



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

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NUMBER

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SCIENCE

5125/02

Paper 2 Physics

October/November 2009

1 hour 15 minutes

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
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 or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

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 | / |
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| | |
| Total | |

This document consists of **9** printed pages and **3** lined pages.



Section A

Answer **all** the questions.

For
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Use

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

- 1 An astronaut drops a hammer on the Moon. The mass of the hammer is 0.5 kg.

Fig. 1.1 shows how the speed of the hammer changes with time as it falls.

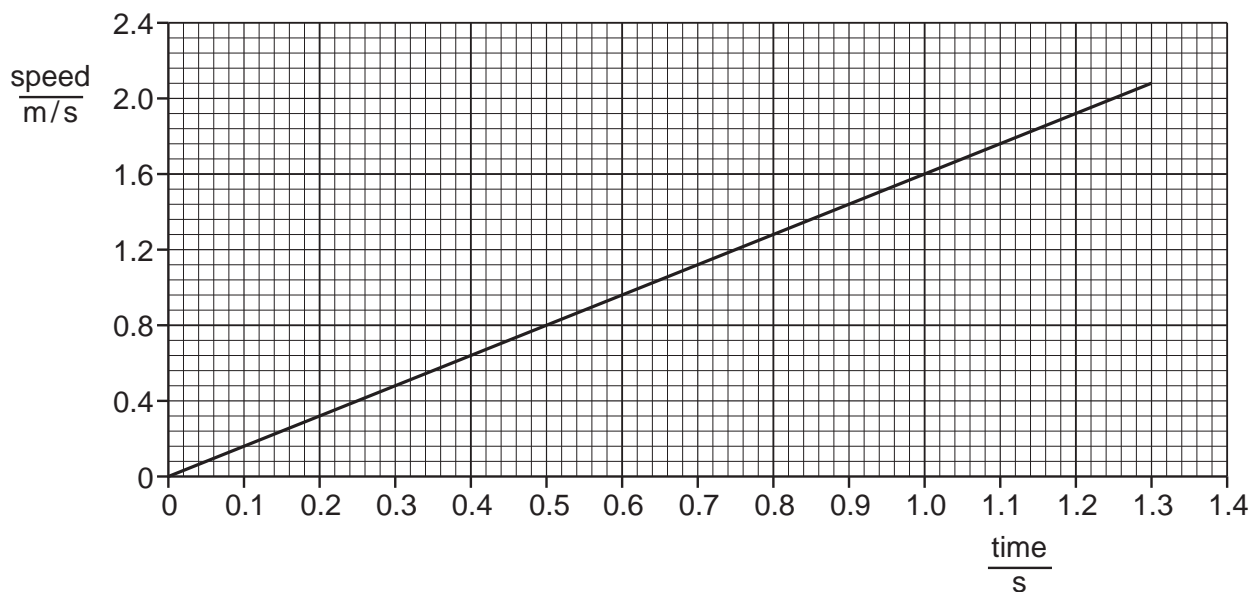


Fig. 1.1

For this falling hammer, calculate

- (a) the acceleration,

acceleration = m/s² [2]

- (b) its weight on the Moon,

weight = N [2]

- (c) the distance it falls in the first second.

distance = m [2]

- 2 The sides of a cube are 3.00 cm long. The cube is made from a metal of density 7.50 g/cm^3 .

(a) State the name of the measuring instrument that could be used to measure the length of the cube to the precision indicated.

..... [1]

(b) Calculate the mass of the cube.

mass = g [3]

- 3 Fig. 3.1 shows a bottle opener.

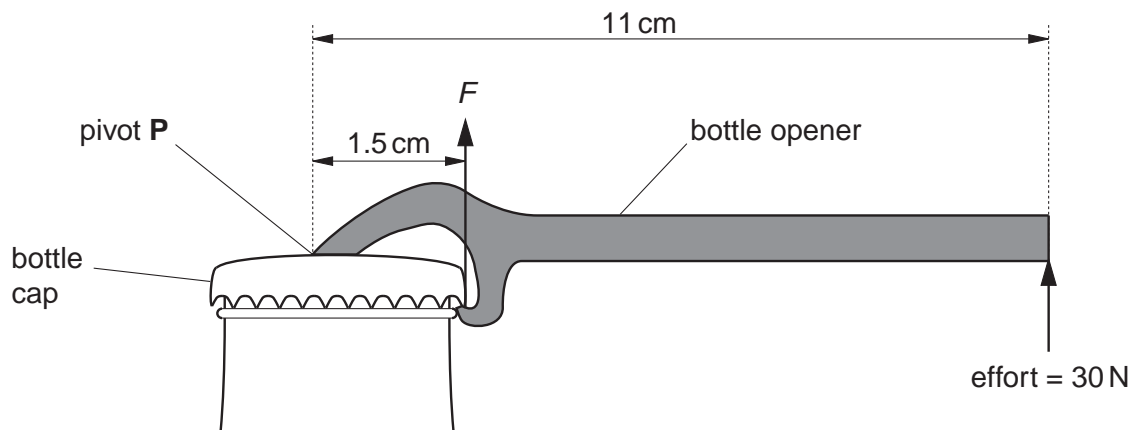


Fig. 3.1

A force of 30 N is applied at a distance of 11 cm from the pivot P. The force F on the bottle cap is 1.5 cm from the pivot P.

Calculate the force F on the edge of the cap.

force = N [3]

- 4 Fig. 4.1 shows a model of a hydroelectric power station.

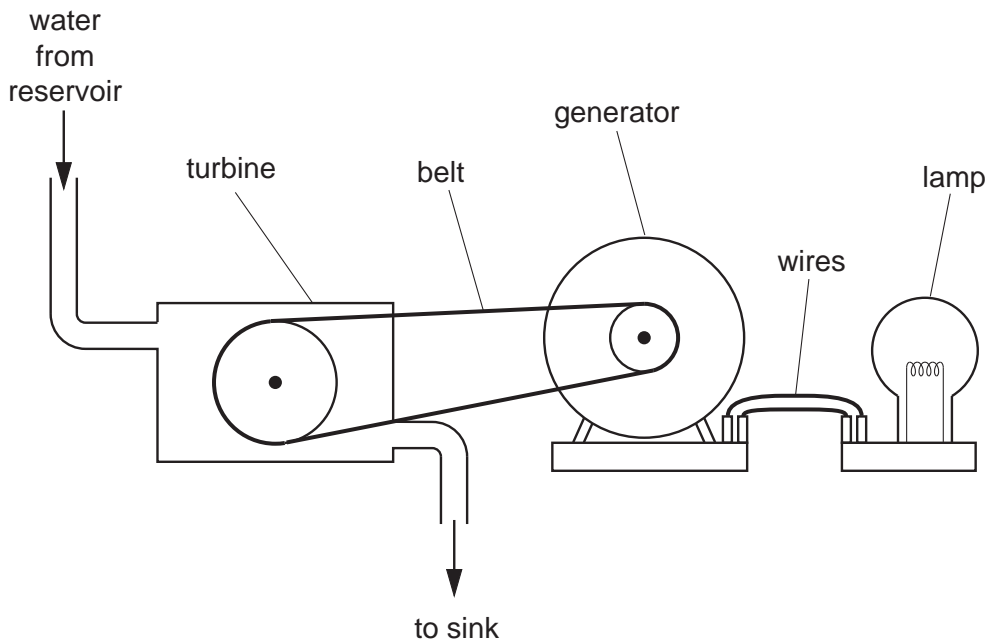


Fig. 4.1

Water from the reservoir flows through the turbine. The turbine turns a generator. The generator is used to operate a lamp.

- (a) State the **useful** energy conversions that take place in

- (i) the generator,

from energy to energy

- (ii) the lamp.

from energy to energy
[2]

- (b) The water from the reservoir falls to the turbine through a height of 0.75 m. The mass of water that flows through the turbine in 5.0 s is 2.0 kg.

The gravitational field strength is 10 N/kg.

Calculate the power delivered to the turbine.

power = W [2]

5 Fig. 5.1 shows a mercury-in-glass thermometer and a thermocouple thermometer.

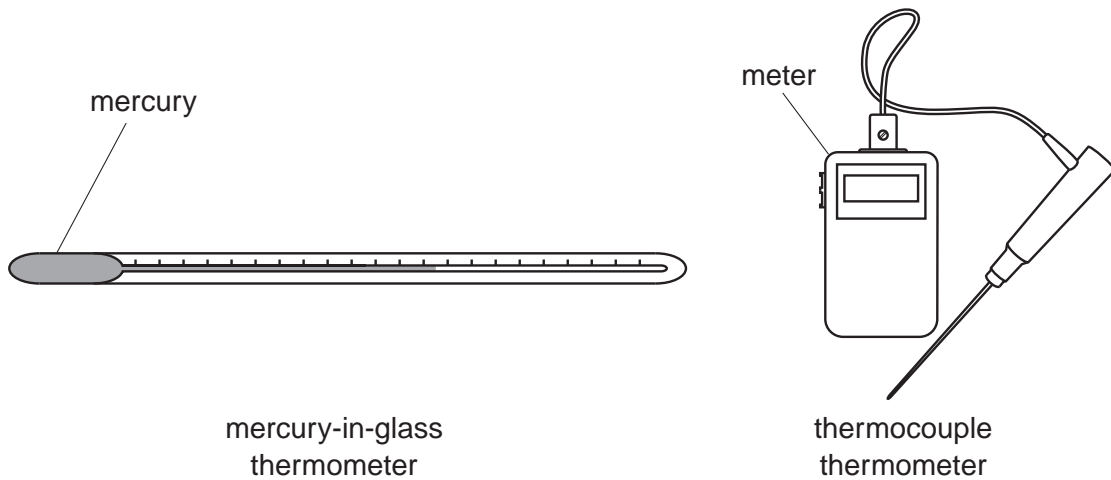


Fig. 5.1

(a) The mercury-in-glass thermometer has a **large** bulb that is made of **thin glass**.

State and explain why each of the following features is an advantage.

1. the large bulb

.....
 [2]

2. the thin glass

.....
 [2]

(b) State two situations in which the thermocouple thermometer would be better for measuring temperature than the mercury-in-glass thermometer.

1.
 2. [2]

- 6 A tuning fork produces a longitudinal wave of frequency 440 Hz. The wave travels through air with a speed of 330 m/s.

(a) Explain what is meant by a *longitudinal wave*.

.....

 [1]

(b) Calculate the wavelength of the wave.

wavelength = m [2]

- 7 Fig. 7.1 shows a ray of light incident on a glass block and the refracted ray in the block.

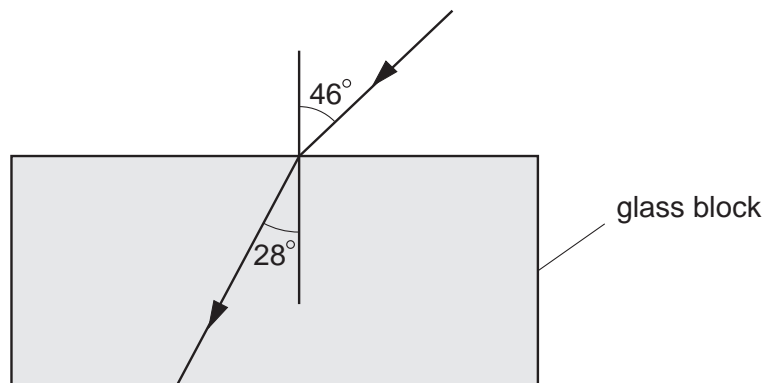


Fig. 7.1

The angle of incidence is 46° and the angle of refraction is 28° .

(a) Calculate the refractive index of the glass.

refractive index = [3]

(b) Complete Fig. 7.1 to show the ray of light after it leaves the glass block. [2]

- 8 Fig. 8.1 shows a battery connected to a lamp.

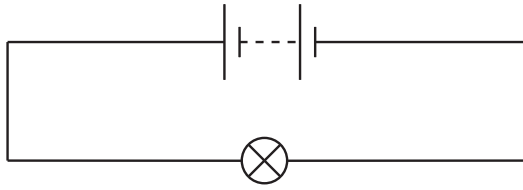


Fig. 8.1

A charge of 150 C flows through the lamp in 100 s.

The energy transferred is 900 J.

- (a) Calculate the potential difference across the lamp.

potential difference = V [2]

- (b) Calculate the current in the lamp.

current = A [2]

- (c) Calculate the power of the lamp.

power = W [2]

9 A nucleus of strontium-90 (${}^{90}_{38}\text{Sr}$) decays by giving out a beta-particle.

(a) State the nature of a beta-particle.

..... [1]

(b) State the number of neutrons in a nucleus of strontium-90.

number of neutrons = [1]

(c) State the number of electrons in a neutral atom of strontium-90.

number of electrons = [1]

(d) When a nucleus of strontium-90 gives out a beta-particle, it changes into a nucleus of another element. State the proton number of the new element.

proton number = [1]

10 Fig. 10.1 shows how the output voltage of an a.c. generator varies with time.

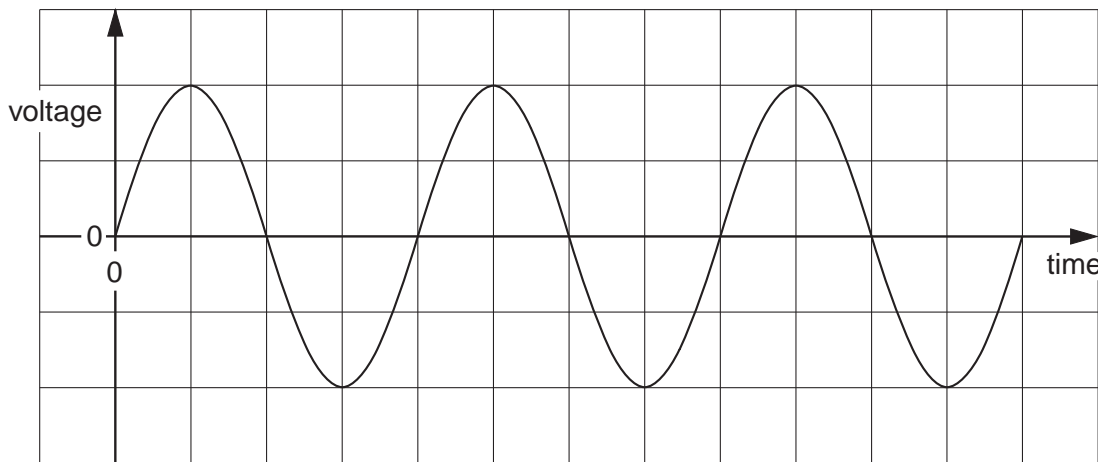


Fig. 10.1

(a) The generator coil is now rotated at a lower speed. On Fig. 10.1, show how the output voltage varies with time. [2]

(b) The output from the a.c. generator is connected to the primary coil of an iron-cored transformer. Explain how this causes an e.m.f. to be induced in the secondary coil of the transformer.

.....

 [2]

Section B

Answer any **two** questions.

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

- 11 (a) Describe an experiment to investigate how the current in a metal wire varies with the potential difference across the wire. [5]
- (b) Sketch a graph of the results that you would expect. [2]
- (c) The experiment is repeated with a wire made of the same metal but with twice the cross-sectional area. Describe and explain how the graph would be different for the second wire. [3]
- 12 (a) Describe an experiment to plot the magnetic field around a bar magnet. [5]
- (b) Describe how a coil of wire may be used
- (i) to make a bar magnet,
- (ii) to demagnetise a bar magnet. [3]
- (c) State how the magnetic properties of iron make it a suitable material for the core of an electromagnet. [2]
- 13 (a) Describe an experiment to show which of two metals is the better conductor of heat. [5]
- (b) Explain how heat is conducted through a metal rod. [2]
- (c) Fig. 13.1 shows a solar panel that uses the Sun's energy to heat water.

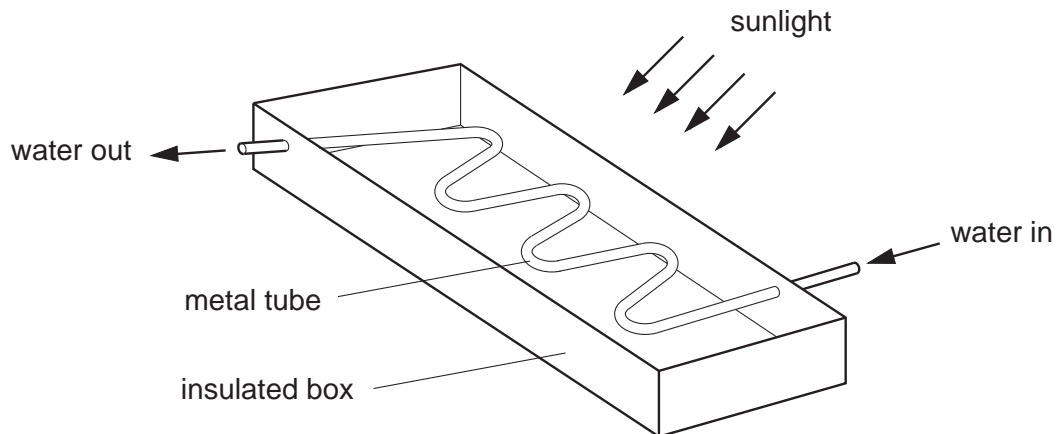


Fig. 13.1

The solar panel consists of a long tube of metal through which water flows. The tube is mounted in an insulated box with a glass top. Both the metal tube and the inside of the box are painted black. Explain

- (i) why the metal tube is mounted inside an insulated box,
- (ii) why the metal tube is painted black. [3]

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