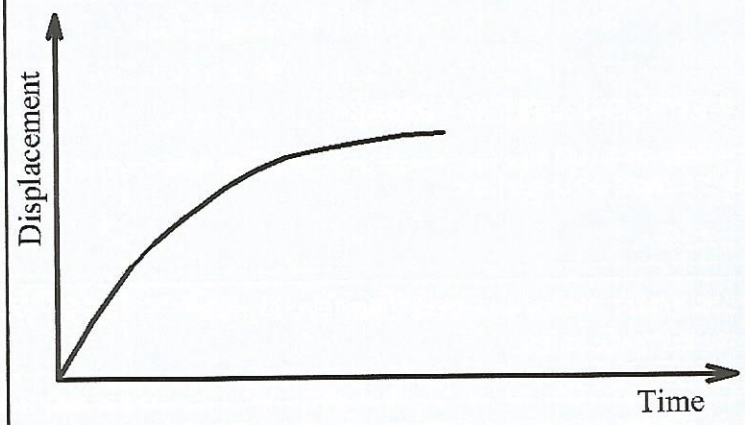
5.4 PHYSICS (232)

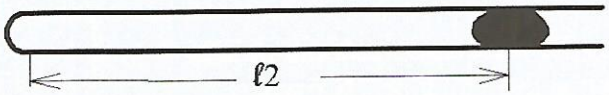
5.4.1 Physics Paper 1 (232/1)

SECTION A (25 MARKS)

1.	(a) Area is a measure of the extent of a surface. (b) m^2 (metre squared)	1 1
2.	The adhesive forces between water molecules and glass are higher √ than cohesive forces √ in water molecules.	2
3.	Remove air from the tube to create a partial vacuum / fill the tube with water, (√) the pressure difference √ between the two ends makes the water to flow.	2
4.	The piece paper can be cut into tiny pieces.	1
5.	Increase in temperature causes the alcohol in P to expand pushing mercury up on the right side of the u tube. The mercury pushes index A up.√	2
6.	Heat is a form of energy while temperature is the degree of hotness.	2
7.	- Base area of the cylinder.√ - The height of the position of the center of gravity above the base.√	2
8.	- With no mass on the hook, mark the pointer position on the graph paper as O g or 0 N mark.√ - Suspend the 100 g mass on the hook and mark the pointer position on the graph paper as the 100 g or I N mark.√ - Count the number of divisions between the 0 g mark and the 100 g mark, divide and label equal divisions accordingly / appropriately.√	3
9.	Volume inflow $= A_1V_1$ Volume outflow $= A_2V_2$ Since the water is incompressible.√ Volume inflow = Volume outflow.√ $A_1V_1 = A_2V_2$ √	3

10.		1
11.	Ft = mV √ Ft = area under curve = ½ × 0.5 × 500 = 125 √ 125 = m × 60 m = 2.0833 kg √	3
12.	Potential → Kinetic → Potential	1
13.	Time	1

SECTION B (55 MARKS)

14.	(a) The pressure of a fixed mass of a gas is inversely proportional to its volume provided the temperature is kept constant.	1
	(b) (i)  √ length of mercury thread √ $l_2 > l_1$	2
	(ii) In 5 (a) the pressure on the air column is greater than the pressure on the air pressure in 5 (b) hence $l_2 > l_1$ √ Since in (a) pressure in air column = $P_{(atmosphere)}$ + ρhg √ While in (b) pressure on air column = $P_{(atmosphere)}$	2
	(c) (i) Absolute zero temperature is the temperature at which the volume of an ideal gas is *assumed* to be zero √	1
	(ii) $\frac{P1}{T1} = \frac{P2}{T2}$ √ $\frac{6}{275} = \frac{P2}{353}$ √ P_2 = 7.702 mmHg √	3

15.	(a) - Reducing the speed of rotation.√ - Increasing the radius of the circular path.√	2
	(b) (i) $V = \omega r$ $= 2\pi fr$ √ $= 2 \times 3.142 \times 2 \times 2$ √ $= 25.136\ ms^{-1}$ √	3
	(ii) $T = \frac{mv^2}{r} - mg$ √ $= \frac{0.5 \times 25.136^2}{2} - 5$ √ $= 152.955\ N$ $= 153\ N$ √	3
	(iii) The tension increases √ At the bottom, the tension acts in the opposite direction as the weight. √	2
16. (a)	(i) Upthrust $= \rho gV$ √ $= 800 \times 10 \times 0.05^3$ √ $= 1\ N$ √	3
	(ii) Apparent weight = W−upthrust √ $= 20-1$ √ $= 19\ N$ √	3
	(iii) Sum of clockwise moments = Sum of anticlockwise moments $x \times 0.5 = 19 \times 0.2$ √ $x = \frac{19 \times 0.2}{0.5}$ √ $= 7.6\ N$ √	3
(b)	Weight of block = weight of water displaced $0.5 \times 10 = 1000 \times 10 \times V$ √ $\therefore V = \frac{0.5 \times \cancel{10}}{1000 \times \cancel{10}}$ √ $= 0.005\ m^3$ √	3

17. (a)	- Impurities √ - Atmospheric pressure √	2
(b)	(i) Boiling point is 104 °C.	1
	(ii) $Q = Pt$ √ $= 80 \times 3.5 \times 60$ √ $= 16\,800$ J √	3
(c)	(i) $\Delta\Theta = 94 - 30$ √ $= 64°$ (ii) $Q = mc\Delta\Theta$ √ $C = \frac{16\,800\ J}{0.2 \times 64}$ √ $= 1312.5$ $Jkg^{-1}K^{-1}$ √	1 3
(d)	$\Delta t = 6.3 - 5.4$ $= 0.9$ minutes $= 54$ seconds √ $L = \frac{Pt}{m} = \frac{54 \times 80}{0.002}$ √ $= 2.16 \times 10^6\ Jkg^{-1}$ √	3
18. (a)	(i) At uniform velocity, $W = mg$ √ $W = 80 \times 10$ √ $= 800\ N$ √ (ii) The reaction $R = w + ma$ √ $= (80 \times 10) + (80 \times 3)$ √ $= 1040$ N √	3 3
(b)	On attempting to jump the person exerts a backward force on the boat which √ exerts an equal forward force on the person because of the low friction between the boat and water, the boat moves backwards √ hence reduces the forward force on the person.√	3
(c)	$W = F \times d$ √ $= 1000 \times 30$ $= 30000\ J$ √	2