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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Mass, Weight & Density

Paper 2 — Theory / Structured Questions (topical compilation)

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M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.

Question # 1: May June 2011/P22/Q1

A student wishes to find the density of a stone. He uses a measuring cylinder and a spring balance with a scale marked in newtons. The measuring cylinder, spring balance and stone are shown in Fig. 1.1.

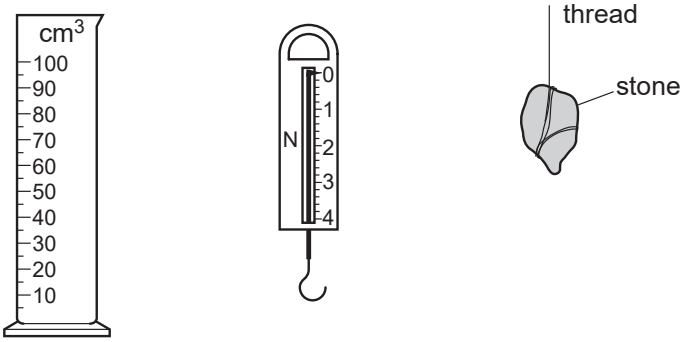

Fig. 1.1

The student knows that the gravitational field strength is 10 N / kg.

(a) Describe how the student uses the spring balance to find the mass of the stone.

.....

.....

.....[2]

(b) Describe how the student uses the measuring cylinder to find the volume of the stone.

.....

.....

.....[2]

(c) The mass of the stone is 150 g and its volume is 70 cm^3.
Calculate the density of the stone.

density of stone = ...[1]

(d) The stone is taken to another place, where the gravitational field strength is less than 10 N / kg. State how this affects the mass and the weight of the stone.

mass .....

weight .....
[1]

Question # 2: May June 2016/P21/Q3

Fig. 3.1 shows a thin sheet of plastic. A student tries to measure the thickness of the sheet with a ruler, but the sheet is too thin to measure accurately.

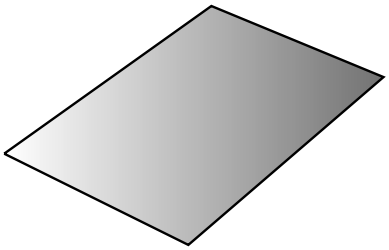

Fig. 3.1 (not to scale)

The student measures the mass of the sheet and obtains the value 0.12 g.

(a) (i) State what is meant by *mass*.

.....

.....[1]

(ii) The student is told that the density of the plastic is $0.91\,g/cm^3$.

Calculate the volume of the plastic sheet.

volume = ...[2]

(iii) The student measures the length and width of the sheet. The readings obtained are:

length of sheet = 3.0 cm
width of sheet = 2.0 cm

Calculate the thickness of the sheet.

thickness = ... [2]

(b) State a measuring instrument that can be used to measure the thickness of the sheet accurately.

.....[1]

Question # 3: May June 2018/P22/Q3

(c) The metal has a mass of 5.0 kg and a density of 7.5×10^3 kg / m^3.

(i) Define *density*.

.....

.....[1]

(ii) Calculate the volume of the metal.

Give your answer to a suitable number of significant figures.

volume = ... [2]

Question # 4: May June 2019/P22/Q1

A student records the mass and volume of two irregular objects, one made of iron and the other of copper. The student uses the equipment shown in Fig. 1.1.

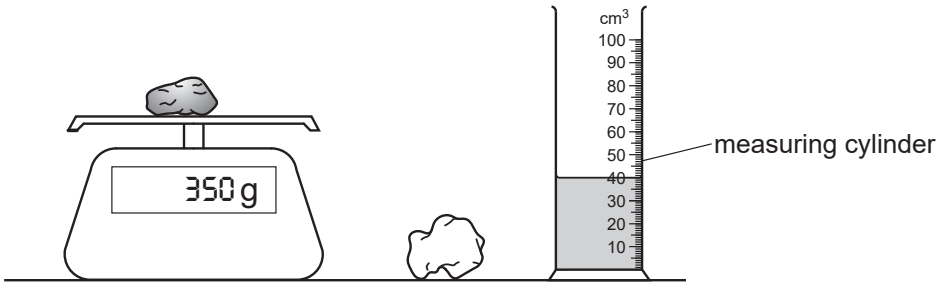

Fig. 1.1

Table 1.1 shows the results obtained.

Table 1.1

	mass / g	volume / cm^3
iron	400	51
copper	350	39

(a) Describe how to determine the volume of an irregular object with the measuring cylinder.

.....

.....

.....

.....

..... [2]

(b) Calculate the density of iron.

density = ... [2]

(c) A third object, which is also made of copper, has the same volume as the iron object.

Calculate the mass of this copper object.

mass = ... [2]

(d) State and explain what happens to the density of the iron object when it is heated.

.....

.....

..... [1]

[Total: 7]

Question # 5: Oct Nov 2007/P2/Q2

A student measures the mass and the volume of four samples of rock A, B, C and D. The results are shown in Fig. 2.1.

	A	B	C	D
mass / g	101	202	448	4508
volume / cm^3	22	44	80	978

Fig. 2.1

(a) **(i)** Describe in detail how a measuring cylinder is used to find the volume of rock A.

.....

.....

.....

.....

..... [2]

(ii) Explain why the volume of rock D cannot be found with an ordinary laboratory measuring cylinder.

.....

..... [1]

(b) Calculate the density of rock A.

density = ... [2]

(c) Three of the rocks are made from the same material.

State and explain which of the rocks is made from a different material.

.....

.....

.....

..... [2]

Question # 6: Oct Nov 2011/P21/Q1

Fig. 1.1 shows an ice cube at 0 °C.

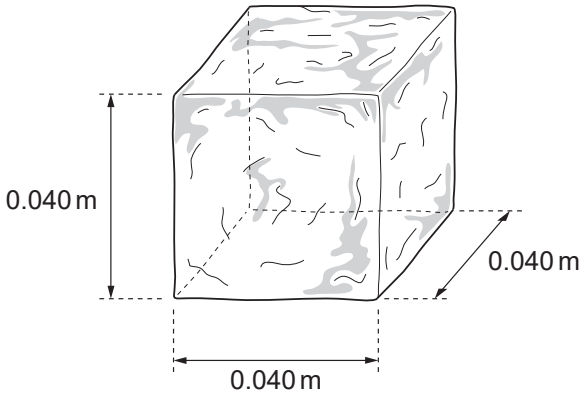

Fig. 1.1

The sides of the cube are of length 0.040 m. Ice at 0 °C has a density of 920 kg / m^3.

(a) Calculate

(i) the mass of the ice cube,

mass = ...[3]

(ii) the weight of the ice cube.

weight = ...[1]

Question # 7: Oct Nov 2012/P21/Q4

A petrol tanker has mass 2800 kg when empty and holds 30 m^3 of petrol when full. The density of petrol is 740 kg / m^3.

(a) Calculate the total mass of the tanker when full of petrol.

mass = ... [2]

(b) The full tanker is travelling along a road when the driver observes an obstruction and applies the brakes. A resultant force of 30 000 N acts on the tanker.

Calculate the deceleration of the tanker.

deceleration = ... [2]

Question # 8: Oct Nov 2013/P22/Q2

Fig. 2.1 shows a boy moving a water container in a wheelbarrow.

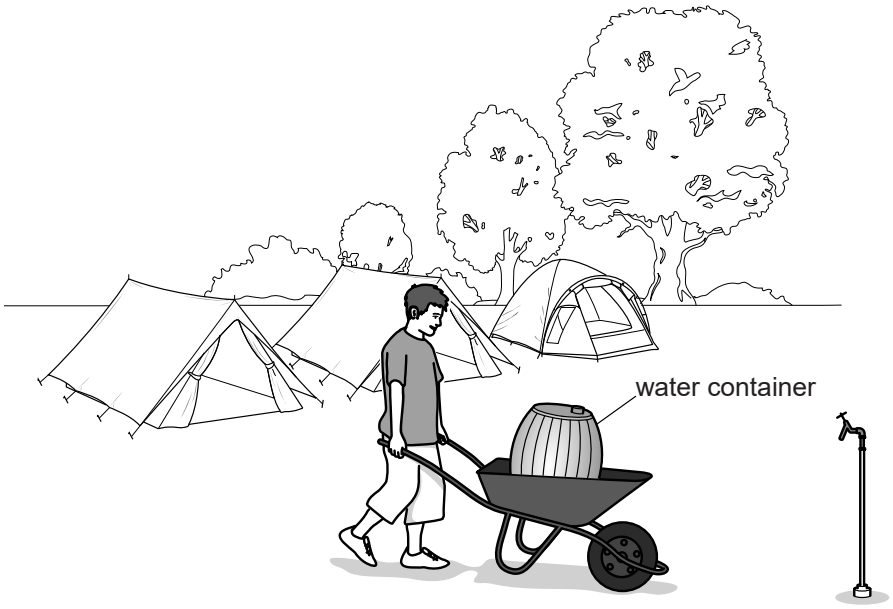

Fig. 2.1

The container has a volume of $0.15\,m^3$ and is filled with water of density $1000\,kg/m^3$.

(a) Calculate the mass of water in the container when it is full.

mass = ...[2]

(b) It is harder to stop the wheelbarrow when the container is full than when it is empty.

Explain this.

.....

.....

.....[2]

Question # 9: Oct Nov 2014/P21/Q2

A student places a metre rule on the edge of a triangular prism. The prism is used as a pivot and the rule balances about the 50 cm mark.

The student then places a block of wood at the 10 cm mark on the rule and an empty measuring cylinder at the 80 cm mark. The rule is still balanced. Fig. 2.1 shows the arrangement.

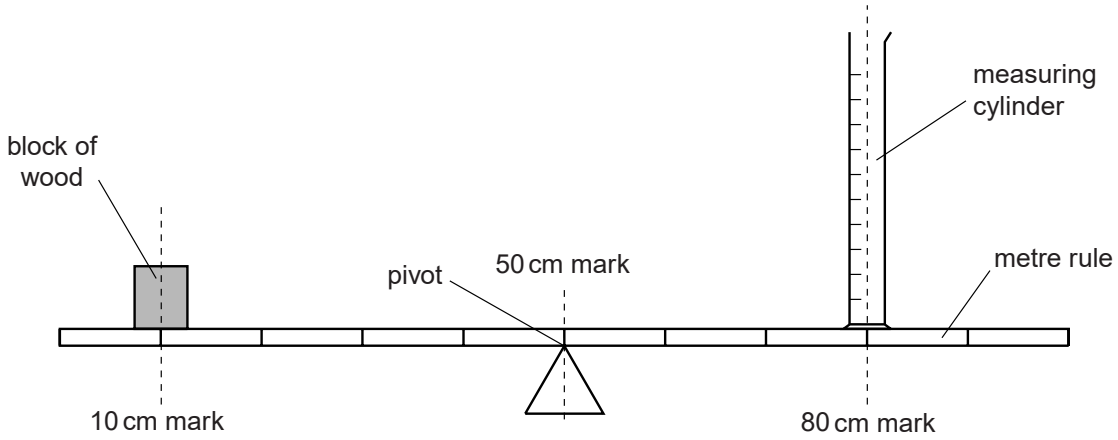

Fig. 2.1 (not to scale)

The student now places a weight of 0.39 N on top of the block of wood. She then starts to pour oil into the measuring cylinder. The rule balances again when there is 60 cm^3 of oil in the measuring cylinder.

The gravitational field strength *g* is 10 N / kg.

(a) Calculate

(i) the weight of the oil in the cylinder,

weight = ...[2]

(ii) the mass of the oil in the cylinder.

mass = ...[1]

(b) Calculate the density of the oil.

density = ...[2]

Question # 10: Oct Nov 2019/P21/Q5

An electronic balance is calibrated to display the weight of an object that is placed on its top plate.

Fig. 5.1 shows the balance with an empty measuring cylinder on the top plate.

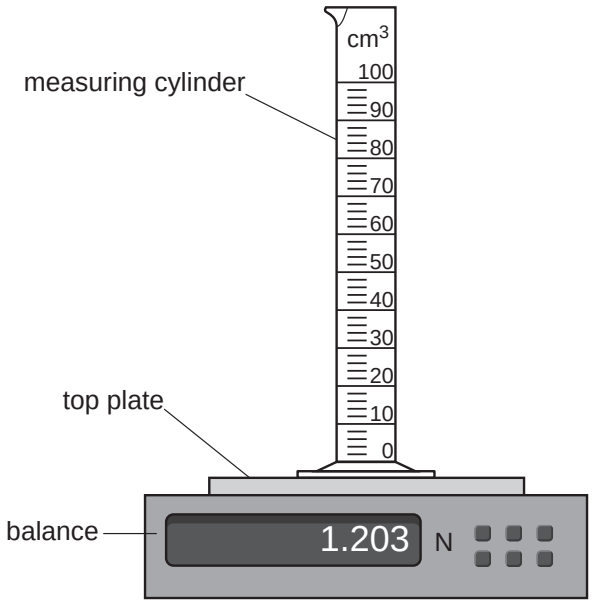

Fig. 5.1

A student pours a small quantity of oil into the measuring cylinder and records the volume and the new reading on the balance.

Fig. 5.2 shows how the reading on the balance varies with the volume of oil in the measuring cylinder.

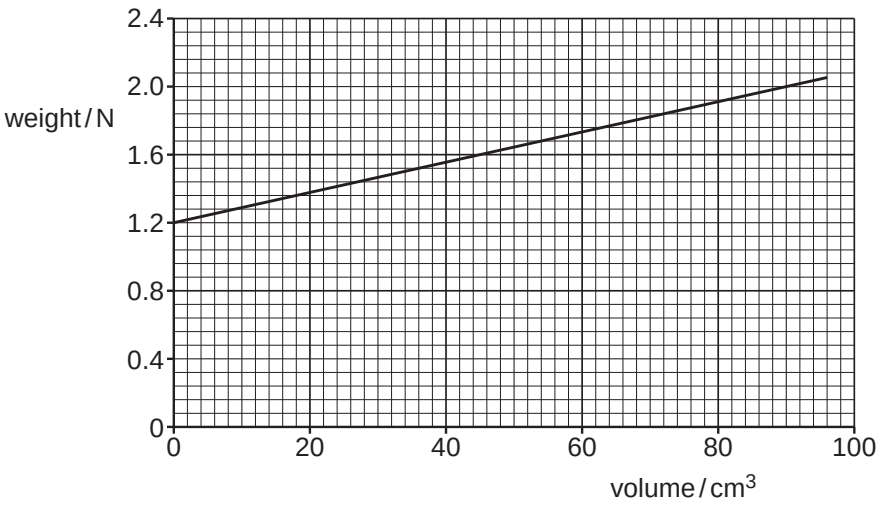

Fig. 5.2

The gravitational field strength g is equal to 10 N / kg.

Using Fig. 5.2, determine the density of the oil.

density = ... [4]