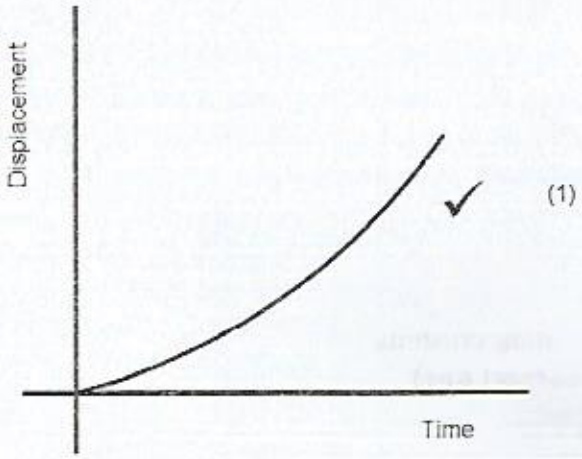
5.4 PHYSICS (232)

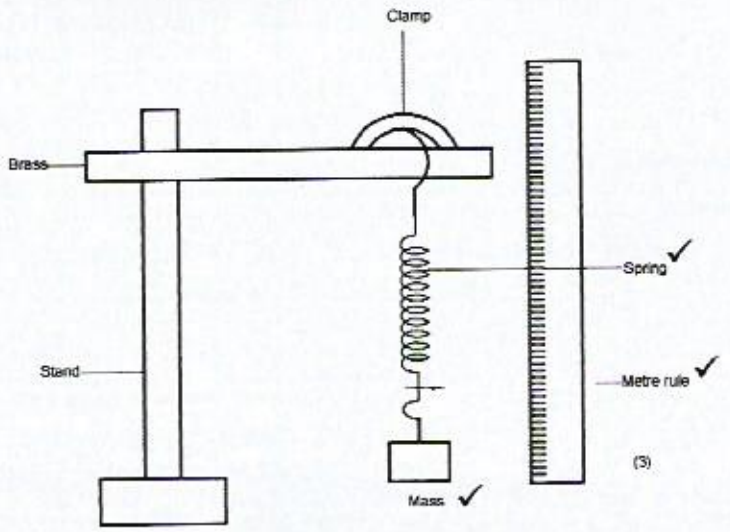
5.4.1 Physics Paper 1 (232/1)

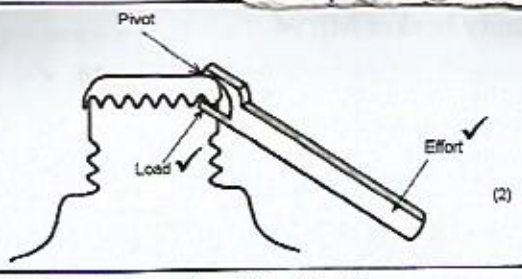
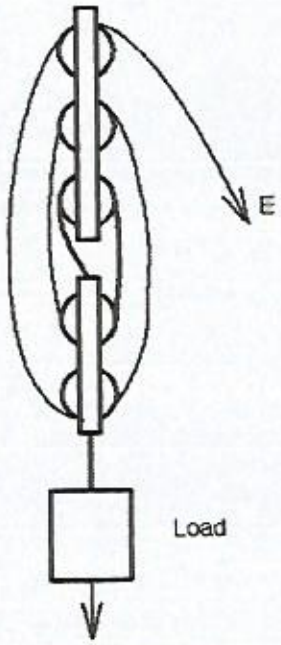
SECTION A (25 marks)

1.	Actual reading = 0.38mm (error) = 0.03 – Meter reading = 0.35mm ✓	(1 mark)
2.	On sucking air rushes into the straw ✓ through the hole making it difficult ✓ to reduce pressure in the straw by sucking	(2 marks)
3.	- Using detergents/impurities - Raising the temperature	(2 mark)
4.	The flask absorbs heat from the hands and first expands✓ hence level of liquid ✓ which expands more than the glass causing the rise. ✓	(3 marks)
5.	Wax on rod B drops off first. ✓ The thicker rod conducts heat faster than the thinner one. ✓	(2 marks)
6.		(1 mark)
7.	The box shifts the position of the center of gravity of the system towards the right hand ✓ to maintain equilibrium. The student leans in the opposite direction. ✓	(2 marks)

8.	Taking moments about the fulcrum Sum of clockwise moments = sum of anticlockwise moments $15x = 10(75 - x)$ $15x = 750 - 10x$ $25x = 750$ $x = 30$ $(x-5)10 = (80-x)15$ $25x = 1250$ $x = 50cm$ hence fulcrum at $75 - 30 = 45$ $45 + 5 = 50$ ✓	(3 marks)
9.	*Radian* is an angle subtended at the center of a circle by an arc of length equal to the radius of the circle. ✓ OR $r = \frac{360}{2\pi}$ **1 radian = 57.29°**	(1 mark)
10.	The assumptions are: the fluid is (i) flowing steadily, (ii) incompressible, (iii) non-viscous. **(any 2)**	(2 marks)
11.	$\rho = \frac{m}{v}$ ✓ $\rho = \frac{650g}{800cm^3}$ ✓ $0.8125gcm^{-3}$ ✓	(3 marks)
12.	C ✓ It has a smaller diameter hence a higher spring constant. ✓	(2 marks)
13	E (20N)✓ F = Ma, the smaller the mass, the higher the acceleration ✓	(2 marks)

SECTION B (55 Marks)

14.(a)	(i)  	(3 marks)
	(ii) - Force due to total mass hung. ✓ - Extension produced by hanging masses. ✓	(2 marks)
	(iii) - Plot a graph of force against extension. ✓ - Determines the slope of the graph ✓ to get $K = \frac{\Delta F}{\Delta e}$	(2 marks)
(b)	$K = \frac{F}{e}$ ✓ $= \frac{0.40}{0.60}$ $= 0.667$ ✓ $\therefore e = \frac{F}{K}$ $= \frac{65}{0.667}$ $= 0.975\text{cm}$ ✓	(3 marks)

15. (a)		(2 marks)
(b)	- Reducing the angle of inclination. - Reducing the friction – using rollers, lubricants etc.	(2 mark)
(c)	(i) 	(3 marks)
	(ii) V.R. = No, of strings supporting the load. = 4.5 ✓	(1 mark)
	(iii) $\eta = \frac{MA}{VR} \times 100$ ✓ $= \frac{600 \div 200}{5} \times 100$ $= 60\%$	(3 marks)
16. (a)	Heat capacity is the quantity of heat energy required to raise the temperature of a substance by 1K. ✓	(1 mark)
(b)	- Increase in pressure lowers the melting point while decrease in pressure raises/increases the melting point. ✓	(1 mark)

(c)	(i) - Measure the mass of the empty beaker M_1. ✓ - Measure the mass of the beaker plus the condensed steam M_2 ✓ - Get the difference between the two masses $(M_2 - M_1) = M$ ✓	(3 marks)
	(ii) - Voltage ✓ - Current ✓	(2 marks)
	(iii) - Assuming no heat is lost, ✓ Heat produced by heater = Heat used to produce steam. $VIt = mLv$ $\therefore Lv = \frac{VIT}{m}$ ✓	(2 marks)
	(iv) - Start timing when the steam drops start forming out steadily and Stop immediately the beaker is withdrawn. ✓	(1mark)
	(v) Steam is produced at boiling point where temperature is constant. ✓	(1 mark)
17. (a)	Continuous random motion of particles. ✓	(1 mark)
(b)	(i) It accelerates, velocity increases. ✓	(1 mark)
	(ii) As the ball falls through the fluid, the viscous drag increases ✓ until the sum of the viscous drag and the upthrust becomes equal ✓ the weight of the steel ball, hence the resultant force becomes zero. ✓	(3 marks)
(c)	(i) $S = ut + \frac{1}{2}gt^2$ ✓ But u = 0 $S = \frac{1}{2} \times 10 \times 4$ ✓ $= 20$ m ✓	(3 marks)
	(ii) $V = u + at$ ✓ $= 10 \times 4$ ✓ $= 40 ms^1$ ✓	(3 marks)

18. (a)	From $y = mx + c$, (P = nT + C) - m is the slope of the graph hence n is the slope, ✓ $\therefore$ slope n $= \frac{(8-4)\times10^2}{5-2}$ ✓ $= \left(\frac{4}{3}\right)\times10^2$ $= 1.33\times10^2\ Nm^{-2}K^{-1}$ n = $133Nm^{-2}K^{-1}$ ✓ C is the y intercept = $1.5\times$ ✓ $10^2\ Nm^2$ ✓ (extrapolated)	
(b)	It is not possible to reduce the pressure of a gas to zero since by then most ✓ of the temperatures are very low hence the ✓ gas liquefies.	(2 marks)
(c)	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ ✓ $\frac{760\times1.5\times10^{-3}}{273} = \frac{720\times V_2}{290}$ ✓ $V_2 = \frac{760\times290\times1.5\times10^{-3}}{273\times720}$ $= 1.682\times10^{-3}m^3$ ✓	(3 marks)
(d)	Assumptions of the kinetic theory of gases: - Attraction of between the molecules is negligible. ✓ - Volume of the molecule is negligible compared to the volume of the container occupied by the gas. ✓ - The molecules undergo elastic collisions. ✓ - The length of time of a collision is negligible compared to the time between collisions. ✓ **(Any three)**	(3 marks)