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5124/02

October/November 2010

1 hour 15 minutes

Candidates answer on the Question Paper

Additional Materials: Answer 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	
Total	

This document consists of **16** printed 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 Complete the following sentences.

(a) 7.0g is equal to mg. [1]

(b) 7.0g is equal to kg. [1]

2 (a) An object of mass 5kg falls towards Earth. At one particular time, its acceleration is 8 m/s^2 .

(i) Calculate the resultant force on the object.

force = N [2]

(ii) The force calculated in (i) is the resultant of two forces acting on the object.

State the names of the two forces.

..... and [1]

(b) As the object falls, its acceleration decreases. Suggest why the acceleration decreases.

.....

..... [1]

- 3 The stages in an experiment to determine the density of a solid are shown in Fig. 3.1.

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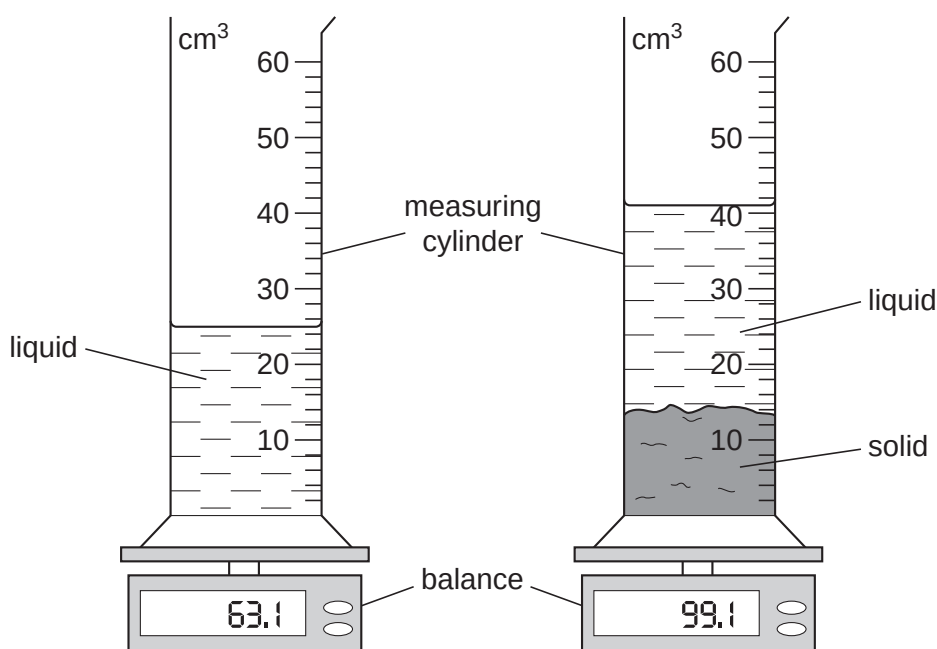


Fig. 3.1

- (a) Use data from Fig. 3.1 to complete the results of the experiment in the spaces below.

(i) mass of solid = g

(ii) volume of solid = cm³

[1]

- (b) Use your answers in (a) to calculate the density of the solid.

density = g/cm³ [2]

- (c) The liquid used was not water. Suggest **one** reason why water may not have been suitable.

.....
..... [1]

- 4 Fig. 4.1 shows how the speed of an athlete changes with time during a race that lasts 14.0 s.

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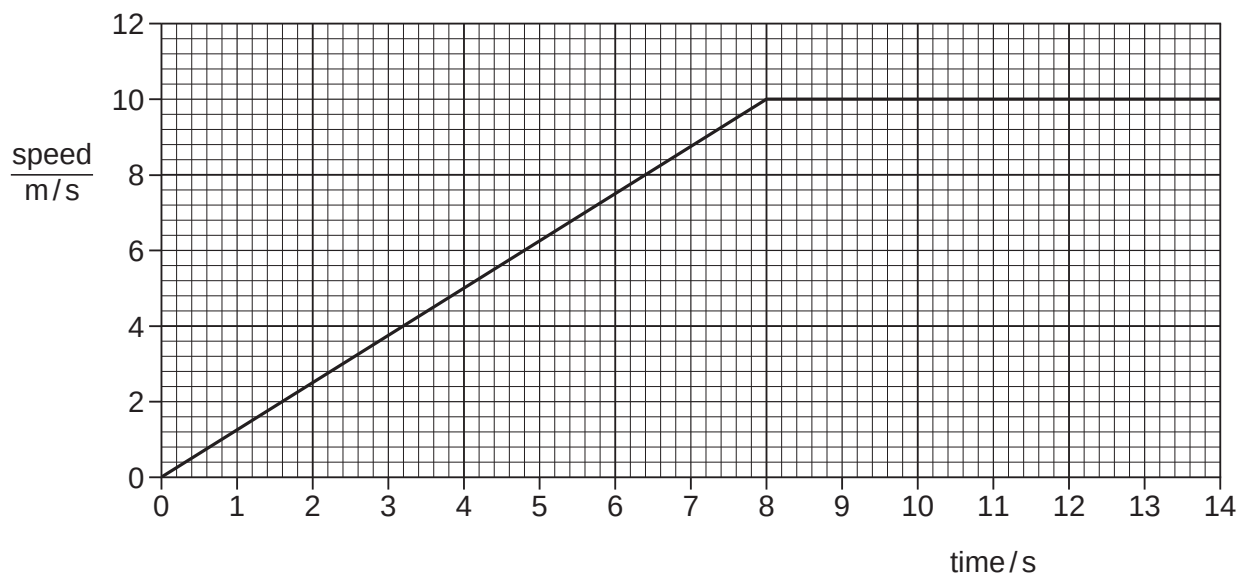


Fig. 4.1

Calculate

- (a) the acceleration during the first 8.0 s of the race,

acceleration = m/s² [2]

- (b) the **total** distance of the race,

distance = m [3]

- (c) the athlete's average speed.

average speed = m/s [2]

- 5 A ray of light passes from air into a transparent plastic block as shown in Fig. 5.1.

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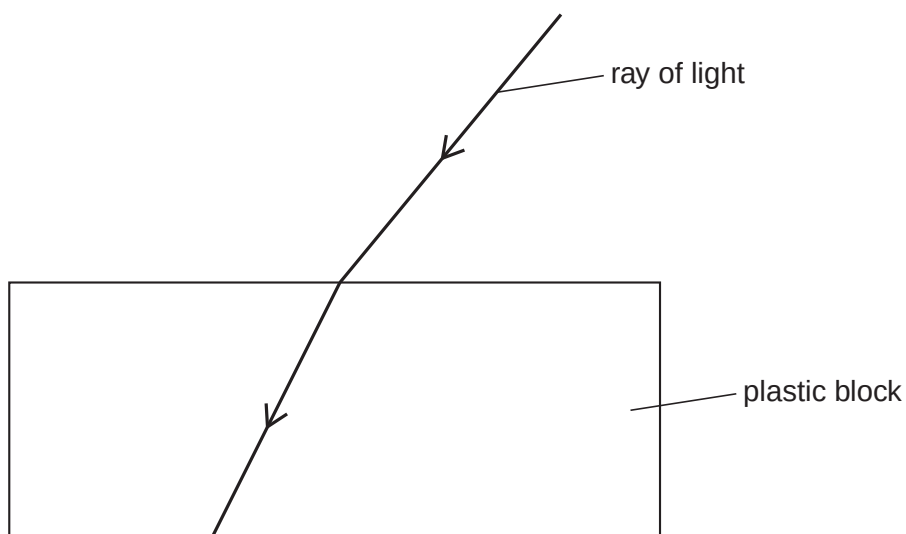


Fig. 5.1

- (a) (i) On Fig. 5.1, label the angle of incidence with the letter i and angle of refraction with the letter r . [1]
- (ii) State how you would use these angles to determine the refractive index of the plastic. [1]
-
- (iii) Complete Fig. 5.1 to show the ray of light after it has left the plastic block. [1]
- (b) A second ray of light is incident on the block with an angle of incidence of 64° . The angle of refraction is 40° . Calculate the refractive index of the plastic.

refractive index = [2]

- 6 Fig. 6.1 illustrates a car that was used to travel across Australia powered only by solar energy.

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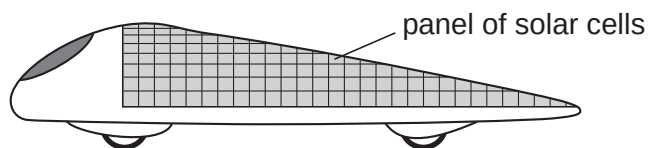


Fig. 6.1

- (a) (i) Describe the origin of the Sun's energy.

..... [1]

- (ii) State how the energy reaches the Earth from the Sun.

..... [1]

- (b) The solar cells on the car are connected to electric motors that are used to drive the wheels. State the useful energy conversions in

- (i) the solar cells,

..... energy to energy [1]

- (ii) the electric motor.

..... energy to energy [1]

- 7 A resistor of resistance 18Ω is connected in parallel with a resistor of resistance 9.0Ω . The parallel combination of resistors is connected to a 12V battery.

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- (a) On Fig. 7.1, complete the circuit diagram for this arrangement.

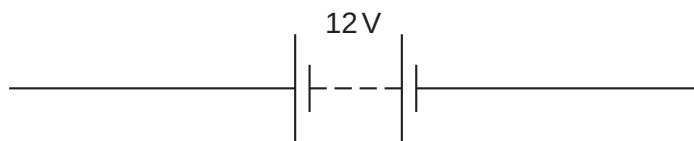


Fig. 7.1

[1]

- (b) Calculate the effective resistance of the two resistors.

effective resistance = Ω [2]

- (c) For the resistor of resistance 9.0Ω , calculate

- (i) the current in the resistor,

current = A [2]

- (ii) the power dissipation.

power = W [2]

- 8 (a) A 3 kW heater is used for 90 minutes during one day. Calculate the cost of using the heater for one day given that one kilowatt-hour of electrical energy costs 40 cents.

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cost = cents [2]

- (b) The heater operates from a 240V supply. State and explain why a 10A fuse would not be suitable for this heater.

.....

 [2]

- 9 A clinical thermometer is shown in Fig. 9.1.

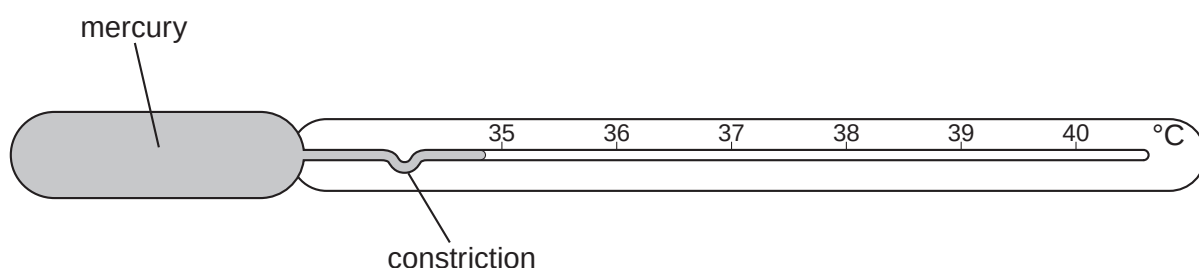


Fig. 9.1

State and explain a feature of the clinical thermometer that improves the thermometer's sensitivity.

.....
 [2]

10 A nucleus of carbon-14 ($^{14}_6\text{C}$) decays to form a nucleus of nitrogen-14 ($^{14}_7\text{N}$).

(a) State how many neutrons there are in a nucleus of carbon-14. [1]

(b) State and explain the type of radiation that is given out by the nucleus of carbon-14.

.....
..... [2]

11 A convector heater that is used to heat a room is shown in Fig. 11.1.

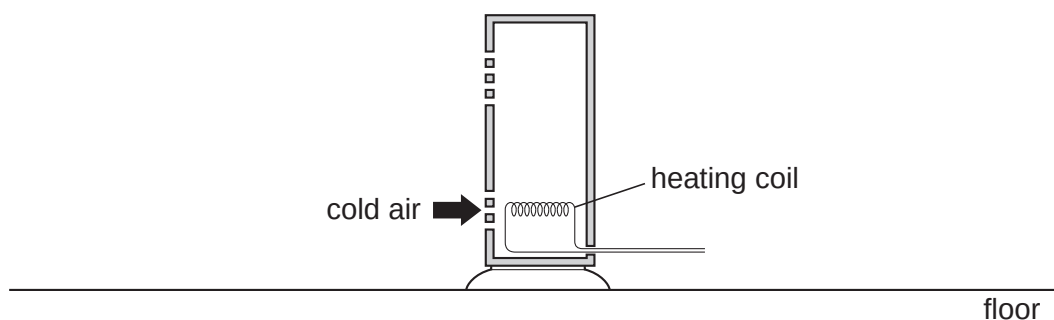


Fig. 11.1

Cold air enters at the bottom of the heater and is heated by the heating coil.

Explain how all the air in the room is heated.

.....
.....
.....
..... [3]

Section B

Answer any **two** questions.

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

- 12 (a)** Describe an experiment to verify the principle of moments. [5]
- (b)** A uniform rod is pivoted at its centre. A vertical force of 25 N acts at a distance of 30 cm from the pivot as shown in Fig. 12.1.

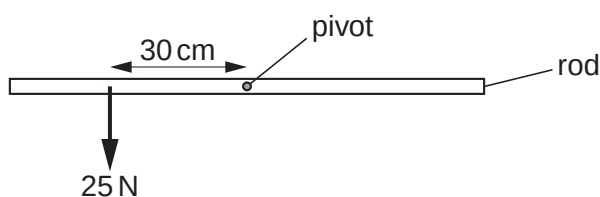


Fig. 12.1

A vertical force of 20 N is applied to the rod to keep the rod horizontal. Calculate the distance of the 20 N force from the pivot. [3]

- (c)** A candlestick has a wide heavy base. State and explain why the base is both wide and heavy. [2]
- 13 (a)** Describe an experiment to measure the speed of sound in air. [5]
- (b)** Explain how sound waves travel through air. [2]
- (c)** A device, consisting of a transmitter and a receiver, is used on some cameras to determine the distance between the camera and an object, as shown in Fig. 13.1.

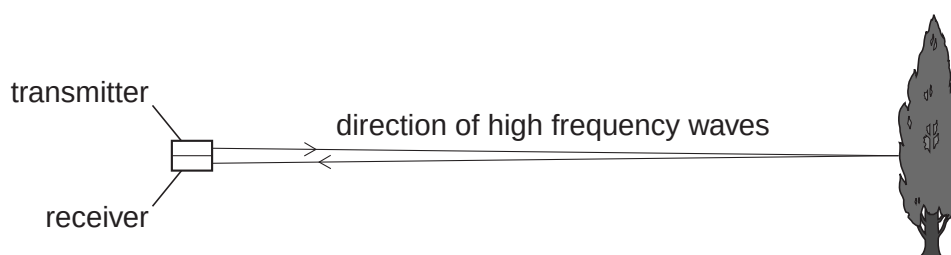


Fig. 13.1

The transmitter gives out very high frequency waves that have a speed of 330 m/s.

When the waves meet an object, they are reflected back to the receiver.

The time between the waves being given out and received back is 0.20 s.

Calculate the distance from the device to the object. [3]

- 14 (a)** A changing magnetic field may induce an e.m.f. in a circuit. Describe an experiment to demonstrate how the magnitude of the induced e.m.f. depends on the rate of change of the magnetic field. [5]

- (b)** A transformer has 2000 turns in its primary coil and 50 turns in the secondary coil.

The alternating voltage across the primary coil is 240V.

Calculate the voltage across the secondary coil. [3]

- (c)** Explain why the core of a transformer is made of iron rather than steel. [2]

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