Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

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

Paper 2 Physics

October/November 2003

1 hour 15 minutes

Additional Materials: Answer paper

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and Candidate number 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 paper 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.

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.

For Examiner's Use	
Section A	
Section B	
TOTAL	

This document consists of **9** printed pages and **3** 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 A car of total mass 800 kg has a constant acceleration. It starts from rest. After 8.0 s it has a speed of 20 m/s.

Over the 8 second interval, calculate for this car, showing your working,

(a) the acceleration,

[2]

(b) the resultant force,

[2]

(c) the distance travelled,

[2]

(d) the kinetic energy gained.

[2]

2 Fig. 2.1 shows a uniform plank of length 2.2 m resting on a pivot **P** that is 0.20 m from one end.

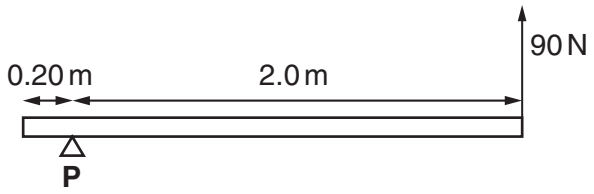

Fig. 2.1

The plank is kept horizontal by a vertical force of 90 N acting as shown in Fig. 2.1.

(a) Calculate the moment about **P** of the 90 N force.

[2]

(b) (i) On Fig. 2.1, mark the position of the centre of mass of the plank. [1]

(ii) Using the principle of moments, calculate the weight of the plank.

[2]

[Turn over

3 State why, for a liquid-in-glass thermometer,

(a) the liquid should **not** be colourless,

.....

.....[1]

(b) the liquid should be a good conductor of heat,

.....

.....[1]

(c) the bore of the tube should be narrow.

.....

.....[1]

4 Fig. 4.1 shows the position of the image **I** formed by light from an object **O** that has passed through a thin converging lens. One ray **R** of light from the top of **O** is shown.

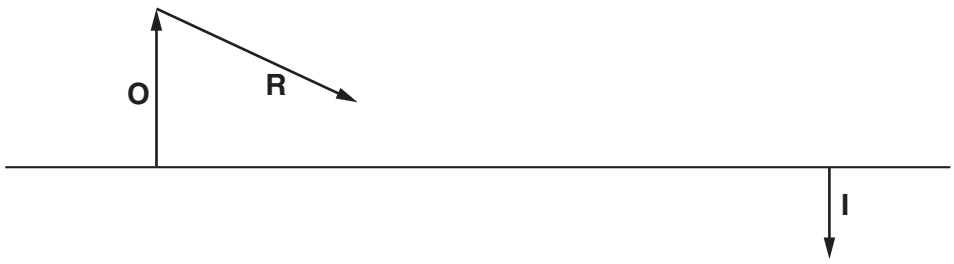

Fig. 4.1

(a) On Fig. 4.1, draw the path of a ray of light from the top of **O** that enables the position of the centre of the lens to be found. Label this position **L**. [1]

(b) On Fig. 4.1, draw the path of a ray of light that enables the focal length of the lens to be found. Mark this distance ***f***. [3]

(c) On Fig. 4.1, continue the path of the ray **R** of light to show where it would go after passing through the lens. [1]

5 Fig. 5.1 shows some regions of the electromagnetic spectrum, arranged in order of increasing wavelength.

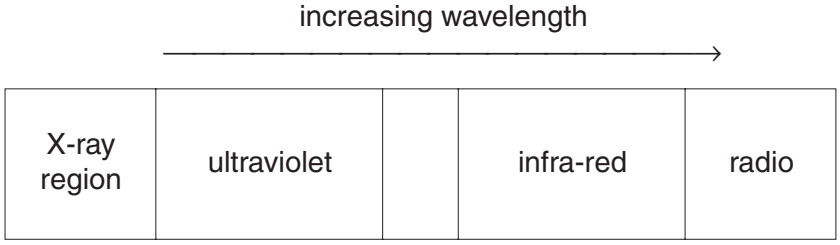

Fig. 5.1

(a) Name the type of electromagnetic wave found in the region that is not labelled.

.....[1]

(b) State the speed in a vacuum of electromagnetic waves.

..... m/s [1]

(c) Which of the regions shown in Fig. 5.1 refers to waves of the highest frequency?

.....[1]

(d) Electromagnetic waves are transverse waves. Explain the meaning of *transverse*.

.....

.....

.....[2]

[Turn over

6 Fig. 6.1 shows the *V*/*I* characteristic graphs for two resistors **X** and **Y**.

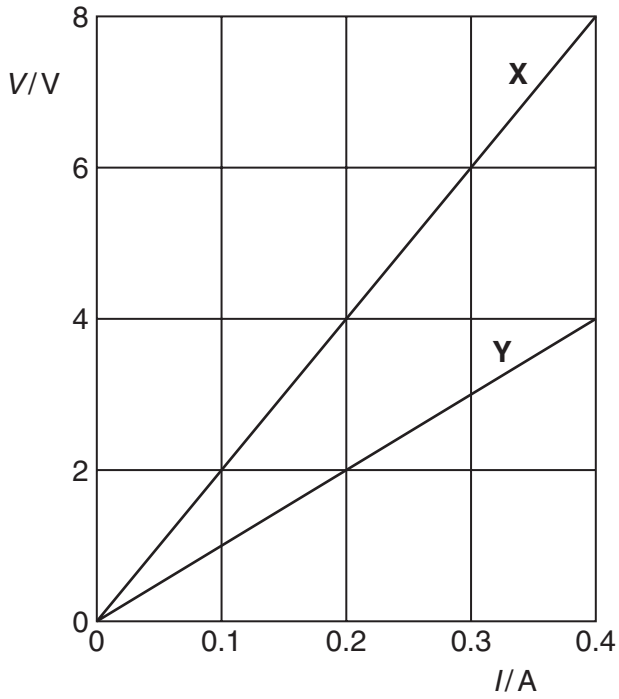

Fig. 6.1

(a) Calculate the resistance of **X**.

[2]

(b) The parallel combination of **X** and **Y** is connected to a battery, as shown in Fig. 6.2.

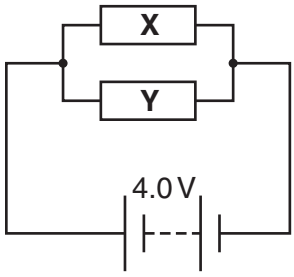

Fig. 6.2

(i) The battery has an e.m.f. of 4.0 V. Using Fig. 6.1, calculate the current in the battery.

[2]

(ii) The battery of e.m.f. 4.0 V is replaced with a different battery. The current in this battery is 0.3 A. Using Fig. 6.1 (or otherwise), determine the e.m.f. of the battery.

[3]

7 A transformer has 20 000 turns on the primary coil and 400 turns on the secondary coil. The efficiency of the transformer is 100%.

(a) Determine the output of the transformer when the input is an alternating supply of 240 V, 50 Hz.

[3]

(b) The transformer is used to operate a 9.6 W lamp from the 240 V supply.

Calculate

(i) the current in the secondary coil,

[2]

(ii) the current in the primary coil.

[2]

[Turn over

8 **(a)** State the names and numbers of the different particles found in a neutral atom of $^{13}_{6}C$.

.....

.....

.....[3]

(b) State where in the atom each type of particle is located.

.....

.....

.....[2]

Section B

Answer any **two** questions.

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

9 **(a)** Describe an experiment to measure the density of sand. Explain how the result would be calculated from the readings taken during the experiment. [6]

(b) The Earth's gravitational field strength *g* is lower at Mexico City than at Cape Town. Explain what differences, if any, there would be for a golf ball if

(i) its mass is measured at both places,

(ii) its weight is measured at both places,

(iii) the force applied by a golf club to give the ball the same initial acceleration is measured at both places.

[4]

10 **(a)** Describe the energy conversions involved in a hydro-electric power station. [7]

(b) Explain why a hydroelectric power station cannot be kept in operation indefinitely by using some of the energy output to restore water to its original place. [3]

11 **(a)** Describe the use of a plotting compass to plot field lines near a bar magnet. [6]

(b) Describe *induced magnetism* by explaining what happens when a bar magnet picks up a chain of soft-iron nails. [4]