Centre Number		Candidate Number	Name	

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

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

Paper 2 Physics

October/November 2005

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 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.

For Examiner's Use	
Section A	
Section B	
TOTAL	

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.

This document consists of **10** printed pages and **2** lined pages.

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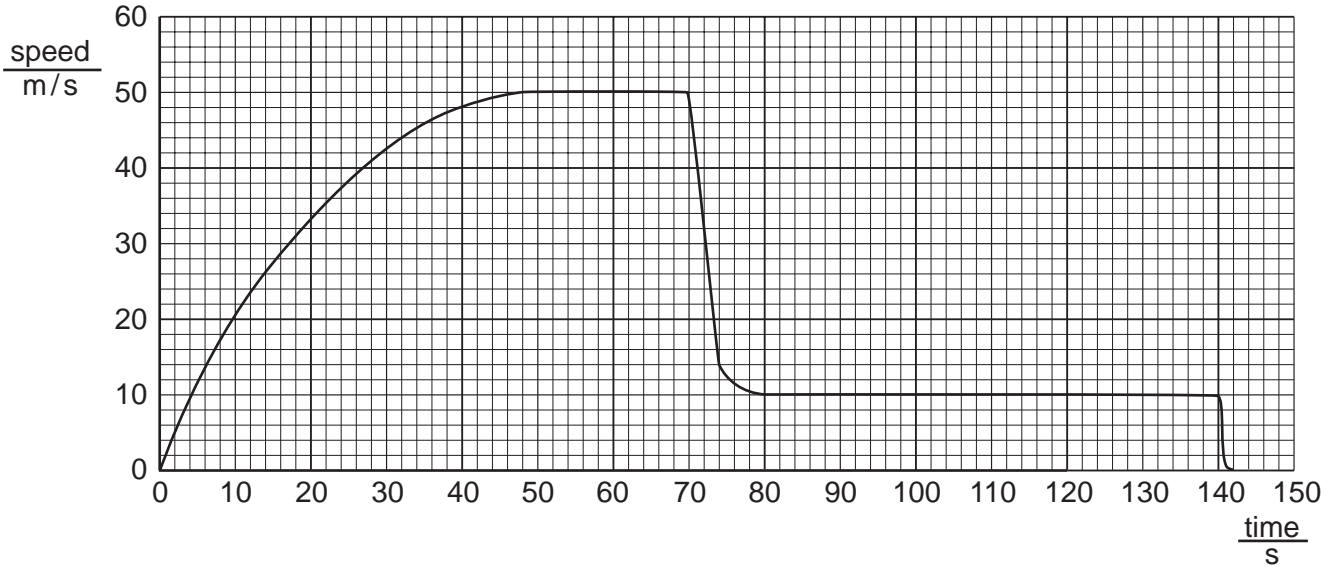
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Section A

Answer **all** the questions.

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

1 A man makes a parachute jump. Initially, he falls without opening his parachute. Then he opens his parachute and falls to the ground.

Fig. 1.1 shows how his speed changes with time after jumping.

Fig. 1.1

(a) Between which two times does the man have a constant acceleration?

....[1]

(b) State the time at which the man opens his parachute.

....[1]

(c) Explain, in terms of the forces acting on the man, why he moves at constant speed between 50 s and 70 s.

....

....

....

....[3]

2 A friend says that her ring is made of pure gold.

Outline how you would find the density of the ring in order to check whether it is made of pure gold. You may draw a diagram if you wish.

....

....

....

....

....[4]

3 Fig. 3.1 shows components in the electromagnetic spectrum in order of decreasing frequency.

decreasing frequency ⟶

gamma	X-rays		light	infra-red	microwaves	

Fig. 3.1

Two components have not been named.

(a) Complete Fig. 3.1 by adding the names of these components. [2]

(b) Define the *frequency* of a wave.

....

....[1]

(c) State the speed of these waves in a vacuum.

speed = ……………………………m/s [1]

(d) State **one** property, other than speed, that all electromagnetic waves have in common.

....

....[1]

4 Fig. 4.1 shows a tool that helps disabled people to open ring-pull cans.
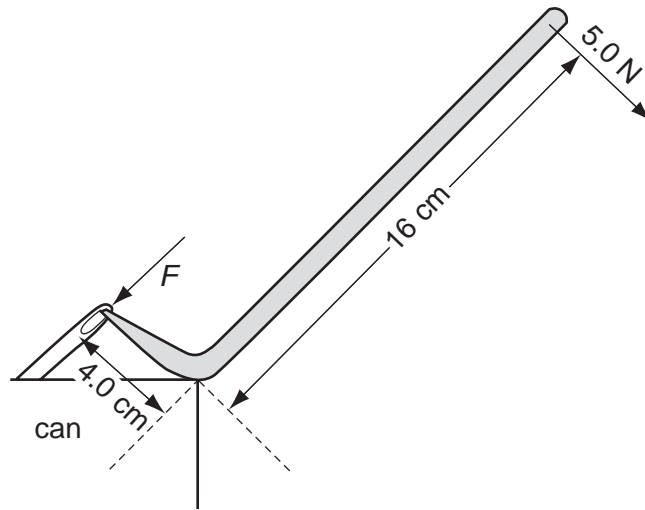
Fig. 4.1

A force of 5.0 N is applied at the end of the tool as shown.

Calculate the force *F* at the ring-pull.

F = ………………… N [3]

5   Fig. 5.1 shows how an electrically-powered pump is used to raise water from tank **A** to tank **B**.
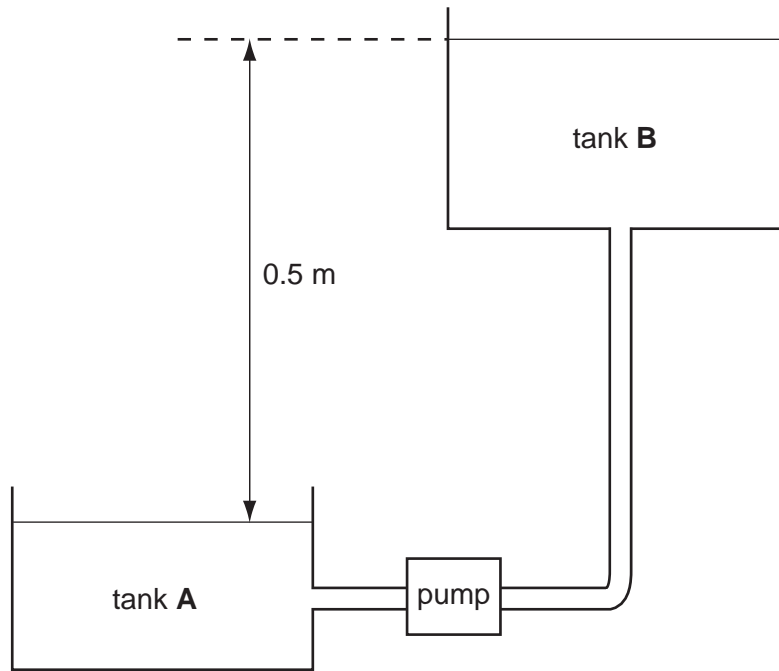
Fig. 5.1

(a) Describe **one** energy transfer produced by the pump.

....

....[1]

(b) A mass of 0.1 kg of water is raised through a height of 0.5 m every second.
The gravitational field strength is 10 N/kg.

Calculate

(i) the gravitational potential energy gained by this mass of water each second,

gravitational potential energy = ... [3]

(ii) the useful output power of the pump.

power = ... [2]

(c) Some of the energy supplied to the pump is wasted. Suggest what happens to this wasted energy.

....

....

....[2]

6 Fig. 6.1 shows an object placed in front of a thin converging lens. The positions of the focal points are marked **F**.

thin converging
lens
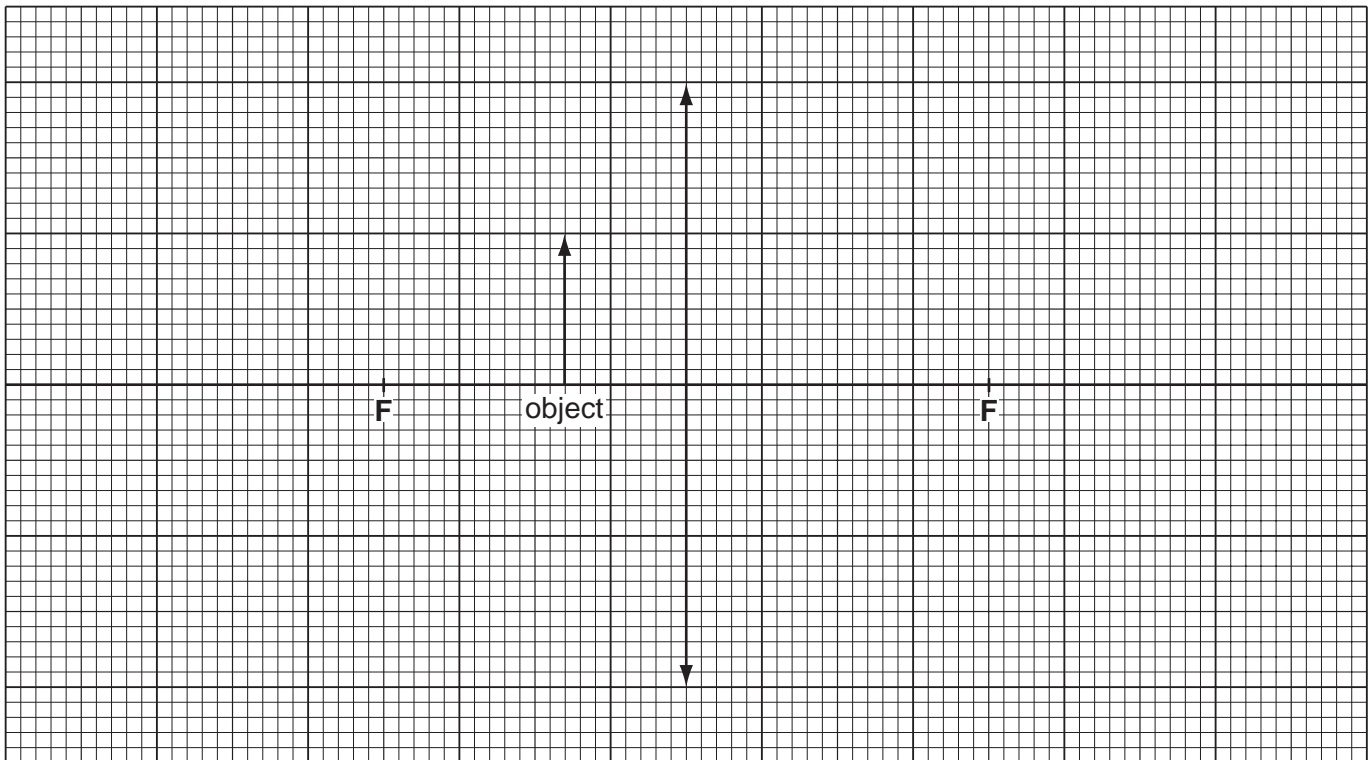
Fig. 6.1

(a) On Fig. 6.1, draw rays from the top of the object to determine the position of the top of the image. Mark the position, **I**, of the top of the image.   [3]

(b) Name an optical instrument that uses this arrangement of lens and object.

....[1]

7 A filament lamp has a power of 100 W at 240 V. A 'low energy' lamp has a power of 20 W at 240 V . The two lamps give out the same amount of light energy per second.

(a) Calculate the current in the 'low energy' lamp.

current = ………………….A [2]

(b) The cost of using electrical appliances in a particular country is 20 cents per kilowatt-hour (kW h).

Calculate the cost of using the 'low energy' lamp for 200 hours.

cost = ………………… cents [2]

(c) (i) Calculate the number of 'low energy' lamps that would transfer the same electrical power as one filament lamp.

number = ………………… [1]

(ii) In the space below, draw a circuit diagram to show how several 'low energy' lamps are connected to the supply so that the lamps have their normal brightness.   [2]

8   A suitable radiation detector is placed in front of a radioactive source.
    Different materials are placed between the source and the detector.
    The detector measures the amount of radiation reaching it per minute (the count rate).

    Fig. 8.1 shows the arrangement of the apparatus.
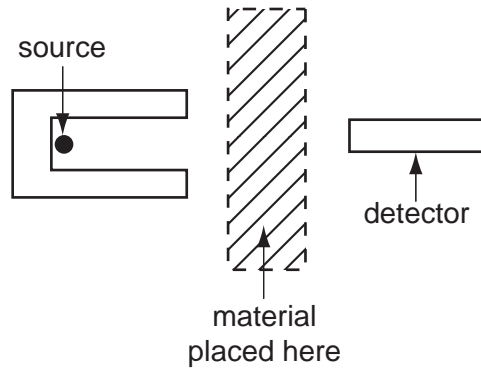
Fig. 8.1

The count rate produced by the source is measured for different materials. The results are shown in Fig. 8.2.

material between source and detector	counts per minute
2 cm air	1260
thin paper	640
2 mm aluminium	640
2 cm lead	130

Fig. 8.2

Using the information in Fig. 8.2 state whether the named radiation is emitted. In each case, explain how you come to your conclusion.

(a) alpha-particles

    ....

    ....

    ....[2]

(b) beta-particles

    ....

    ....

    ....[2]

(c) gamma rays

    ....

    ....

    ....[2]

9 Fig. 9.1 shows a simple transformer.

iron core

primary coil
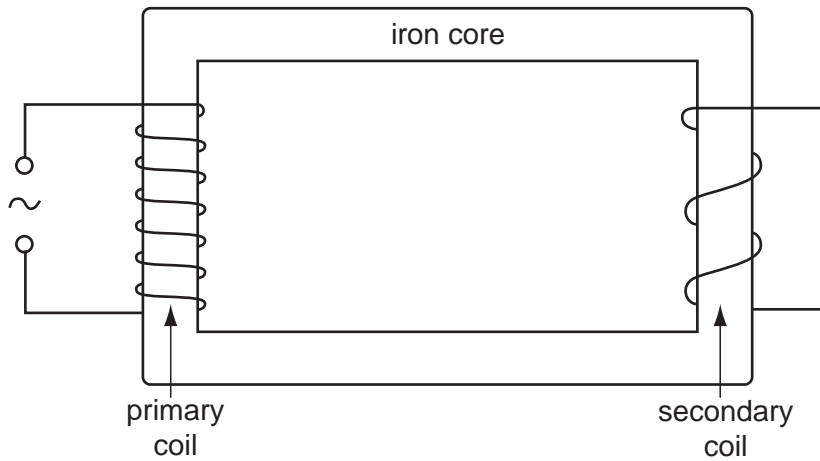
secondary coil

Fig. 9.1

Explain why an alternating current in the primary coil gives rise to an e.m.f. in the secondary coil.

....

....

....

....[3]

Section B

Answer any **two** questions.

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

10 **(a)** Describe an experiment to determine the speed of sound in air. [6]

(b) Describe how sound waves can travel through air. [4]

11 **(a)** Describe an experiment to determine values of voltage across a metallic conductor and the corresponding values of current in the conductor. Draw a labelled diagram of the circuit you would use and explain how you would take the readings. [6]

(b) Sketch the *V/I* characteristic graph for the metallic conductor and explain the shape of your graph. [4]

12 **(a)** A pupil is given two drinking cups of the same size but made from different materials. Suggest an experiment to determine which of the two materials is the better insulator.

[6]

(b) (i) An electric kettle is filled with water. The heating element is at the bottom. Explain why all of the water becomes heated when the kettle is switched on. [3]

(ii) Explain why a shiny metal kettle loses energy more quickly when it becomes dirty.

[1]

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