

Physical Quantities & Measurement Techniques

Question Paper

Course	CIE IGCSE Physics
Section	1. Motion, Forces & Energy
Topic	Physical Quantities & Measurement Techniques
Difficulty	Medium

Time Allowed 60

Score /42

Percentage /100

Question 1a

A student has a pile of A4 paper for his computer printer.

Fig. 1.1 shows the dimensions of the pile of paper.

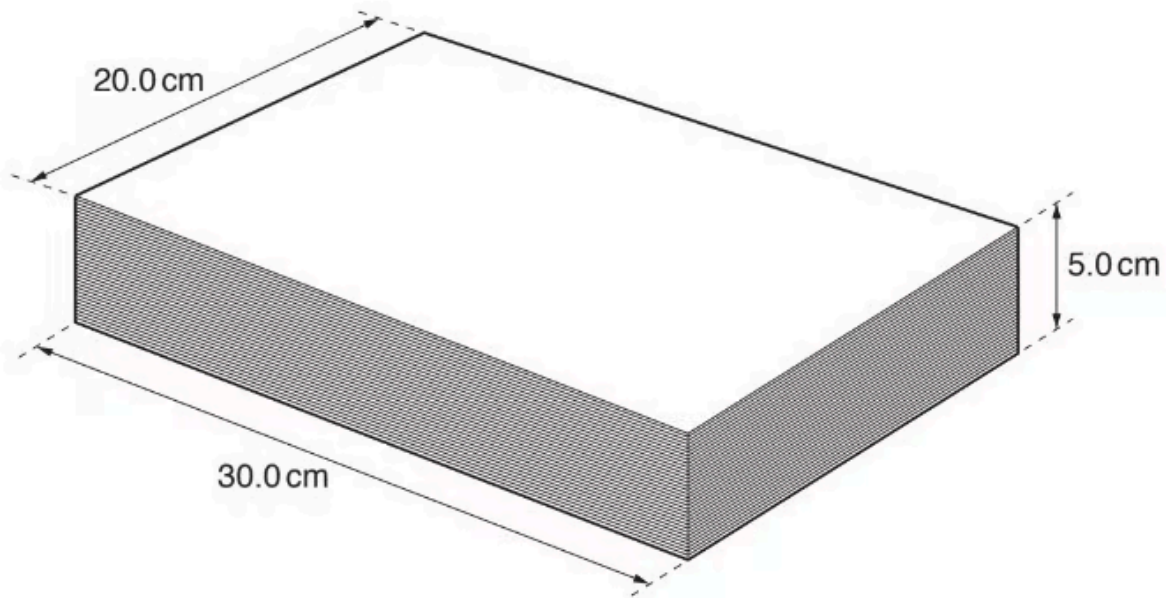


Fig. 1.1 (not to scale)

The pile contains 500 sheets of paper.

Calculate the average thickness of one sheet of paper.

average thickness = cm
[1 mark]

Question 1b

Show that the pile of paper has a volume of 3000 cm^3 . Use the information shown in Fig. 1.1.

[1 mark]

Question 1c

The student measures the total mass of the paper in the pile.

State the name of a device used to measure mass.

[1 mark]

Question 1d

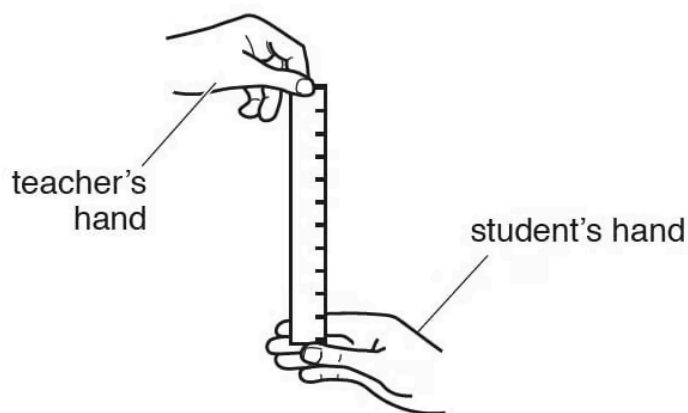
The mass of the paper in the pile is 2400 g.

Calculate the density of the paper.

density = g/cm³
[3 marks]

Question 2a

A teacher investigates the reaction time of five students. A 0.50 m ruler is held above the hand of a student before being allowed to fall. The arrangement is shown in Fig. 3.1.

**Fig. 3.1**

As soon as the ruler falls the student closes their hand, catching the ruler. The further the ruler falls, the greater the reaction time of the student. The results obtained are shown in Fig. 3.2.

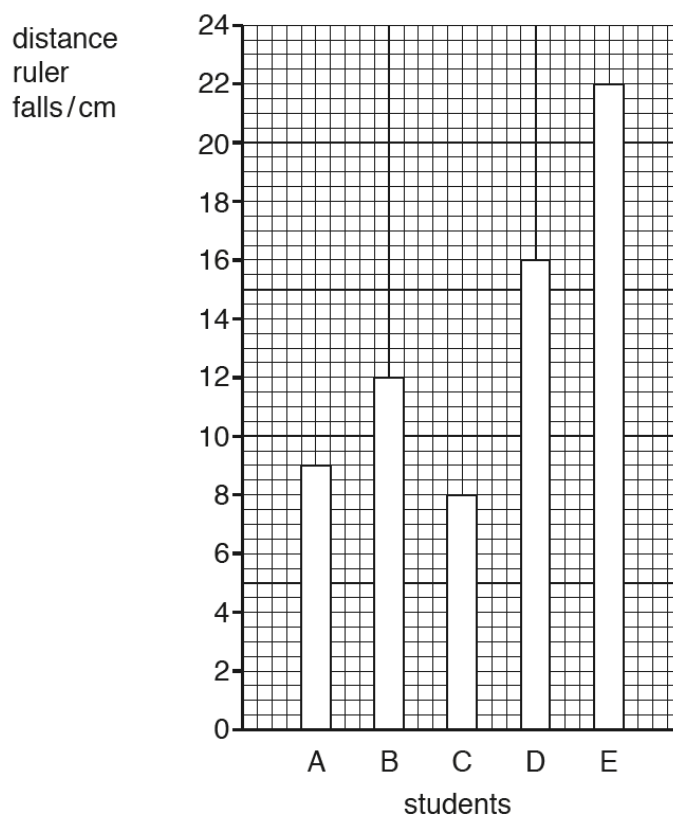


Fig. 3.2

Using the results shown in Fig. 3.2, calculate the average distance that the ruler drops.

average distance = cm
[2 marks]

Question 2b

List the students in order of their reaction times, with the shortest reaction time at the top of the table. One has been done for you.

order	student
1st	
2nd	
3rd	B
4th	
5th	

[2 marks]**Question 2c**

In a similar investigation, a ruler drops a distance of 11.0 cm and has an average speed of 16 cm / s.

Calculate the reaction time.

reaction time = s

[3 marks]

Question 3a

Fig. 1.1 shows a large tank containing water. The tank leaks. Drops of water fall from the tank.

The drops hit the ground at a regular rate.

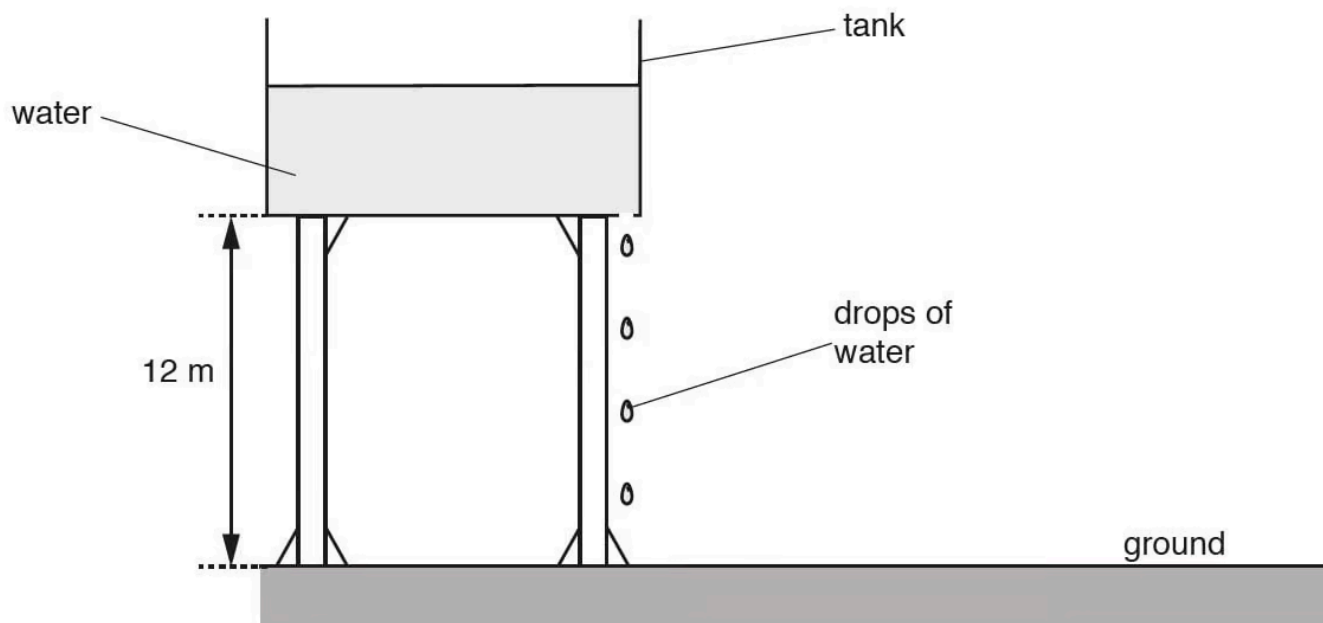


Fig. 1.1

A student measures the time interval between two drops of water hitting the ground. They use a stopwatch and repeat the procedure three times. Fig. 1.2 shows each stopwatch reading.



time = s time = s time = s

Fig. 1.2

- (i) On the line below each stopwatch, state the time readings shown, in seconds.

[1]

- (ii) Calculate the average time interval between two drops of water hitting the ground.

average time = s [2]

[3 marks]

Question 3b

Another student measures the average time taken for a drop of water to fall from the tank to the ground. The time taken is 1.6 s.

Calculate the average speed of this drop of water.

average speed = m/s
[3 marks]

Question 4a

A student has a piece of metal that has an irregular shape. The weight of the metal is 3.0 N.

Calculate the mass of the metal.

mass = kg
[2 marks]

Question 4b

Fig. 2.1 shows the piece of metal, a measuring cylinder and a beaker containing water.

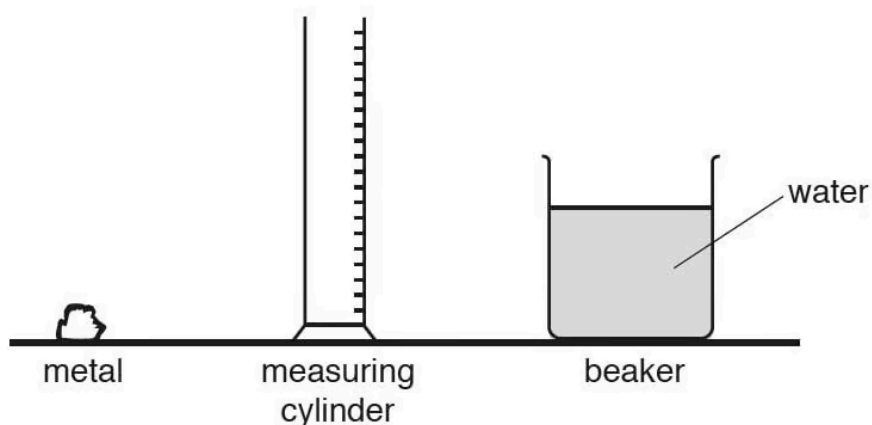


Fig. 2.1

- (i) Describe how to determine the volume of the metal, using the equipment in Fig. 2.1. [4]
- (ii) Explain why the procedure in **(b)(i)** is not suitable for finding the volume of a piece of low-density wood that is of similar shape and size to the piece of metal in **(a)**. [1]
- (iii) The mass of another piece of metal is 405 g and its volume is 150 cm³.
Calculate the density of the metal. State the unit.

density = [3]

[8 marks]

Question 5a**Extended tier only**

Two students are discussing mass and weight.

Student 1 claims that a person's weight will be different on Mars than it is on Earth.

Describe the difference between mass and weight, and explain whether you agree with Student 1.

[5 marks]**Question 5b****Extended tier only**

Identify the vector quantities.

Tick all the boxes that apply.

☐ displacement☐ distance☐ speed☐ velocity**[1 mark]**

Question 5c**Extended tier only**

Two forces act at right angles to one another: a 35 N force acts to the right and a 42 N force acts downward.

Construct a scale diagram showing the effect of these two forces, and label the resultant force as X.

Use the scale 10 N = 1 cm

[3 marks]**Question 5d****Extended tier only**

Calculate the magnitude and direction of the resultant force of the forces acting from part (c)

magnitude of resultant force =

direction of resultant force = to the horizontal

[4 marks]