01. 0625_s23_ms_42 Q: 3

Question	Answer	Marks
(a)	(force of gravity / weight of person is spread over a much) greater area	**B1**
	$p = F/A$ **OR** $p \propto 1/A$	**B1**
	(force is same so) pressure is lower (so ice is less likely to crack)	**B1**
(b)	5.8×10^3 Pa	**A4**
	p (due to water) = ρgh **OR** (p =) ρgh **OR** (p =) $1000 \times 9.8 \times 0.45$ **OR** (p =) 4410	C1
	$W = mg$ **OR** (W =) mg **OR** (W =) (690×9.8) **OR** (W =) 6762 **OR** (p (due to ice) =) 1352.4	C1
	(pressure =) candidate's calculated pressure due to water + candidate's calculated pressure due to ice **OR** total pressure = $[1000 \times 9.8 \times 0.45] + [(690 \times 9.8) / 5.0]$ **OR** total pressure = 4410 + 1352.4	C1

02. 0625_s23_ms_43 Q: 2

Question	Answer	Marks
(a)(i)	(pressure is) force per unit area	**B1**
(a)(ii)	(variation with depth) increases (as depth increases)	**B1**
	(variation with density) increases (as density increases)	**B1**
(b)	any **two** from: • geothermal • nuclear • tidal	**B2**
(c)(i)	(statement) non-renewable / not renewable / no	**B1**
	(explanation) (nuclear) fuel is used up	**B1**
(c)(ii)	(statement) renewable / yes	**B1**
	(explanation) waves will always continue **OR** produced by wind which will always continue **OR** nothing used up	**B1**

03. 0625_s22_ms_41 Q: 2

Question	Answer	Marks
(a)	gravitational potential energy	**B1**
(b)(i)	1.6×10^6 Pa	**A3**
	(p =) $h\rho g$ (in any form) **or** $150 \times 1000 \times 10$ **or** 1.5×10^6	C1
	1.5×10^6 **or** $1.0 \times 10^5 + \{150 \times 1000 \times 10\}$ **or** $1.0 \times 10^5 + 1.5 \times 10^6$ **or** 1.6×10^N	C1
(b)(ii)	5.6×10^6 N	**A2**
	(F =) pA (in any form) **or** $1.6 \times 10^6 \times 3.5$	C1

Question	Answer	Marks
(c)	speed (of water) remains constant	**B1**
	otherwise density would decrease **or** gaps would appear in the water **or** volume / density does not change **or** liquids incompressible **or** water enters / leaves at constant rate **or** quantity of water remains constant	**B1**

04. 0625_w22_ms_42 Q: 1

Question	Answer	Marks
(a)	(depth =) 0.211 m	**A3**
	$\rho = m / V$ **OR** (V =) m / ρ **OR** 800 / 1020	C1
	$V = l \times w \times d$ **OR** (d =) $V / (l \times w)$ **OR** $V \div 3.72$	C1
(b)	(ΔGPE =) 56(.0) J	**A3**
	GPE = $mg\Delta h$ **OR** (GPE =) $mg\Delta h$ **OR** (800 / 60) × 10 × 0.42(0)	C1
	(mass per second =) 800 / 60 (kg) **OR** their GPE per minute ÷ 60	C1
(c)	(P =) 8200 Pa	**A3**
	(P =) $h\rho g$	C1
	(P =) 1020 × 10 × 0.8(00) (Pa)	C1
	OR	
	(P =) F / A	(C1)
	$F = mg$ **OR** F = 1020 × 0.8(00) × 3.72 × 10	(C1)

05. 0625_m21_ms_42 Q: 1

	Answer	Marks
(a)	78 N	**A3**
	(m=) ρV OR $\rho = m / V$ in any form	C1
	$W = mg$	C1
(b)	4.5×10^3 N	**A3**
	(F=) (Δ)PA OR $P = F / A$ in any form	C1
	($\Delta P = 1.3 \times 10^5 - 1.0 \times 10^5$ =) 3×10^4	C1
	outwards	**B1**
(c)	(ρ=) 800 kg / m^3	**A3**
	(ρ=) P / gh OR $P = \rho gh$ in any form	C1
	(ρ=) $9.6 \times 10^4 / (10 \times 12)$	C1

06. 0625_s21_ms_43 Q: 2

	Answer	Mark
(a)(i)	pressure = force/area accept P inversely proportional to area	**B1**
	same force exerted by each group of books	**B1**
	area (in contact with bookshelf) in group B is greater OR area (in contact with bookshelf) in group A is smaller	**B1**
(a)(ii)	(pressure =) 1900 Pa	**A3**
	force = 6 × 0.52 × 10 OR 31(.2) seen	**C1**
	area = 6 × 0.013 × 0.21 OR 0.016(38) seen OR 163.8 (cm^2)	**C1**

	Answer	Mark
(b)	(depth =) 19 m	A3
	$p = \rho gh$ OR $(3.0 - 1.0) \times 10^5 = 1030 \times 10 \times h$ in any form	C1
	$h = (3.0 - 1.0) \times 10^5 / 1030 \times 10$ OR $h = 2.0 \times 10^5 / 1030 \times 10$	C1

07. 0625_s20_ms_43 Q: 2

(a)	V (= 0.3 × 0.3 × 0.4) = 0.036 (m^3)	C1
	ρ = m / V in any form OR (m =) ρV OR 1020 × 0.036	C1
	(m =) 37 kg	A1
(b)(i)	P = ρgh in any form	C1
	(h =) 400 × 10^3 / (1020 × 10)	C1
	(h =) 39 m	A1
(b)(ii)	P = F / A OR (F =) PA OR 500 × 10^3 × 0.62	C1
	(F =) 310 000 N OR 310 kN	A1

08. 0625_w20_ms_41 Q: 3

Question	Answer	Marks
(a)	(p_{liq} =) $h\rho g$ (in any form) **or** 0.400 × 1000 × 10 **or** 2000 **or** 4000 **or** 1.02×10^5 (Pa)	C1
	(p =) p_{atm} + $h\rho g$ (in any form) **or** 1.00×10^5 + 0.400 × 1000 × 10 **or** 4000 **or** 1.02×10^5 (Pa)	C1
	1.04×10^5 Pa	A1
(b)(i)	(F =) pA (in any form) **or** 4000 × 0.025	C1
	100 N	A1
(b)(ii)	(W.D. =) $F \times x$ (in any form) **or** $1.04 \times 10^5 \times 0.025 \times 0.50$ **or** 4000 × 0.025 × 0.50 **or** 50 (J)	C1
	1300 J	A1

09. 0625_m19_ms_42 Q: 4

(a)(i)	Vacuum OR nothing OR mercury vapour	B1
(a)(ii)	P = hρg in any form OR (h =) P / ρg OR 1.02×10^5 / (13600 × 10)	C1
	0.75 m	A1

(a)(iii)	Same vertical height (of mercury)	M1
	Pressure due to column of liquid depends on vertical height OR in formula P = hρg, h is vertical height OR the pressure remains constant because ρ and g don't change, nor does h.	A1
(b)	Air is present in the space labelled S OR above the mercury in the tube	M1
	This air exerts a (downward) pressure on the mercury	A1

10. 0625_w19_ms_42 Q: 1

(a)	(A = 44 × 20 =) 880 (m^2)	C1
	V = A × depth in any form OR (d =) V / A	C1
	(d = 264 / 880 =) 0.30 m	A1
(b)	ρ = m / V in any form OR (ρ =) m / V	C1
	(ρ = 2.7 × 10^5 / 264 =) 1020 kg / m^3	A1
(c)	p = ρgh in any form OR (p =) ρgh	C1
	(p = 1020 × 10 × 0.3 =) 3 100 Pa	A1
(d)	tape measure	B1

11. 0625_w19_ms_43 Q: 1

(a)	attempt to use 2 rectangles for A	C1
	A = ((1 × 3.2) + (1.1 × 1.6) = 3.2 + 1.76 =) 4.96 (m^2)	C1
	9.9 m^3	A1
(b)	$\rho = m / V$ OR $m = \rho V$ OR (m =) 9.9 × 1.1 × 10^3	C1
	(*m* =) 1.1 × 10^4 kg	A1
(c)	depth of water = 1.2 m	C1
	(*P* =) *ρgh* OR (*P* = 1.1 × 10^3 × 10 × 1.2)	C1
	(*P* =) 1.3 × 10^4 Pa	A1

12. 0625_s18_ms_41 Q: 3

(a)(i)	W = (4.8 × 10 =) 48 N	1
(a)(ii)	(P =) F ÷ A OR 48 ÷ (0.12 × 0.16)	1
	2500 Pa	1
(b)	Atmospheric pressure (in addition to liquid pressure)	1
(c)	P = hdg or in words OR (d =) P ÷ hg OR 2500 ÷ (0.32 × 10)	1
	780 kg / m^3	1
	OR d = M ÷ V = 4.8 ÷ (0.12 × 0.16 × 0.32)	(1)
	780 kg / m^3	(1)

13. 0625_s18_ms_42 Q: 2

(a)	average/overall/combined density (of the metal and air contained) less (than density of sea water)	1
(b)	(P =) $h \times \rho \times g$ **OR** (V=) $A \times l$ in any form	1
	(P= 1.2 × 1020 × 10 =) 12 000 (Pa) **OR** (V= 0.8 × 1.2 =) 0.96 (m^3)	1
	$P = F \div A$ **OR** (F =) $P \times A$ **OR** (W =) $V \times \rho \times g$	1
	(F = 12240 × 0.80 =) 9800 N **OR** ($F = W$ =) 9800 N	1
(c)	same numerical answer as **(b)**	1
	resultant/net (vertical) force = 0 **OR** downward force = upward force **OR** forces are balanced	1

14. 0625_w18_ms_41 Q: 4

(a)	mass = 0.25 (kg) OR $\rho = m / V$	C1
	volume = ($\pi \times 0.03^2 \times 0.1 = 2.8 \times 10^{-4}$ (m^3))	C1
	density = ($0.25 / 2.8 \times 10^{-4}$) = 890 kg / m^3	A1
	OR	
	mass = 250 (g) OR $\rho = m / V$	
	volume = ($\pi \times 3^2 \times 10$ =) 280 cm^3	
	density = (250 / 280 =) 0.89 g / cm^3	
	OR	
	$\rho = F / A = h\rho g$	
	$\rho = F / Ahg$ OR $2.5 / \pi \times 0.03^2 \times 0.1 \times 10$	
	= 890 kg / m^3	
(b)(i)	manometer	B1
(b)(ii)	(P =) hdg OR $0.02 \times 800 \times 10$	C1
	160 Pa	A1
(b)(iii)	Value of h stays the same	M1
	Difference in height not dependent on cross-sectional area of tube OR Pressure of a liquid column depends only on values of h, d and g	A1

15. 0625_w18_ms_42 Q: 2

(a)	(volume =) $\pi r^2 h$ or $\pi(0.035^2) \times 0.12$ **or** 4.62×10^{-4} (m^3)	C1
	$\rho = m / V$ in any form OR (m =) ρV	C1
	(mass = $900 \times 4.62 \times 10^{-4}$ =) 0.41 (kg)	A1
	0.66 kg **or** 250 g or 0.25 kg correctly added to previous result	B1
(b)(i)	manometer	B1
(b)(ii)	$P = \rho gh$ in any form or (ρ =) P / gh	C1
	(ρ = 400 / (10 × 0.05) =) 800 kg/m^3	A1
(b)(iii)	liquid on left goes further up tube	B1
	pressure of gas greater than air pressure + pressure from liquid column	B1

16. 0625_w18_ms_43 Q: 3

(a)(i)	(mercury) barometer	**B1**
(a)(ii)	vacuum **or** nothing **or** (low pressure) mercury vapour	**B1**
(a)(iii)	(p) = $h\rho g$ **or** $0.76 \times 1.4 \times 10^4 \times 10$	**C1**
	1.1×10^5 Pa	**A1**
(b)	(m =)ρV **or** $\rho \pi r^2 l$ **or** $\rho \pi d^2 l / 4$ **or** in numbers	**C1**
	(W =)ρVg **or** $\rho \pi r^2 lg$ **or** $\rho \pi d^2 lg / 4$ **or** in numbers	**C1**
	84 N	**A1**

17. 0625_s17_ms_42 Q: 2

(a)	Column 1 Box 3 mass same	**B1**
	Column 2 Box 4 weight 1/6	**B1**
	Column 3 Box 3 deceleration same	**B1**
(b)	P=F / A in any form or (F=) PA	**C1**
	(F_1 = 500 000 × 0.00065 =) 330 (N)	**C1**
	$F_1d_1 = F_2d_2$ in any form or F_1d_1/d_2	**C1**
	(F_2 = 325 × 7/24 =) 95 N	**A1**
	Total:	**7**

18. 0625_s17_ms_43 Q: 4

	$F_1d_1 = F_2d_2$ OR (F_2 =) $\frac{F_1d_1}{d_2}$ OR 200 × 22 ÷ 8.0	**C1**
	550 (N) **or** 200 × 22 ÷ 8.0	**C1**
	(p =) $\frac{F}{A}$ OR 550 ÷ 0.00050 OR 200 × 22 ÷ (8.0 × 0.00050)	**C1**
	1.1×10^6 Pa	**A1**
	Total:	**4**

19. 0625_w17_ms_41 Q: 3

(a)	(Measure of) quantity / amount of matter OR (property) that resists change in motion / speed / momentum OR measure of a body's inertia	**B1**
(b)(i)	$d = m / V$ OR in words OR $0.44 / 0.080^3$ OR $0.44 / 5.12 \times 10^{-4}$ OR $440 / 8^3$ OR 440 / 512 OR $0.44 / 8^3$ OR 0.44 / 512	**C1**
	0.86 g / cm^3 OR 860 kg / m^3 OR 8.6×10^{-4} kg / cm^3	**A1**
(b)(ii)	Sinks OR does not float AND (cube) denser (than oil)	**B1**
(c)(i)	$W = mg$ OR (g =) W / m OR 0.70 / 0.44	**C1**
	1.6 N / kg	**A1**
(c)(ii)	(P =) hdg OR $0.030 \times 850 \times 1.6$	**C1**
	41 Pa	**A1**

20. 0625_w17_ms_42 Q: 1

(a)	$\rho = m / V$ in any form OR (m =) ρV OR (m =) $9000 \times 7.5 \times 10^{-5}$	**C1**
	(m =) 0.68 kg **accept** 680 g	**A1**
(b)(i)	$W = mg$ in any form or (W =) mg OR (W =) 0. 68×10	**C1**
	(W =) 6.8 N	**A1**
(b)(ii)	any **one** of: weight has direction / mass does not weight is a vector / mass is not weight varies / mass does not mass is amount of matter weight is a force / mass is not	**B1**
(c)(i)	$\rho = h \rho g$ in any form OR (ρ =) ρ / hg OR (ρ =) 560 / (0.027 × 10)	**C1**
	(ρ =) 2.1×10^3 kg / m^3	**A1**
(c)(ii)	explains why there is a resultant downward force	**B1**

21. 0625_w17_ms_43 Q: 2

(a)	(m =)ρV **or** $950 \times 8.2 \times 10^{-5}$ **or** 0.95×82	**C1**
	$7.8 / 7.79 \times 10^N$ (where N is a integer)	**C1**
	0.078 / 0.0779 kg **or** 78 / 77.9 g	**A1**
(b)(i)	(p =)$h\rho g$ **or** $0.094 \times 950 \times 10$	**C1**
	890 / 893 Pa	**A1**
(b)(ii)	atmospheric pressure (is acting)	**B1**
(c)(i)	steel is denser (than liquid) **or** denser than 950 kg / m^3	**B1**
(c)(ii)	take new reading **and** subtract 82 (cm^3) / original reading	**B1**