....

(ii) made of unmagnetised iron,

....

....

(iii) a permanent magnet.

....

....[4]

(b) In an experiment, a steel ball-bearing is held up by an electromagnet, as shown in Fig. 6.1.

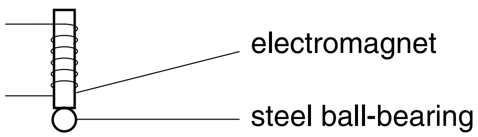

Fig. 6.1

The electromagnet then releases the ball-bearing, which falls to the floor.

(i) From what metal is the core of the electromagnet made?

....

(ii) How is the electromagnet made to work?

....

(iii) What is done to make the electromagnet release the ball-bearing?

....[3]

For Examiner's Use

7 This question is about the dangers of electricity.

(a) A builder tries to save money by not fitting fuses or circuit-breakers to the electric circuits in a house. Why might this be dangerous?

....

....

....[2]

(b) Another builder only has switches like the one shown in Fig. 7.1.

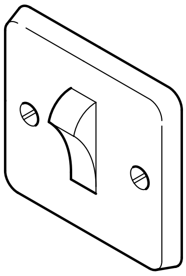

Fig. 7.1

The builder decides it might be dangerous to fit one of these switches in a washroom, where there would be water and steam.

Why might it be dangerous?

....

....

....[2]

(c) A cleaning operator is trained to check the cable of a vacuum cleaner for damage before it is used.

Why might it be dangerous to use equipment with a damaged cable?

....

....[1]

For Examiner's Use

8 **(a)** Describe what happens to an atom when it undergoes radioactive decay.

....

....

....[3]

(b) A scientist measures the count rate from a radioactive substance over a period of 20 minutes. The table shows the results of his measurements.

time/minutes	0	5	10	15	20
count rate / counts/s	800	400	205	105	50

(i) From the table, estimate the half-life of the substance.

half-life = ... minutes

(ii) How many half-lives elapsed during the 20 minute experiment?

number of half-lives = ...

(iii) If the scientist had taken readings for 25 minutes, what might the count rate have been at the end of his experiment?

count rate after 25 minutes = ... counts/s
[3]

(c) In the following table, write in the correct numbers of electrons, protons and neutrons contained in an α-particle and in a β-particle.

	electrons	protons	neutrons
α-particle			
β-particle			

[4]

[Turn over

9 A student draws the circuit shown in Fig. 9.1. The circuit is intended to be used to measure the resistance of **R**, a length of nichrome resistance wire.

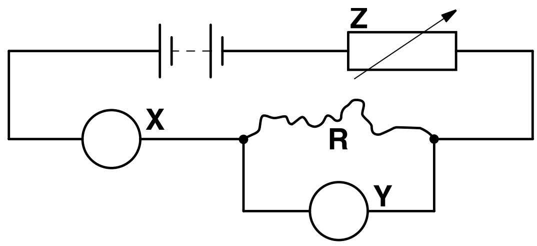

Fig. 9.1

(a) The student cannot remember which meters he should use at **X** and at **Y**.

(i) Which meter should he show at **X**? ....

(ii) Which letter should he put in the circle at **X**? ....

(iii) Which meter should he show at **Y**? ....

(iv) Which letter should he put in the circle at **Y**? ....
[4]

(b) **(i)** What is the component labelled **Z**? ....

(ii) What is the purpose of **Z** in the circuit? ....
[3]

(c) The student connects the circuit and obtains the graph shown in Fig. 9.2.

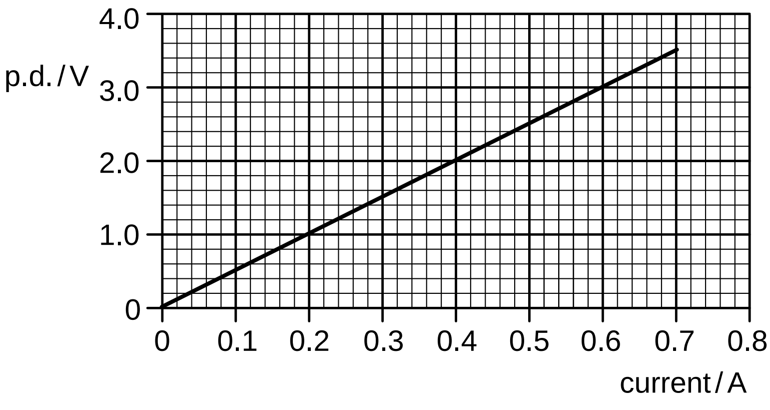

Fig. 9.2

(i) How can the student use the graph to find the resistance of **R**?

....

....

....

(ii) Calculate the value of **R**.

resistance **R** = ... [4]

(d) The student removes the length of nichrome wire **R** and replaces it with the same length of thinner nichrome wire.

(i) Will the resistance of this wire be greater than, smaller than or the same as the wire in the rest of the question?

....

(ii) On Fig. 9.2, sketch a line which the student might obtain when he repeats the experiment with the thinner wire. [3]

For Examiner's Use

10 The densities of three solids are

aluminium	2 700 kg/m^3,
concrete	2 200 kg/m^3,
wood	600 kg/m^3,

Blocks having identical dimensions are made of these three substances. The blocks are stood on a horizontal surface, as shown in Fig. 10.1.

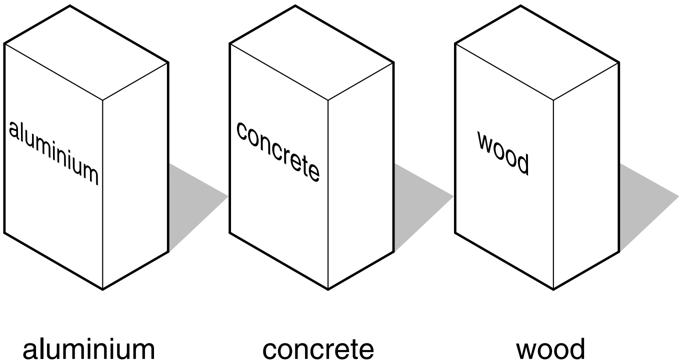

Fig. 10.1

(a) (i) Which block has the greatest mass? ....

How do you know this? ....

....

(ii) Which block has the greatest weight? ....

(iii) Which block exerts the greatest pressure on the horizontal surface? .... [4]

(b) The wood block can be placed on the horizontal surface in any one of three ways, **A**, **B** or **C** (see Fig. 10.2).

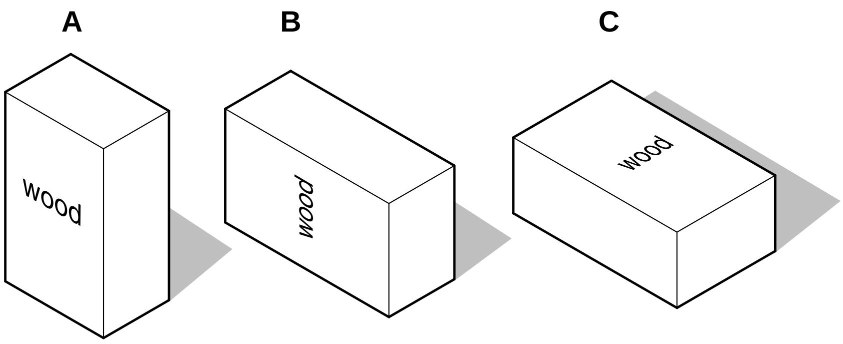

Fig. 10.2

In which position does the wood block exert the greatest pressure? ....

How do you know this? ....

.... [2]

(c) A person spends some time relaxing on a sandy beach. He sits on a chair with four legs, as shown in Fig. 10.3.

Fig. 10.3

Unfortunately, the chair quickly sinks into the sand.

(i) Why does this happen?

....

....

(ii) Suggest how the person might stop this happening.

....

....[3]

11 A laboratory thermometer is put into some heated **pure** water, as shown in Fig. 11.1. After some time the water boils.

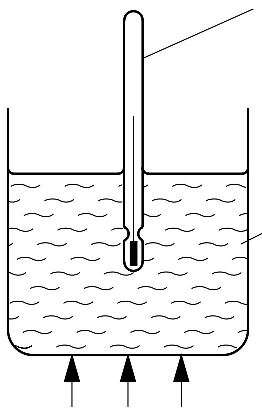

Fig. 11.1

(a) What quantity does the thermometer measure? ....[1]

(b) Suggest what liquid might be contained by the thermometer. ....[1]

(c) The atmospheric pressure is normal.

What value should the thermometer show when the water is boiling? ....[2]

(d) The heating is continued and the water carries on boiling.

What happens to the reading on the thermometer?

....[1]

(e) How could you check that the zero mark on the thermometer had been correctly positioned? You may use a diagram if it helps you to answer clearly.

....

....

....

....

....

.... [3]

12 Fig. 12.1 shows the plan of the dining room in a house in a cold country. Details of the rest of the rooms are not shown. The air outside the house is much colder than that inside the house.

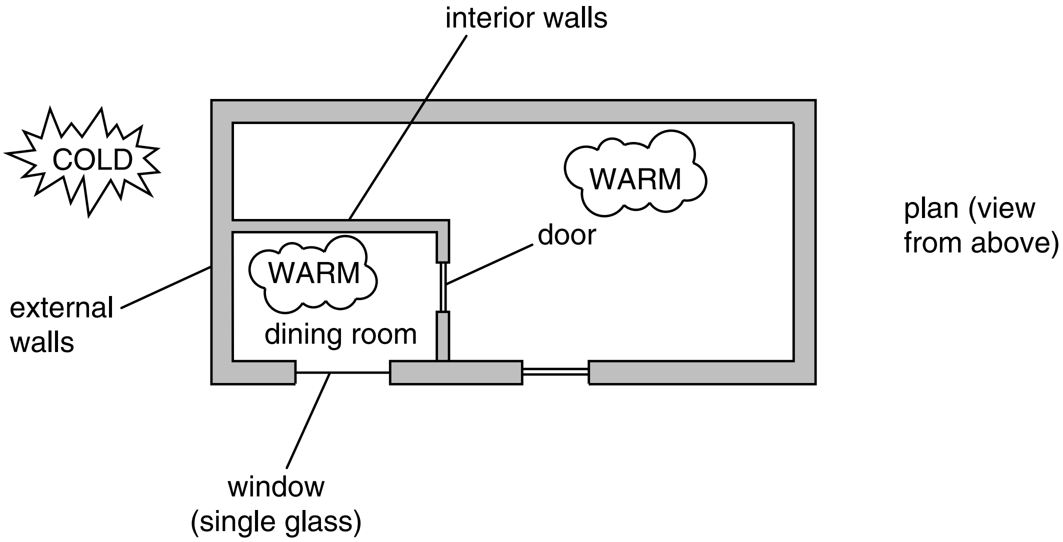

Fig. 12.1

Heat is lost from the dining room by conduction at the rates shown below.

through external walls	3 000 000 J/hour
through internal walls	100 000 J/hour
through door	50 000 J/hour
through window	1 000 000 J/hour

(a) Suggest why

(i) much more heat is lost through the external walls than through the internal walls,

....

....

(ii) such a lot of heat is lost through the window.

....

....
[2]

(b) If the figures above relate to the only sources of heat loss, how many J/hour would the heater in the dining room need to supply in order to keep the temperature in the room constant?

rate of heat supply needed = ... J/hour [2]

(c) Suggest **one** other way heat might be lost from the room.

....[1]

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