CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE   **5124/02, 5125/02**

Paper 2 Physics

May/June 2003

1 hour 15 minutes

Additional Materials: Answer paper.

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, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B
Answer any **two** questions.
Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

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	
Section A	
Section B	
TOTAL	

This document consists of **12** printed pages and **4** lined pages.

[Turn over

Section A

Answer **all** the questions.

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

1 Fig. 1.1 shows the speed-time graph for a small balloon initially at rest, then falling vertically through the air.
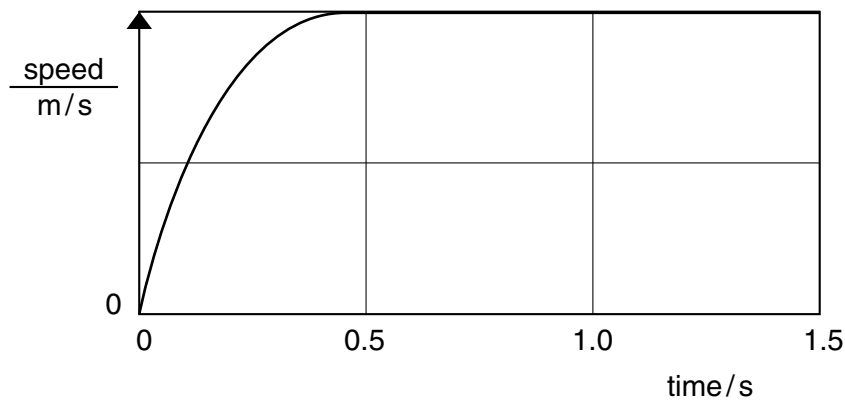
Fig. 1.1

(a) (i) Use Fig. 1.1 to determine the time interval over which the balloon is accelerating.

....

(ii) Is the acceleration constant? Explain your answer.

....

.... [2]

(b) The mass of the balloon is 60 g. Assume $g = 10$ N/kg.

(i) Calculate the weight of the balloon.

[2]

(ii) State the value of the air resistance on the balloon 1.0 s after release.

Explain your answer.

....

.... [2]

2 A uniform metre rule is balanced at the 50 cm mark. Weights of 1.5 N and

3.0 N are hung from the 10 cm and 40 cm marks respectively, as shown in Fig. 2.1.


```
    10 cm          40 cm  50 cm            80 cm
  ┌─────────────────────────────────────────────┐
  └─────────────────────────┬───────────────────┘
        │              │     △              │
        ↓              ↓                    ↓
      1.5 N          3.0 N                  W
```
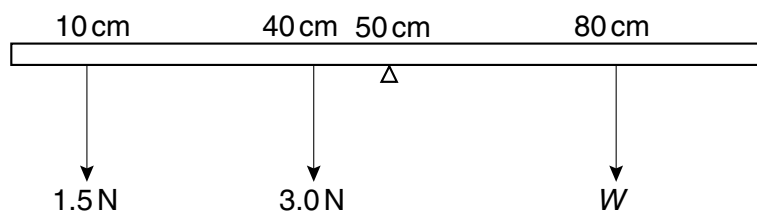
Fig. 2.1

A weight *W* hanging from the 80 cm mark balances the system.

Calculate

(a) the moment about the 50 cm mark of the 1.5 N weight,

[2]

(b) the moment about the 50 cm mark of the 3.0 N weight,

[1]

(c) the value of the weight *W*.

[3]

[Turn over

3 Fig. 3.1 shows the extension-load graph for a piece of rubber.
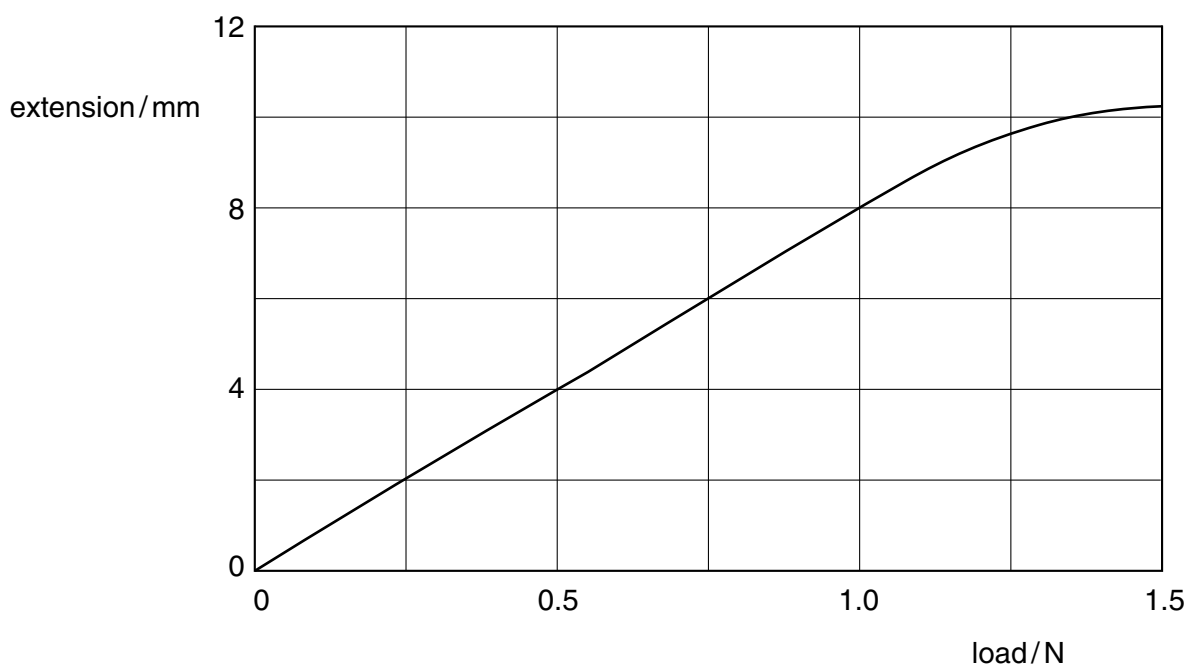
Fig. 3.1

(a) What load produces an extension of 6.0 mm?

.... N [1]

(b) What feature of the graph shows that doubling the load will not always double the extension?

....

....

.... [1]

4 A horizontal force of 24 N acts on an object of mass 1.5 kg that is initially at rest on a smooth floor.

(a) Calculate the work done in moving the object from rest through a distance of 2.0 m.

[2]

(b) Calculate the speed of the object when it has moved 2.0 m from rest.

[3]

[Turn over

5 A beaker containing hot liquid is placed on a table in a room. The temperature of the beaker and its contents changes as shown in Fig. 5.1.
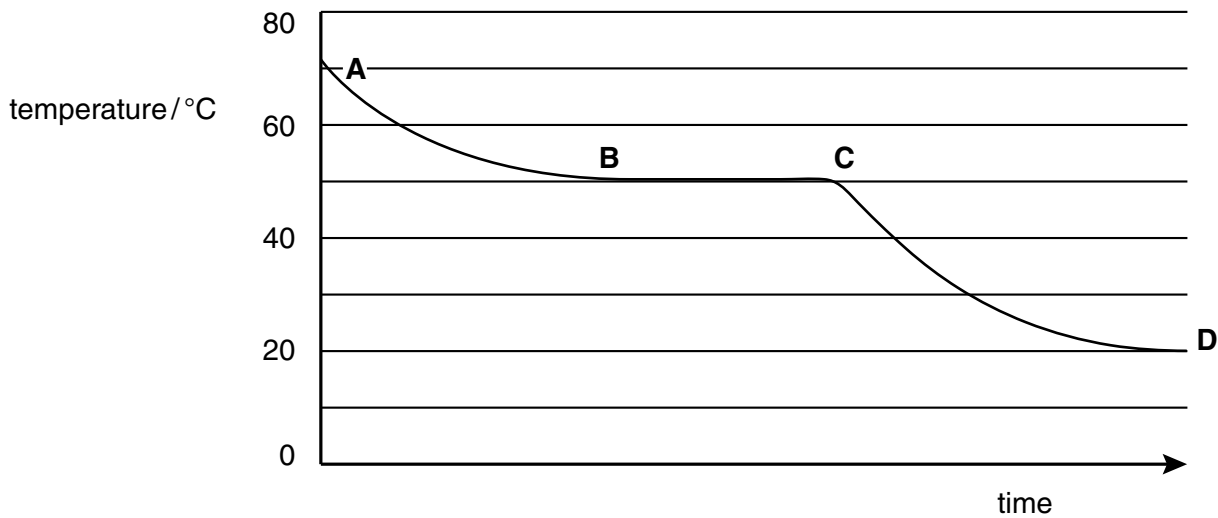
Fig. 5.1

(a) Use Fig. 5.1 to determine the freezing point of the liquid.

.... °C [1]

(b) Explain why the beaker and contents are still losing heat over the section labelled **BC** in Fig. 5.1 even though the temperature is constant.

....

....

....

.... [3]

(c) What is the temperature of the room? Explain your answer.

.... °C

....

....

.... [2]

6 Fig. 6.1 shows a long spring fixed at end **A** and stretched so that the other end is at **B**.
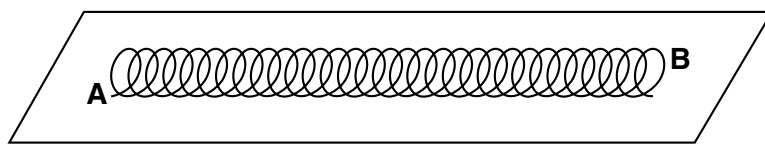
Fig. 6.1

(a) Describe how end **B** should be moved so that a longitudinal wave travels from **B** towards **A**.

....

....

.... [2]

(b) A wave has a frequency of 3.0 Hz and its speed is 1.2 m / s. Calculate the wavelength of the wave.

[2]

[Turn over

7   Fig. 7.1 shows the path of a ray as light travels from air into glass.
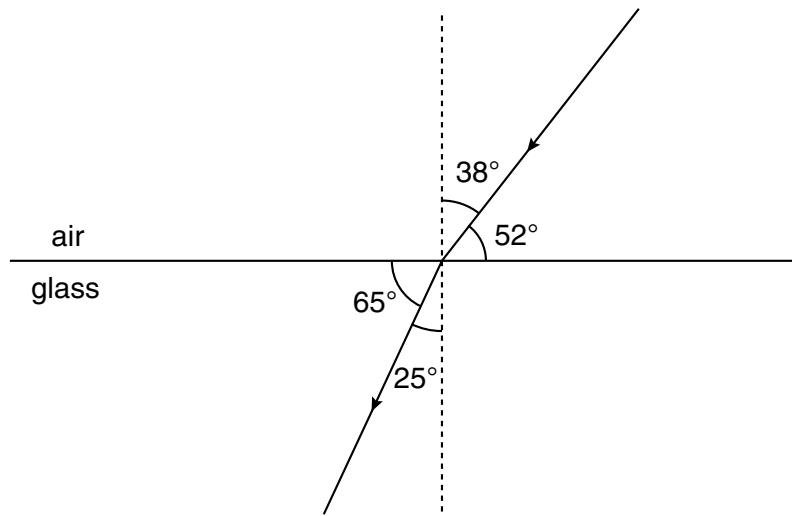
Fig. 7.1

Showing your working, calculate the refractive index of the glass.

[3]

8   Fig. 8.1 shows the output of an a.c. generator.
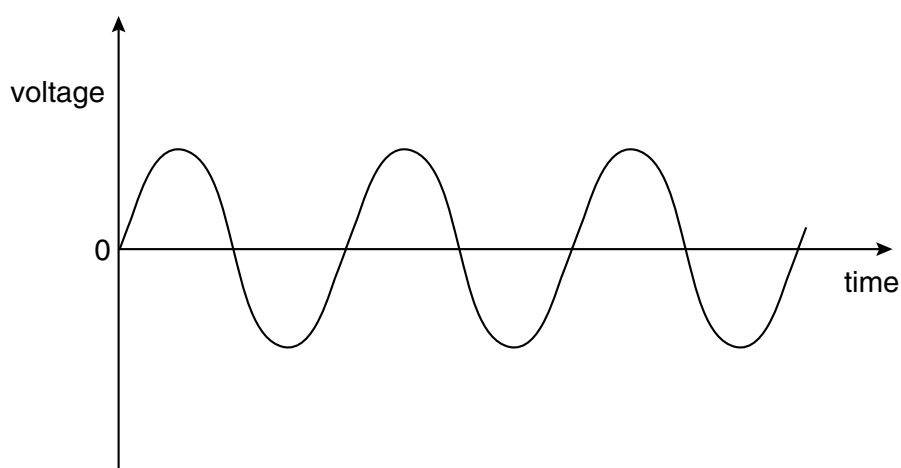
Fig. 8.1

   (a)   State the name of the physical process that produces the output of the generator.

   .... [1]

   (b)   On Fig. 8.1, sketch a second line to show the output of the generator when the rotation
   rate is doubled.   [2]

9   An electric heater is rated at 2.0 kW, 240 V. The heater is connected to a 240 V supply.

   (a)   **(i)**   Calculate the current in the heater.

                                                                                                                            [3]

   (ii)   Suggest a suitable fuse to be used in the heater circuit, given fuses of ratings 3 A,
   5 A and 10 A. Give a reason for your choice.

         ....

         ....

         .... [2]

   (b)   Calculate the energy used, in kW h (kilowatt-hours), when the heater is operated for
   3 hours.

                                                                                                                            [1]

[Turn over

10 A detector of nuclear radiation is placed close to a radioactive source. When a sheet of paper is placed between the source and the detector, the measured count rate from the source is unaltered. When a sheet of aluminium which is a few millimetres thick replaces the paper, the count rate from the source is reduced, but not to zero.

What types of radiation are being emitted by the source? Explain your answer.

....

....

....

....

.... [4]

Section B

Answer any **two** questions.

Write your answers on the lined pages provided and, if necessary,
continue on separate answer paper.

11 (a) (i) What is meant by the *period* of a pendulum?   [2]

(ii) Describe an experiment to set up a simple pendulum of length 1.0 m, and to make
an accurate measurement of its period.   [6]

(b) Fig. 11.1 shows part of a ruler that has been placed on a sheet of paper in order to
measure the distance between two parallel lines **A** and **B**.
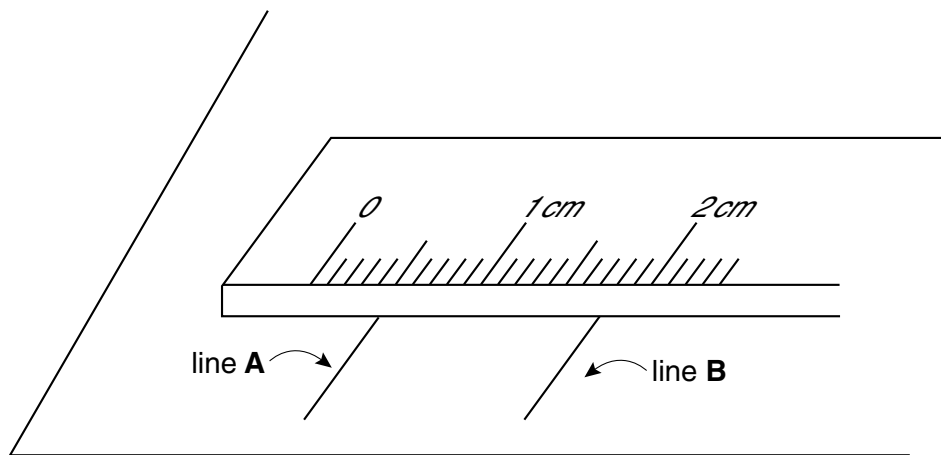
Fig. 11.1

Explain why the person using the ruler should, in turn, look **vertically** down on line **A**
and then on line **B** to obtain an accurate measurement of the separation.   [2]

[Turn over

12 (a) Describe an experiment to measure the resistance of a resistor. Include a circuit diagram in your answer, and show how the result would be calculated. [6]

(b) Sketch, on the same axes, the *V/I* characteristic graphs for

(i) a metallic (ohmic) conductor,

(ii) a non-ohmic conductor.

Suggest why a metal may show non-ohmic behaviour if the current in it is very high. [4]

13 (a) Describe an experiment to mark correctly the 0 °C and 100 °C positions on the stem of a mercury-in-glass thermometer. [5]

(b) Describe and explain the reasons for the special features of a clinical thermometer. [5]

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