Density and Pressure

Mark Scheme 3

Level	IGCSE(9-1)
Subject	Physics
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1P)
Topic	Solids, Liquids and Gases
Sub-Topic	Density and Pressure
Booklet	Mark Scheme 3

Time Allowed: **50 minutes**

Score: **/41**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	775%	70%	60%	55%	50%	<50%

Question number		Answer	Notes	Marks
1 (a) (i)		pressure difference = height (or depth) x density x *g* ;	Allow h × ρ × *g* (and rearrangements) Reject "gravity" for *g* in 7(a)(i)	1
(ii)		substitution into correct equation; evaluation; e.g. 1028 X 10 X 700 7 196 000 (Pa)	Allow standard form Allow use of g = 9.8(1) → 7 059 276 or 7 052 080	2
(iii)		(total pressure =) 72 x10^5 + 1 x 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 × 10^5 = F/3.1 F= 41 × 10^5 x 3.1 1.271 x 10^7 (N)	Substitution and transposition either order 12 710 000, 127.1 x 10^5 , 1.3 x 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 ρ=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 x 0.036 ÷ 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
3 (a)	Substitution into correct equation; Calculation; e.g. 10 000 x 10 = p_2 x 270 p_2 = 370 (kPa)	correct answer = 2 marks ACCEPT 370.37….. (kPa)	2
(b)	press decreases; Any two from: molecules slow down; less frequent collisions with walls / don't collide as much with walls; less hard /less force (on same area);	 ACCEPT less kinetic energy / less momentum IGNORE collisions with each other ACCEPT smaller momentum change (in collisions)	3
(c) (i)	Pressure decreases; One of Fewer molecules (bombarding container); Less force from the molecules;		2
(ii)	Gas leaves (the liquid)/Expands/Foams the cream;	ACCEPT Cools;	1

Total 8 Marks

Question number	Answer	Notes	Marks
4 (a) (i)	Any three of MP1. idea of (continuous) random movement; MP2. collisions / impact/eq with (inside) fabric/walls; MP3. idea that force is produced (by bombarding molecules); MP4. idea of pressure as force on an area;	ignore moves freely allow momentum or NIII argument	(3)
(ii)	any four from: MP1. pressure inside stays constant; MP2. pressure difference across the balloon fabric; MP3. (resultant) force acting down on the fabric; MP4. balloon fabric becomes concave / moves downwards; MP5. (free end of) pointer moves up;	allow for MP1, pressure increases slightly, for MP2 volume of air in can decreases, for MP5 end of pointer on the fabric moves down	(4)

(iii)	accept any two sensible suggestions e.g. longer stick/lever; narrower (diameter of) can; more stretchy material; less taut material;		(2)
(b) (i)	either it/the reading would decrease; OR (right end of) pointer goes down; OR left end of pointer goes up;		(1)
(ii)	more pressure inside the can ; plus any one from: particles inside can now move faster / have more KE; (hence) particles hit the balloon fabric more frequently; (hence) particles hit the fabric harder;	allow if seen in (i) look for idea of time implied more often allow momentum idea	(2)

Total for Question 4 = 12 marks