

Density and Pressure

Mark Scheme 5

Level	IGCSE(9-1)
Subject	Physics
Exam Board	Edexcel IGCSE
Module	Single Award (Paper 2P)
Topic	Solids, Liquids and Gases
Sub-Topic	Density and Pressure
Booklet	Mark Scheme 5

Time Allowed: 57 minutes

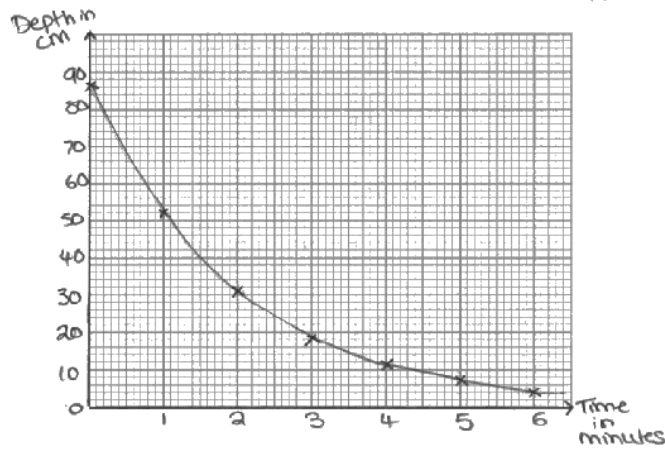
Score: /47

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)	<p><u>metre</u> rule(r);</p> <p>stop watch / stop clock;</p>	<p>allow (metal) tape measure / measuring tape / <u>metre</u> stick</p> <p>ignore timer</p> <p>either order</p>	2
(b) (i)	<p>suitable scale chosen (>50% of grid used);</p> <p>axes labelled with quantities and unit;</p> <p>plotting correct to nearest half square (minus one for each plotting error);;</p> <p>line (curve) of best fit acceptable;</p>	<p>reject 'm' for minutes orientation</p> <p>unimportant</p> <p>i.e. two plotting errors = no marks for plotting</p> <p>i.e. smooth curve within 1 small square of each point</p>	5



time in minutes	water depth in cm
0	6
1	2
2	1
3	8
4	1
5	
6	

(ii) idea that **depth** decreases with time;
 idea that relationship is non linear;

allow RA
 ignore 'negative correlation'
 Ignore all references to 'proportional' and 'curved'
 allow idea of rate arguments
 e.g. 'depth decreases more slowly with time' gets 2 marks
 allow exponential decrease for 2 marks

2

(c)	any 1 of: MP1. idea of pressure decreasing (with depth / time); MP2. idea of force changing with {pressure / depth / time}; MP3. idea of (available) GPE decreasing;	allow RA allow 'weight' for force ignore 'mass'	1
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Total 10 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 <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> ' particles freeze' KE is lost allow <ul style="list-style-type: none"> '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 <ul style="list-style-type: none"> $\frac{210\,000}{300} = \frac{P_2}{81}$ 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)

Question number	Answer	Accept	Reject	Marks
3 (a) (i)	Anomaly clearly identified (20.44 mm);			1
(ii)	Averaging seen /162.7÷8 /142.26 ÷7; Anomaly excluded/ ÷7 seen ; Final answer rounded to 2 decimal places; e.g.: 20.32 (m	Ignore sig figs in working Allow full marks for correct answer, no working, i.e.: 20.32 (mm) = 3 marks If no working accept these other bald answers: 20.3228.. etc (mm)= 2 marks 20.34 (mm) = 2 marks 20.3375.. (mm) = 1 mark 20.33 (mm) = 1 mark		3

Question number	Answer	Accept	Reject	Marks
3 (c)	<p>Any three of:</p> <p>MP1 Measure/find <u>mass</u>;</p> <p>MP2 Using a named instrument - e.g. (top pan) balance, scale(s);</p> <p>MP3 A sensible experimental precaution: e.g. Repeat readings / measure mass of several of coins and divide/ check balance zero;</p> <p>MP4 Formula to use (density = mass ÷ volume);</p> <p>MP5 A correct <u>density</u> unit mentioned (e.g. kg/m³);</p>	<p>Ignore information about calculating or finding volume</p> <p>Accept "Weighing" to find <u>mass</u></p> <p>Ignore measuring weight</p> <p>Ignore volume = $\pi r^2 h$</p>		3

Total 9 marks

Question number	Answer	Notes	Marks
4 (a)	10 000; N;	allow 9800, 9810, 10^4 allow "newton(s)" marks are independent	2
(b) (i)	density = mass / volume;	allow abbreviation, e.g. $\rho = m/V$, $d = m/V$ or rearrangements	1
(ii)	substitution OR rearrangement; evaluation; e.g. $2300 = 1000/\text{volume}$ $= 0.43 \text{ (m}^3\text{)}$	award if either seen in working allow 0.4, 0.434, 0.435, 0.4347... condone 0.44	2

(c)	(i)	bar chart / bar graph;	condone histogram	1
	(ii)	any 1 from: MP1.idea that (density) data is discontinuous; MP2.materials have non-numerical values / are not quantifiable; MP3.material types identified as categories; MP4.idea that a line graph would indicate continuity;	discrete, categoric, non/not continuous	1
	(iii)	cork is less dense OR water is denser; cork 25%, $\frac{1}{4}$ as dense OR water four times denser;	accept correct calculation of <u>both</u> densities for 2 marks	2

Total 9 marks

Question number	Answer	Notes	Marks
5 (a)	(i) uranium/plutonium;	allow chemical symbols	1
	(ii) (particles) formed after fission/ after U breaks up; plus any one from: - neutron; daughter nuclei; named products;	do not allow after decay allow gamma (radiation)	2
	(iii) MP1 they are (still) radioactive/emit ionising radiation /eq; MP2 they last for a very long time/have a long half-life/eq;	allow harmful to people/environment	2
	(iv) it slows down neutrons/eq;	ignore absorbs neutrons	1
	(v) any two ideas from: - MP1 fewer neutrons would be absorbed; MP2 fission rate would increase / / (reactor) become critical ; MP3 too much energy produced (too fast); MP4 meltdown of core/reactor;	more neutrons available the reaction would go out of control do not accept "turns into a bomb" meltdown of 'it'	2

(b) (i)	773(K);		1
	<p>(ii) substitution; rearrangement; evaluation; e.g.</p> $\frac{8.4}{773} = \frac{P_2}{1170}$ $P_2 = \frac{8.4 \times 1170}{773}$ <p>13 (MPa)</p>	<p>no mark for the equation</p> <p>rearrangement and substitution in either order</p> <p>12.7</p> <p>allow ecf from (b)(i) for all 3 marks</p> <p>if calculation seen with °C for T₁ instead of K, then max mark = 2</p> <p>answer of 19.7 (MPa) with no working = 1 mark</p> <p>total marks = 12</p>	3