Mark scheme

Mass, weight and density

Physics 0625 · Questions from Paper 3, Paper 4 and Paper 6

Total marks

84

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
5	7	8	8	12	8	7	7	11	11	**84**

Question 1 [5]

1(a)	density = mass ÷ volume in any form OR (mass =) density × volume	**C1**
	mass = 1000 × 0.05	**C1**
	50 (kg)	**A1**
1(b)	Floats OR does not sink	**M0**
	density of full barrel OR its density OR density of plastic OR density of barrel OR density of (pure) water is less than sea water	**C1**
	density of plastic OR barrel AND (pure) water is less than sea water	**A1**

Question 2 [7]

2 **(a)** (D =) mass/volume — C1
476/35 — C1
13.6 OR 13 600 — A1
g / cm^3 OR kg / m^3 — B1
note: if value calculated, unit must agree with value)

(b) top box ticked (mass of water is less than mass of mercury) — B1

(c) **(i)** middle box ticked (stays the same) — B1

(ii) top box ticked (decreases) — B1

[Total: 7]

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Question 3 [8]

3(a)	(42 – 30 =) 12 (cm^3)	**B1**
3(b)	(ρ =) 8(.0)	**A3**
	(ρ =) 320 ÷ 40	(C2)
	(density =) mass ÷ volume **OR** (ρ =) m / V in any form	(C1)
	g / cm^3	**B1**
3(c)(i)	friction / drag (upward arrow)	**B1**
	weight (downward arrow)	**B1**
3(c)(ii)	(falling with) {constant / steady / uniform} speed	**B1**

Question 4 [8]

4 **(a)** **(i)** D = M / V in any form OR D × V — C1
2300 × 0.0012 — C1
2.76 OR 2.8 (kg) — A1

(ii) (mass of bricks =) 500 × 2.76 OR 500 × candidate's **(a)(i)** — C1
(total mass =) 1480 OR e.c.f. candidate's **(a)(i)** — C1
yes / no ticked (expect yes), must be compatible with candidate's total mass — A1

(b) **(i)** the same because made of same material — B1

(ii) less than OR equivalent answer — B1

[Total: 8]

Question 5 [12]

5(a)(i)	rule(r) / metre stick / tape measure	**B1**
5(a)(ii)	place n tiles on top of each other owtte AND n = 10 or more	**B1**
	measure the (total) thickness of more than one tile	**B1**
	divide by n AND n = 2 or more	**B1**
5(b)(i)	(volume =) (25 × 20 × 0.30 =) 150 (cm^3)	**B1**
5(b)(ii)	2.7	**A3**
	410 ÷ 150 OR 410 ÷ (their ans **(b)(i)**)	(C2)
	density = mass ÷ volume in any form	(C1)
	g / cm^3	**B1**
5(b)(iii)	4.1(0) (N)	**A3**
	0.41(0)	(C1)
	(W =) m × g OR m × 10 in any form	(C1)

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Question 6 [8]

6(a)	(gravitational field strength is) force per unit mass (on an object in a gravitational field)	**B1**
6(b)(i)	16 N	**A2**
	$W = mg$ **OR** (m =) $W \div g$ **OR** 42 / 9.8 **OR** (mass of object =) 4.3 (kg)	C1
6(b)(ii)	1.6×10^{20} m^3	**A2**
	(V =) m / ρ **OR** (V =) $6.4 \times 10^{23} / 3900$	C1
6(c)(i)	arrow parallel to driving force **AND** pointing to the right	**B1**

6(c)(i)	(arrow pointing to the right) labelled 30 N	**B1**
6(c)(ii)	1 (resultant force) increases **OR** there is a resultant force (in the direction of the driving force) **OR** 2 resultant force = driving force – resistive force(s)	**B1**

Question 7 [7]

7(a)	(oil) stays on surface / floats on the water	**B1**
	(oil has) lower density than water **OR** liquids of lower density float on liquids of higher density	**B1**
7(b)(i)	measure (initial) volume of liquid / water AND immerse object **OR** immerse object in a known / measured volume of liquid / water	**B1**
	subtract initial / start volume from final / new volume **OR** calculate the difference in volume **OR** measure change in volume	**B1**
	OR (alternative answer)	
	fill displacement can / container with water **AND** immerse object	**(B1)**
	measure volume of displaced water	**(B1)**
7(b)(ii)	220 g	**A3**
	$\rho = m / V$ **OR** (m =) ρV **OR** 2.7×83	C1
	(m =) 2.7×83 **OR** 2.2×10^n	C1

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Question 8 [7]

8(a)(i)	(Weight is) force/pull of gravity (acting on an object)	**B1**
8(a)(ii)	Mass × acceleration due to gravity OR *m*g OR 350 × 7.5	**C1**
	2600 N	**A1**
8(b)	(ρ =) m / V in any form	**C1**
	0.27 (kg / m^3) OR 270 (g / m^3)	**A1**
	Balloon moves/floats up	**B1**
	(Floats when) density of balloon less than density of atmosphere OR (sinks when) density of balloon greater than atmosphere	**B1**
	OR (ρ =) m / V in any form	**(C1)**
	110 g	**(A1)**
	Balloon rises	**(B1)**
	(Floats when) mass/weight of balloon less than mass/weight of atmosphere (of same volume as balloon) (Sinks when) mass/weight of balloon greater than mass/weight of atmosphere (of same volume as balloon)	**(B1)**
	Total:	**7**

Question 9 [11]

9(a)(i)	l = 5.1 (cm) and w = 4.7 (cm)	**1**
9(a)(ii)	V = 95.88 (cm^3)	**1**
9(a)(iii)	64 (g)	**1**
9(a)(iv)	ρ to 2 or 3 significant figures	**1**
	unit g / cm^3	**1**
9(b)(i)	estimate of V_1 given to the nearest cm^3 and > ½V < V	**1**
9(b)(ii)	m_W numerically equal to V_1	**1**
9(c)(i)	d = candidate's **(a)(iii) – (b)(ii)** correct	**1**
9(c)(ii)	YES/NO and suitable comparison of d with m or m_W	**1**
9(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)

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Question 10 [11]

10(a)(i)	two measurements in cm 2.7 and 2.5, both given to nearest mm	**1**
10(a)(ii)	correct average: expect 2.6 (cm)	**1**
10(a)(iii)	any reasonable advantage for the method in the question given **OR** it is difficult to measure the diameter directly **OR** hard to find centre of ball	**1**
	a ruler for measuring the diameter directly would give rise to parallax errors	**1**
10(b)	V = 9.1(4)	**1**
	unit: cm^3	**1**
10(c)	correct **method** for calculation of m_B shown	**1**
	m_B = 11.6 (g)	**1**
10(d)	ρ on answer line correctly calculated to 2 or more significant figures	**1**
	unit: g / cm^3	**1**
	answer given to 2 or 3 significant figures	**1**

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