

Question	Answer	Marks	AO Element	Notes	Guidance
1	any four from: measure volume of water (in a measuring cylinder) (1) add metal to water in the measuring cylinder (1) so that metal is completely submerged (1) measure (new) volume of water in a measuring cylinder (with metal) (1) find the difference between the two volumes (1)	4			
2	density (of water) too small OR manometer would be too high / big owtte	1			
3	7900 OR 7870 (1) 70 ÷ 0.0089 (1) (density =) mass ÷ volume in any form (1)	3			
4(a)	0.50 kg (1) $\rho = m/V$ in any form (1)	2			

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4(b)	<p>190 000 J / 1.9×10^5 J / 190 kJ (1)</p> <p>(E=) $mc \Delta T$ in any form (1)</p> <p>(E=) mL in any form (1)</p> <p>use of $c = 4200$ (J/kg °C) AND $\Delta T = 5$ (1)</p> <p>use of $c = 2100$ AND $\Delta T = 18$ (1)</p>	5			
5	<p>any three from:</p> <p>measure mass of (empty) measuring cylinder on balance</p> <p>add liquid to measuring cylinder AND read volume</p> <p>measure mass of measuring cylinder AND liquid on balance</p> <p>find difference in the 2 mass readings</p>	3			
6(a)	<p>11 (g / cm³) (2)</p> <p>OR</p> <p>(density =) $86 \div 8.0$ (1)</p>	2			
6(b)	any value greater than (b)(i) (g / cm ³)	1			

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7(a)	(mass = 1900×0.05) = 95 kg (2) OR ALLOW ($m =$) ρV in any form OR 1900×0.05 (1)	2			
7(b)	(= 95×1500) = 140 000 J / °C or 1.4×10^5 J / °C (2) Or ALLOW ($C =$) $m \times c$ (1)	2			
8	(density =) mass \div volume (1) (density =) $98.4 \div 41.0$ (1) $2.4(0)$ (g / cm ³) (1)	3		(density =) $98.4 \div 41.0$ gains 2 marks $2.4(0)$ (g / cm ³) gains 3 marks	
9	(volume =) difference in candidate's readings (1) 24 (cm ³) (1)	2		$24(\text{cm}^3)$ gains 2 marks	

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10	1 (volume of block) increases (1) 2 (mass) remains constant owtte (1) 3 (density) decreases (1)	3			
11(a)	(1100 – 400 =) 700 (g)	1			
11(b)	density = mass ÷ volume OR $\rho = m \div V$ in any form (1) (ρ =) 700 ÷ 750 (1) (ρ =) 0.93 (g/cm ³) (1)	3			
12	density = mass ÷ volume OR $\rho = \frac{m}{V}$ in any form (1) (ρ =) 148 ÷ 16.6 (1) (ρ =) 8.9 (g/cm ³) (1)	3			
[Total: 40]					