

Question number		Answer	Notes	Marks
1	(a) (i)	pressure difference = height (or depth) x density x g ;	Allow $h \times \rho \times g$ (and rearrangements) Reject “gravity” for g in 7(a)(i) Allow standard form	1
	(ii)	substitution into correct equation; evaluation; e.g. $1028 \times 10 \times 700$ $7\,196\,000$ (Pa)	Allow use of $g = 9.8(1) \rightarrow 7\,059\,276$ or $7\,052\,080$	2
	(iii)	(total pressure =) $72 \times 10^5 + 1 \times 10^5$ (Pa);	Allow $7\,296\,000$ (Pa) OR answer to 7(a)(ii) + $100\,000$	1
(b)	(i)	pressure = force/area	Allow $p = F/A$	1
	(ii)	Substitution into correct equation; Transformation; Evaluation; e.g. $41 \times 10^5 = F/3.1$ $F = 41 \times 10^5 \times 3.1$ 1.271×10^7 (N)	Substitution and transposition either order $12\,710\,000$, 127.1×10^5 , 1.3×10^7	3
(c)		because fresh water has a lower density than sea water OR reverse argument;		1
(d)		any five of MP1 suitable measuring instruments mentioned; e.g. measuring cylinder and (electronic) balance MP2 method of obtaining correct mass; e.g. subtract mass of container, use of tare MP3 detail to ensure accuracy of liquid volume; e.g. burette, pipette, density bottle, account taken of meniscus MP4 equation stated - density = mass ÷ volume; MP5 suitable units used, e.g. g for mass and cm^3 for volume MP6 Idea of appropriate repeating or averaging at any stage	Allow scales Ignore newtonmeter, weighing machine Ignore weight Allow keep temperature constant Allow $\rho = m/V$ Allow ml, l Allow “discard anomalous results”	5

Question number	Answer	Notes	Marks
2 (a) (i)	pressure = force ÷ area;	pressure = force ÷ area area = force ÷ pressure force = pressure x area Accept standard symbols (P, F, A) – upper or lower case acceptable for this item REJECT relationship 'triangle' on its own	1
(ii)	Substitution into correct equation / 8 times the force; Calculation; e.g. pressure = $8 \times 0.036 \div 0.0013 =$ 220 (Pa)	Correct final value = 2 irrespective of working Final value of 27.7 or 28 scores 1 (since it is a correct calculation that has missed the x8 factor) ALLOW 222 (Pa), 221.5..... (Pa), 220 (Pa) for final value NO significant figure penalty	2
(b) (i)	(total) force is unchanged / the same; same mass/number/weight (of coins);	ACCEPT 'force is the same because the weight is the same'=2 'force is the same because the mass is the same'=2	2
(ii)	Reduced / less; ONE of - (reduced) by a factor of 8; <u>same</u> mass/weight/force spread over a larger area; calculates the new pressure;	NOT ACCEPT 'larger surface area' alone	1 1

Total 7 Marks

Question number	Answer	Notes	Marks
2 (a)	B (hit the walls of the container harder)		1
(b)	(average) KE (of particles) decreases (as the temperature falls); AND one of • (because) they move slower; • idea that at 0 K the particles have no kinetic energy; • idea that at 0 K the particles are not moving;	ignore • ' particles freeze' • KE is lost allow • 'it' for average KE • absolute zero for 0 K	2
2 (c) (i)	300 K;		1
(c) (ii)	both temperatures seen in Kelvin; Substitution; (Rearrangement and) Evaluation; e.g. $\frac{210\,000}{300} = \frac{P_2}{354}$ this would get 2 marks if seen $\frac{210\,000 \times 354}{300} = P_2$ this would get 2 marks if seen $(P_2) = 250(\text{kPa})$ this is 3 marks	no mark for equation as it is given on page 2 allow • $\frac{210\,000}{81} = \frac{P_2}{27}$ for 1 mark • 630 (kPa) for 2 marks • bald answer 248 (kPa) for 3 marks • answers which round to 250 Power of Ten error (POT) = -1	3

(Total for Question 2 = 7 marks)