Centre Number	Candidate Number

Candidate Name _____

CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Ordinary Level

SCIENCE 5124/2

PAPER 2 Physics

MAY/JUNE SESSION 2002

1 hour 15 minutes

Additional materials:
Answer paper

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and on all separate answer paper used.

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 paper provided and, if necessary, continue on separate answer paper.

At the end of the examination,

1. fasten all separate answer paper securely to the question paper;
2. enter the numbers of the **Section B** questions you have answered in the grid below.

INFORMATION FOR CANDIDATES

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 question paper consists of 7 printed pages and 5 lined pages.

University of Cambridge Local Examinations Syndicate

[Turn over

Section A

Answer **all** the questions.

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

1 Fig. 1.1 shows a speed-time graph for an object that moves along a horizontal straight track.

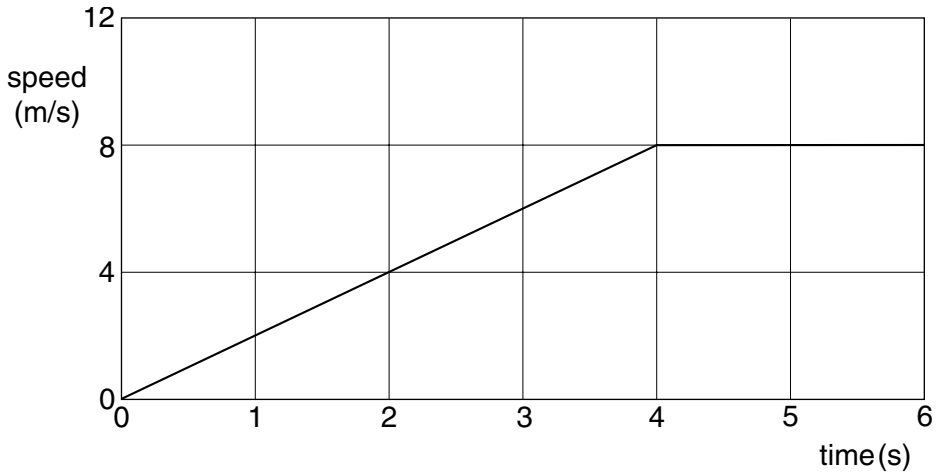


Fig. 1.1

(a) Calculate the acceleration of the object during the time from

(i) 0 to 4 seconds,

[2]

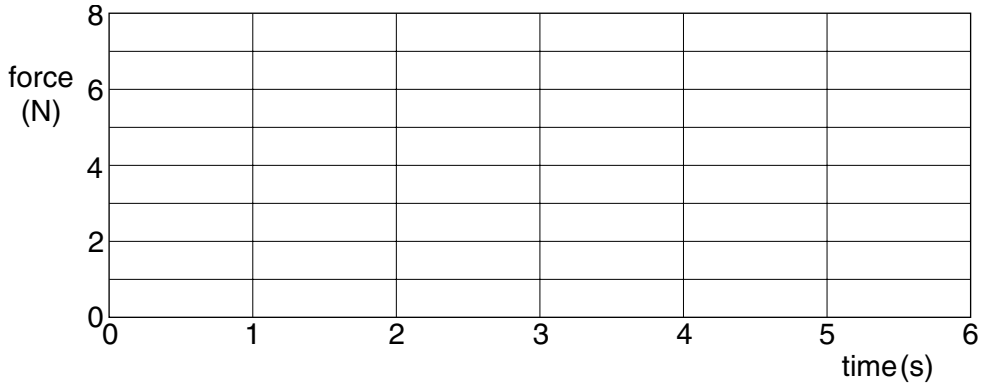
(ii) 4 to 6 seconds.

[2]

(b) Calculate the distance moved by the object during the first 4 seconds.

[2]

(c) The mass of the object is 3.0 kg. On Fig. 1.2, draw a graph of force against time for the object.



[3]

Fig. 1.2

2 An object of mass 0.3 kg is thrown vertically upwards. It moves 4 m after being thrown before reaching its highest point.

(a) Assuming that $g = 10\,\text{N/kg}$, give values for

(i) the speed of the object at its highest point,

.....[1]

(ii) the acceleration of the object at its highest point,

.....[1]

(iii) the total potential energy gained by the object after being thrown,

[3]

(iv) the minimum kinetic energy of the object as it leaves the hand.

[1]

(b) Explain why it may have been necessary to give the object more kinetic energy than stated in **(a)(iv)** for it to rise 4 m.

.....

.....[2]

3 When a clamped ruler is pulled to one side, as shown in Fig. 3.1, and then released, it vibrates and produces a sound wave.

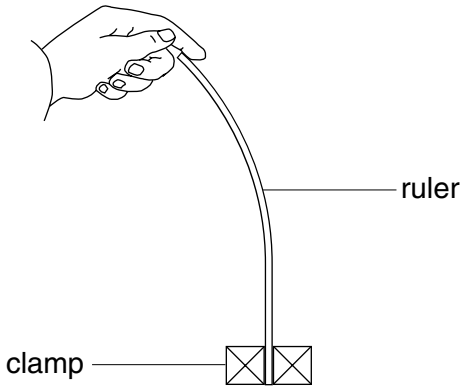


Fig. 3.1

Explain why there are compressions and rarefactions in the sound wave that is produced.

.....

.....

.....

.....

.....[4]

4 Fig. 4.1 shows a triangular object **ABC** placed in front of a plane mirror.

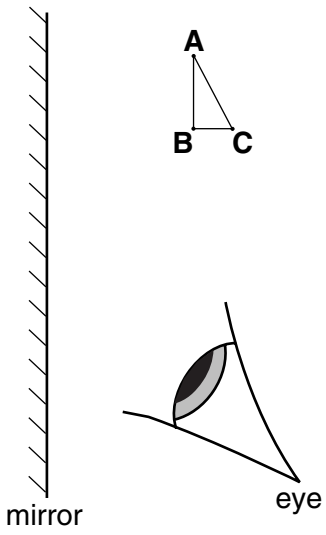


Fig. 4.1

On Fig. 4.1 draw

(a) the image of the triangle, as seen in the mirror [3]

(b) the path of **two** rays of light leaving point **B** and then reflecting at the mirror before entering the eye. [3]

5 Fig. 5.1 shows two identical resistors **R** connected in parallel to a 1.5 V cell. $\mathbf{A_1}$, $\mathbf{A_2}$ and $\mathbf{A_3}$ are ammeters. The reading of $\mathbf{A_2}$ is 0.03 A.

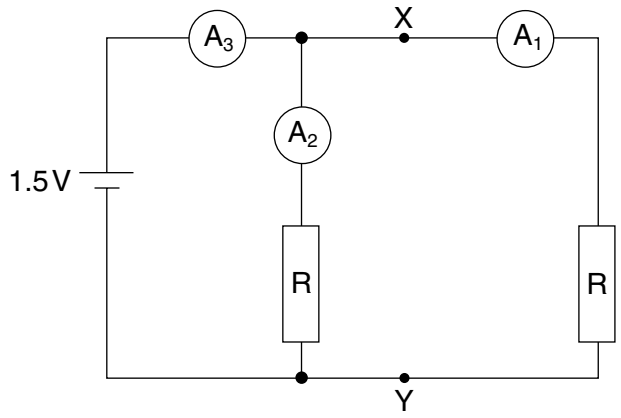


Fig. 5.1

(a) What are the readings of $\mathbf{A_1}$ and $\mathbf{A_3}$?

$\mathbf{A_1}$ .....

$\mathbf{A_3}$ ..... [2]

(b) What would the readings of the ammeters become if another identical resistor were connected between **X** and **Y**?

$\mathbf{A_1}$ .....

$\mathbf{A_2}$ .....

$\mathbf{A_3}$ ..... [3]

(c) Calculate the resistance of **R**.

[2]

6 **(a)** Explain why damp conditions can be hazardous when using a device connected to a mains electricity supply.

.....

.....

.....[2]

(b) Explain why a fuse should be placed in the live wire, not the neutral wire, in a mains circuit.

.....

.....

.....

.....[3]

7 The lead nucleus $^{214}_{82}Pb$ is unstable, decaying by the emission of a beta-particle to produce a bismuth (Bi) nucleus.

(a) State, for one neutral atom of the lead, the number of

(i) neutrons, ...

(ii) protons, ...

(iii) electrons. ..... [3]

(b) Complete the equation below to represent the decay of the lead nucleus.

$$^{214}_{82}Pb \longrightarrow \quad Bi \quad +$$

[3]

Section B

Answer any **two** questions.

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

8 **(a)** Describe an experiment to verify the principle of moments. In your account, draw a diagram to show the equipment being used and explain how the readings taken during the experiment would be used to verify the principle. [6]

(b) Explain, with the aid of a diagram, why a freely pivoted plane lamina will come to rest with its centre of mass vertically below the pivot point. [4]

9 **(a)** Describe an experiment to show that a blackened metal surface is a better emitter of infrared radiation than a polished metal surface at the same temperature. [5]

(b) When switched on, an electric light bulb quickly reaches a constant high temperature. Explain how heat is lost from the bulb and also why the temperature of the bulb becomes constant. [5]

10 **(a)** Describe a simple form of generator which uses slip rings. In your account you should include a labelled diagram and explain how the generator produces an e.m.f. [6]

(b) **(i)** Sketch a graph of voltage against time for an a.c. generator.

(ii) On the same axes, sketch a second graph to show the output of the generator when it is rotated at half the rate in **(i)**. [4]