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0625/22

May/June 2011

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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 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.

Answer **all** questions.

You may lose marks if you do not show your working or if you do not use appropriate units.

Take the weight of 1 kg to be 10 N (i.e. acceleration of free fall = 10 m/s^2).

The number of marks is given in brackets [] at the end of each question or part question.

This document consists of **15** printed pages and **1** blank page.

- 1 The volume of a stone is to be found using the equipment illustrated in Fig. 1.1.

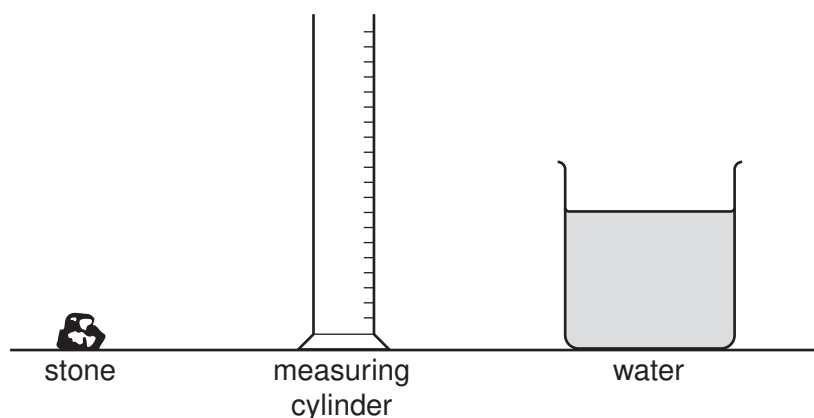


Fig. 1.1

The following five steps are intended to describe how the volume of the stone is found.

Complete the sentences by adding appropriate words.

- (a) Pour some into the measuring cylinder. [1]
- (b) Take the reading of the from the scale on the measuring cylinder. [1]
- (c) Carefully put into the measuring cylinder. [1]
- (d) Take the new reading of the from the scale on the measuring cylinder. [1]
- (e) Calculate the volume of the stone by

 [2]

[Total: 6]

- 2 Energy may be transferred from one place to another by means of conduction, convection or radiation.

Which process is involved when energy is transferred through

- (a) a solid, [1]
(b) a liquid, and [2]
(c) a vacuum? [1]

[Total: 4]

- 3 Solar panels are fitted to the roof of a house.

Describe briefly what they do.

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

[Total: 3]

4 Fig. 4.1 shows how the speed of an object varies during a period of 30 s.

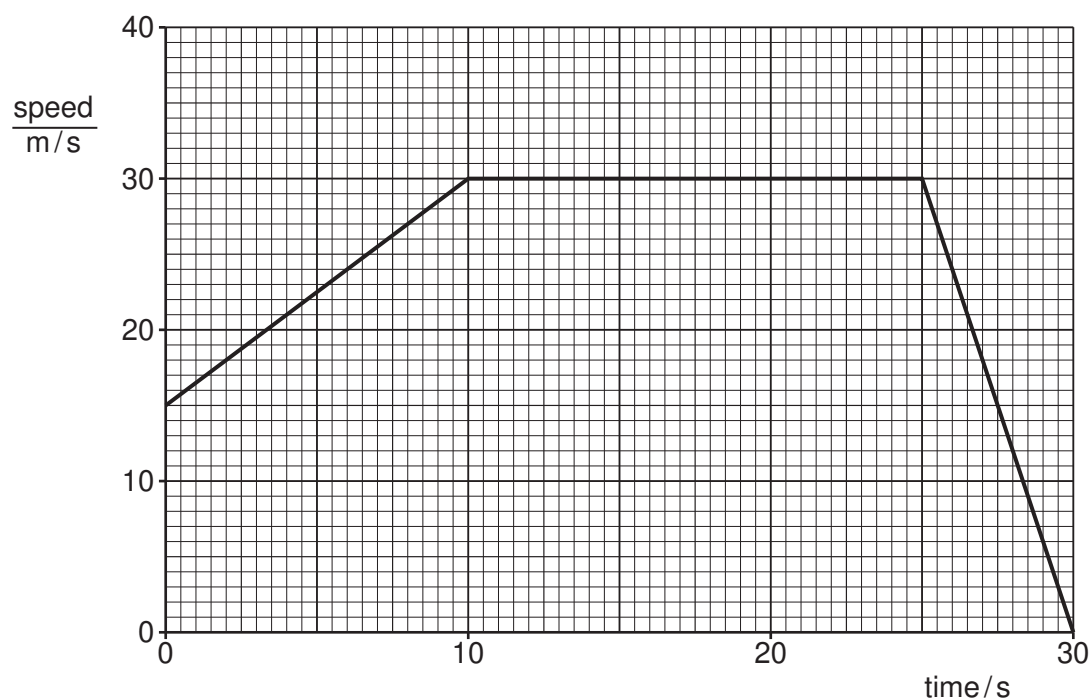


Fig. 4.1

(a) State the speed of the object

(i) at the start of the 30 s,

speed = m/s

(ii) at the end of the 30 s.

speed = m/s
[2]

(b) Describe what is happening to the speed during the period

(i) 0 s – 10 s,

(ii) 10 s – 25 s,

(iii) 25 s – 30 s.

[3]

- (c) Determine the distance travelled in the last 5 s.

distance = m [3]

- (d) The total distance travelled in the 30 s is 750 m.

Calculate the average speed of the object during the 30 s.

average speed = m/s [3]

[Total: 11]

- 5 (a) Fig. 5.1 shows a girl looking at her reflection in a mirror on the wall. The reflecting surface of the mirror is the surface in contact with the wall.

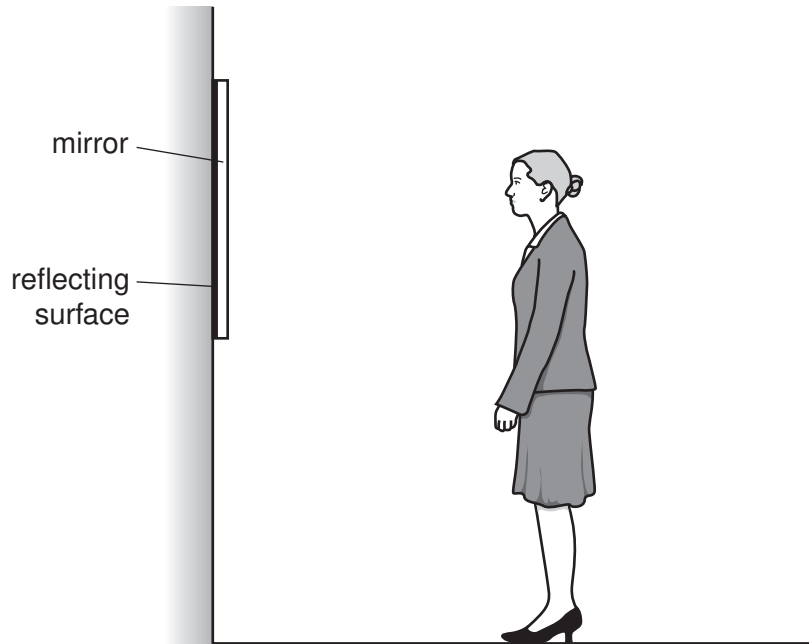


Fig. 5.1

On Fig. 5.1,

- (i) put a small X where the image of the girl's eye is positioned, [2]
- (ii) carefully draw lines to find the lowest part of her body that she can see reflected in the mirror. Mark clearly the portion of her body that she cannot see. [3]

- (b) A helicopter is hovering over a harbour. The pilot can see the waves arriving from out at sea. The waves hit the harbour wall at an angle, as shown in Fig. 5.2.

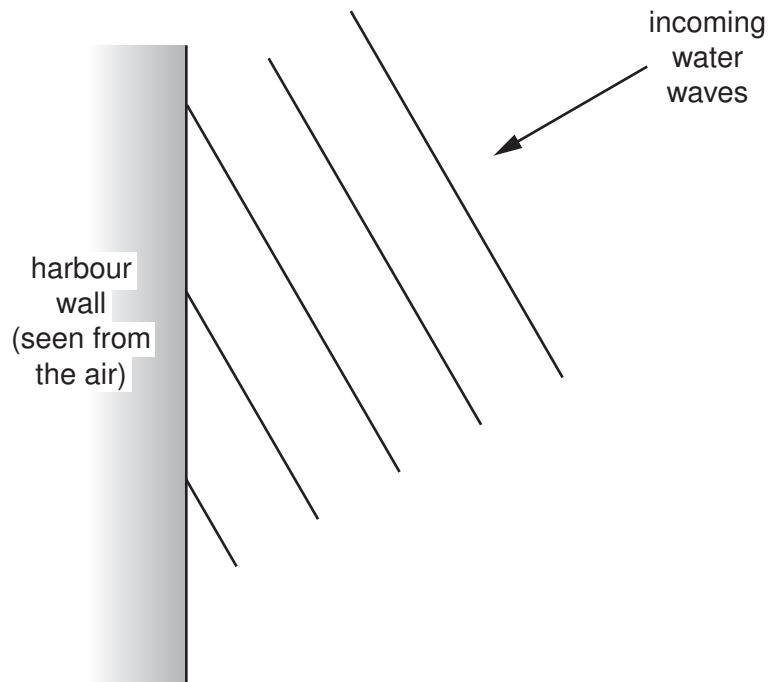


Fig. 5.2

The waves are reflected when they hit the harbour wall.

Carefully complete Fig. 5.2 to show the reflected parts of the first two waves to hit the wall.

[3]

[Total: 8]

- 6 (a) The temperature of a block of iron is increased.

State what happens to

- (i) the energy of the atoms due to their vibrations,

.....
 [1]

- (ii) the average separation of the atoms,

.....
 [1]

- (iii) the density of the iron.

.....
 [1]

- (b) When concrete roads are made, the concrete is laid in sections, with gaps between the sections. The gaps are then filled with a soft material, called pitch. This is shown in Fig. 6.1.

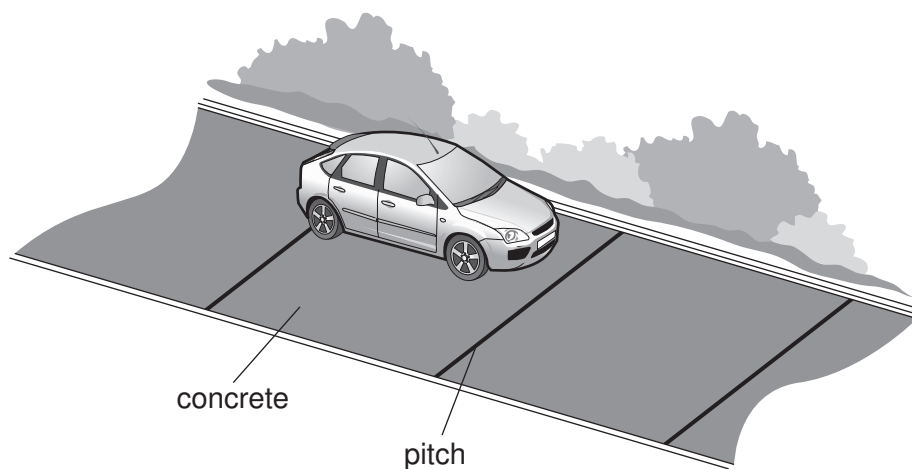


Fig. 6.1

Suggest why the concrete is laid in sections like this.

.....

 [2]

[Total: 5]

7 (a) State what an electric current consists of.

..... [2]

(b) (i) What name do we give to materials in which it is easy to create an electric current?

.....

(ii) State one example of such a material.

..... [2]

(c) (i) What name do we give to materials in which it is difficult to create an electric current?

.....

(ii) State one example of such a material.

..... [2]

[Total: 6]

- 8 The components in Fig. 8.1 are connected in a circuit.

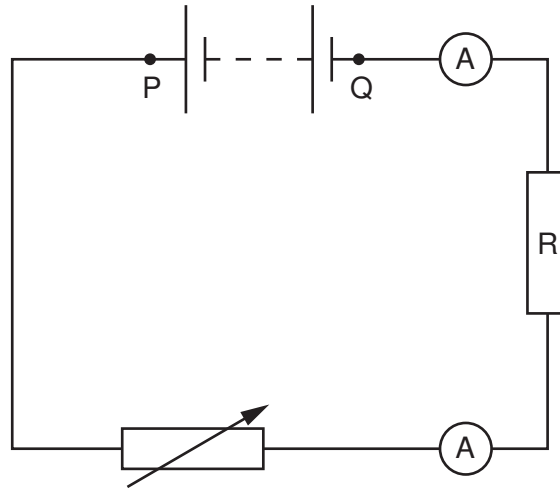


Fig. 8.1

- (a) Complete the following sentence.

The components in the circuit of Fig. 8.1 are connected in with each other. [1]

- (b) On Fig. 8.1, draw

- (i) an arrow to show the direction of the conventional current in the circuit,
 (ii) a voltmeter connected to measure the potential difference across R. [2]

- (c) (i) State the name of the component represented by this symbol:



- (ii) What is the purpose of this component in the circuit?

.....

 [2]

(d) The top ammeter reads 1.5 A. The voltmeter reads 6.0 V.

(i) State the reading of the bottom ammeter. A [1]

(ii) Calculate the resistance of R.

resistance = [4]

(e) A piece of low resistance wire is carelessly allowed to connect P and Q.

State which component could be damaged when this happens.

..... [1]

[Total: 11]

9 (a) State two advantages that electromagnets have, compared with permanent magnets.

1.

2. [2]

(b) Tick one box in each of the columns below, to indicate what should be used to give the strongest electromagnet.

column 1 number of turns on coil	
1000 turns	☐
500 turns	☐
250 turns	☐

column 2 type of core	
air	☐
plastic	☐
iron	☐

column 3 current	
3.0 A	☐
2.0 A	☐
1.0 A	☐

[2]

[Total: 4]

10 A sportsman is feared to have broken a leg, and is taken to hospital to have his leg X-rayed.

(a) Complete the following sentence about X-rays.

X-rays are a form of radiation that have

very wavelengths. [2]

(b) In the hospital, what is used to detect the X-rays and produce an image of the bones of the leg?

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

(c) Describe the properties of X-rays that enable an image to be produced, which distinguishes between bones and flesh.

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

(d) State one precaution taken by the technicians who operate the X-ray machines.

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

[Total: 6]

- 11 Fig. 11.1 shows a tube for producing cathode rays, connected to two voltage supplies and switches.

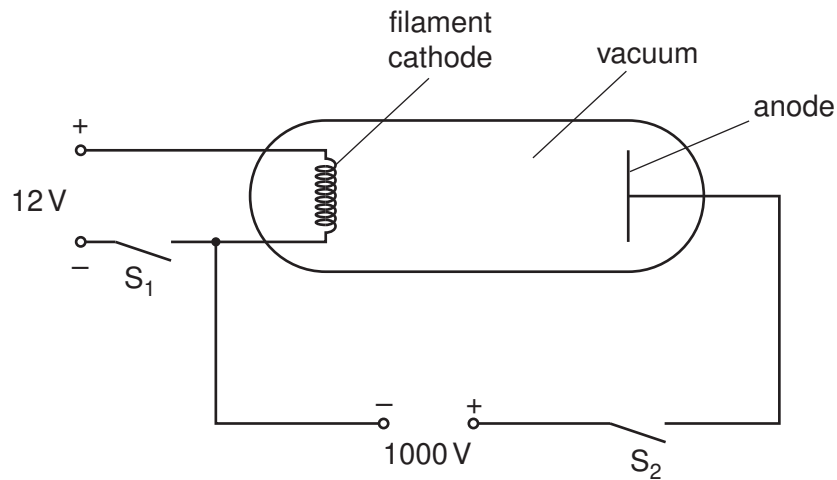


Fig. 11.1

- (a) Which switch has to be closed in order to make the filament release electrons?

..... [1]

- (b) (i) Explain why closing the switch in (a) makes the filament release electrons.

.....

 [4]

- (ii) What name do we give to this means of electron release?

..... [1]

- (c) State and explain what will happen to the released electrons when both switches are closed.

.....

 [3]

[Total: 9]

- 12 A radioactive source, which emits beta-particles, is used as shown in Fig. 12.1 to detect whether cartons on a conveyor belt have the required volume of pineapple juice in them.

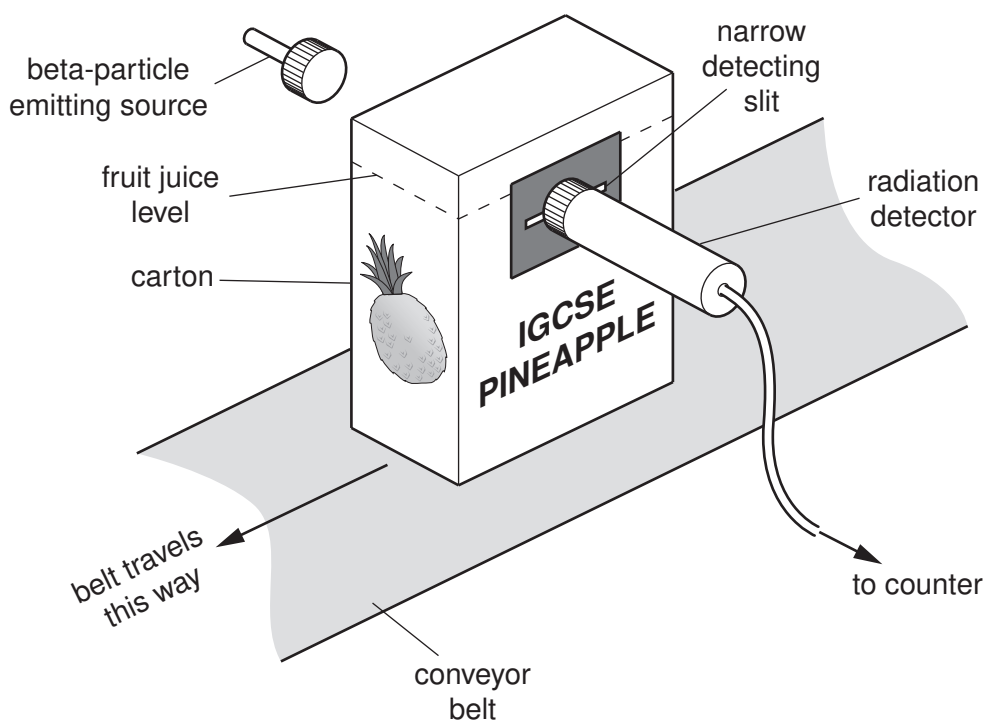


Fig. 12.1

- (a) State why an alpha-emitting source would not be suitable for this application.

.....
 [1]

- (b) State why a gamma-emitting source would not be suitable for this application.

.....
 [1]

- (c) The factory has a choice of two beta-emitting sources.

source	half-life
barium-139	85 minutes
strontium-90	28 years

State, giving your reasons, which of these sources is the most suitable for this application.

.....

 [2]

- (d) The equipment is set to give a reading of 200 counts/s when there is a carton with the correct amount of pineapple juice between the source and the detector.

Tick the appropriate boxes to indicate what reading would be expected in each situation.

	reading		
	more than 200 counts/s	200 counts/s	less than 200 counts/s
carton containing too little juice			
carton containing too much juice			
no carton at all			

[3]

[Total: 7]

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