SMART EXAM RESOURCES
IGCSE PHYSICS
ATP- TOPIC QUESTIONS+MARKSCHEMES
DENSITY OF WOODEN BLOCK

1 A student determines the density of a block of wood.

(a) Fig. 1.1 shows one face of the block of wood that the student uses.

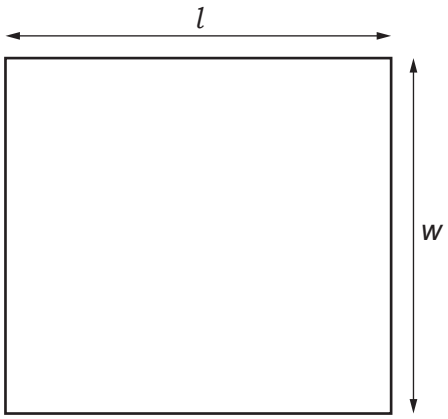

Fig. 1.1

(i) Measure the length l and width w of the block of wood. Fig. 1.1 is drawn actual size.

l = ... cm

w = ... cm
[1]

(ii) The student measures the height h of the block of wood.

h = 4.0 ..... cm

Calculate the volume V of the block of wood using the equation $V = l \times w \times h$.

V = ... cm^3 [1]

(iii) The student measures the mass m of the block of wood on a balance.

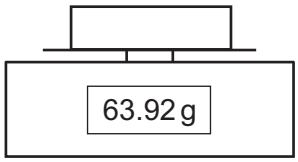

Fig. 1.2

Write down the mass m of the block as shown in Fig. 1.2. Give your answer to the nearest gram.

m = ... g [1]

(iv) Calculate the density ρ of the wood using the equation $\rho = \frac{m}{V}$. Give your answer to a suitable number of significant figures for this experiment and include the unit.

ρ = ... [2]

(b) The student places the block of wood carefully in water in a glass dish. The wood floats as shown in Fig. 1.3.

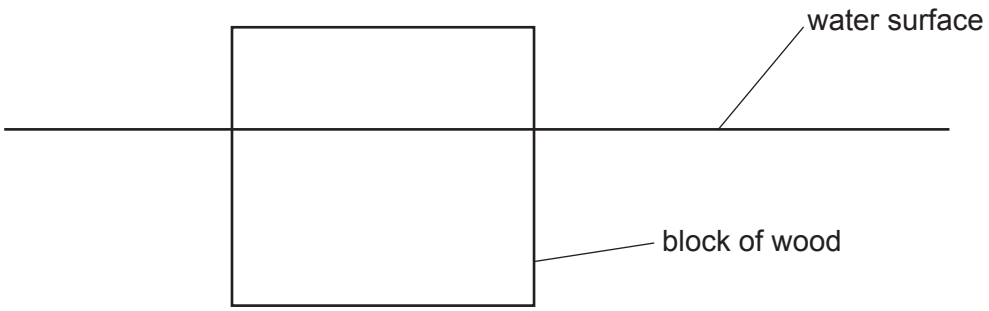

Fig. 1.3

(i) Using Fig. 1.3, estimate, without taking a measurement, the volume V_1 of wood that is below the water surface.

V_1 = ... cm^3 [1]

(ii) Calculate m_W, the mass of water with volume V_1, using the equation $m_W = \rho_W \times V_1$, where $\rho_W = 1.00$ in the same units as ρ in part **(a)(iv)**.

m_W = ... [1]

(c) A student suggests that the mass m of the block of wood should be equal to the mass m_W of the water with volume V_1.

(i) Calculate the difference d between your values of m and m_W.

d = ... [1]

(ii) Discuss whether the difference d is small enough to conclude that $m = m_W$.

.....

.....

..... [1]

(d) Another student wants to obtain a more accurate value for V_1. He uses the method of floating the block of wood in water as described in **(b)**.

Suggest how the student could obtain a more accurate value by taking a measurement.

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..... [2]

[Total: 11]

MARK SCHEME:

Question	Answer	Marks
1(a)(i)	t = 5.1 (cm) and w = 4.7 (cm)	1
1(a)(ii)	V = 95.88 (cm^3)	1
1(a)(iii)	64 (g)	1
1(a)(iv)	ρ to 2 or 3 significant figures	1
	unit g / cm^3	1
1(b)(i)	estimate of V_1 given to the nearest cm^3 and > ½V < V	1
1(b)(ii)	m_W numerically equal to V_1	1
1(c)(i)	d = candidate's **(a)(iii)** – **(b)(ii)** correct	1
1(c)(ii)	YES/NO and suitable comparison of d with m or m_W	1
1(d)	(float wood and) mark water level / remove and mark the water level	1
	measure submerged depth and multiply by the cross-sectional area	1
	OR	
	measure height of block that is not submerged	(1)
	multiply by the cross-sectional area then subtract from total volume of block.	(1)
	OR	
	use of a measuring cylinder / displacement can	(1)
	measure the volume of water displaced (by the floating block)	(1)