

KANDARA SUB-COUNTY FORM 3 JOINT EVALUATION

Kenya Certificate of Secondary Education

PHYSICS

Paper 1

October 2016

MARKING SCHEME

1. Reading = 6.45mm
 diameter = 6.45 - 0.14
 = 6.31mm ✓

2. $x = ut + \frac{1}{2}gt^2$
 = 0 + $\frac{1}{2} \times 10 \times 4^2$ ✓
 = 80m

3. $\frac{V_1}{T_2} = \frac{V_2}{T_2}$
 $V_2 = \frac{V_1}{T_1} \times T_2$
 = $\frac{200 \times 370}{300}$
 = 246.67cm³ ✓

4. $V = \frac{m}{\rho} = \frac{1.8}{9 \times 10^2}$

mass = $\frac{1.8}{9 \times 10^2} \times 1000$ ✓ = 2kg ✓

5. Clockwise moments = anticlockwise moments

$F_1 \times d_1 = F_2 d_2$ ✓
 $2 \times 30 = W \times 10$
 $W = \frac{60}{10} = 6.0N$ ✓

6. $A_1 V_1 = A_2 V_2$
 $24 \times 9 = A_2 \times 6$ ✓
 $A_2 = \frac{24 \times 9}{6} = 36cm^2$ ✓

7. a) Adhesive forces between water molecules and glass are stronger than cohesive force between water molecules ✓

b) Density reduces. This is because mass remains constant but volume increases ✓

8. $t = \frac{V}{A} = \frac{1 \times 10^{-6}}{3.14 \times 10^{-4}}$ ✓ = $3.183 \times 10^{-3}m$ ✓

9. Black surfaces are better absorbers of heat than white / shiny hence white feels cooler ✓

10. $W = ke$ ✓
 = 75 x 0.35 ✓
 = 26.25N ✓

11. $P_{max} = \frac{\text{force}}{\text{min area}} = \frac{6.0}{0.004} = 15000N/m^2$ ✓

12. - mercury is dense heavy ✓
 - mercury does not stick on glass ✓

13. a) For a helical spring the extension is directly proportional to the force producing it provided that elastic limit is not exceeded ✓

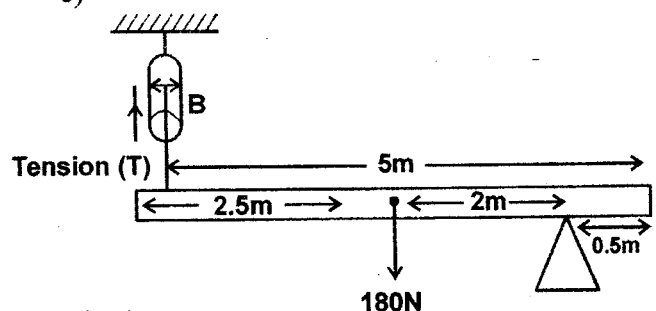
b) i) let original length be = x
 $e = 13 - x$ and $e = 15 - x$ } for both
 $e = \frac{f}{k} = \frac{50}{k}$ and $\frac{80}{k}$ }
 $\therefore 13 - x = \frac{50}{k}$ and $15 - x = \frac{80}{k}$ ✓ both

$15k - kx = 80$ }
 $13k - kx = 50$ } ✓
 $2k = 30$
 $k = 15$ ✓

ii) $k = 15$ ✓
 $x = 13 - \frac{50}{15}$

$x = 9.667cm$ ✓

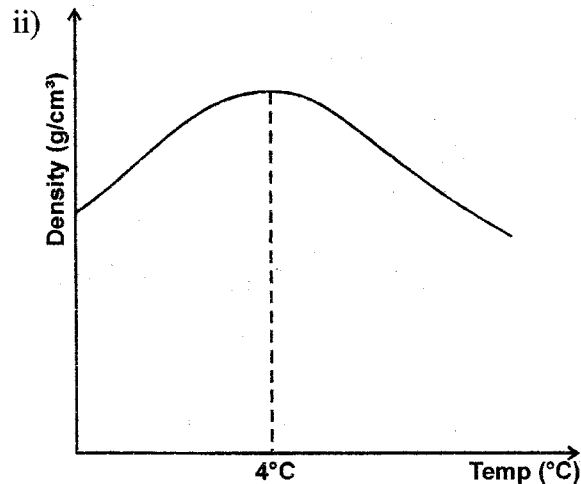
c)



$$\begin{aligned} \text{ii) } T \times 4.5 &= 180 \times 2 \checkmark \\ T &= \frac{360}{4.5} \checkmark = 80\text{N} \checkmark \end{aligned}$$

14. a) Temperature measured in Kelvin while heat is measured in Joules ✓

$$\begin{aligned} \text{b) i) } P &= 4^\circ\text{C} + 273 \checkmark \\ &= 277\text{K} \checkmark \end{aligned} \left. \vphantom{\begin{aligned} P \\ = 277\text{K} \end{aligned}} \right\} \text{ accept } 4^\circ\text{C} \checkmark \checkmark$$



Correct shape with maximum at 4°C

$$\begin{aligned} \text{iii) I. Heat supplied (Q)} &= P \times t \\ &= 300 \times 5 \times 60 \\ &= 90,000 \text{ Joules} \checkmark \end{aligned}$$

$$\begin{aligned} \text{II. Heat capacity} &= \frac{(Pt)}{\Delta\theta} \checkmark \\ &= \frac{90,000}{40} \checkmark = 2250 \text{ JK}^{-1} \end{aligned}$$

$$\text{III. } 2250 = MC \checkmark$$

$$M = \frac{2250}{C} = \frac{2250}{4200} \checkmark = 0.5357\text{kg}$$

15. a) Friction ✓
Weight of lower block ✓

b) i) To change direction of effort ✓

$$\text{ii) I. V.R} = 6 \checkmark$$

$$\text{II. M.A} = \frac{L}{E} \checkmark$$

$$= \frac{284}{71} \checkmark$$

$$= 4 \checkmark$$

$$\begin{aligned} \text{III. E} &= \frac{M.A}{V.R} \times 100\% \checkmark \\ &= \frac{4}{6} \times 100 \\ &= 66.67\% \checkmark \end{aligned}$$

16. a) Thermometer ✓
Bunsen burner / heater ✓ } (could be in the diagram)

b) To distribute heat equally / uniformly for uniform heating of air ✓

c) To measure the pressure of the air at various temperatures ✓

d) -273°C

$$\begin{aligned} \text{e) } \frac{P_1 V_1}{T_1} &= \frac{P_2 V_2}{T_2} \\ \frac{1.5 \times 10^5 \times 1.6}{285} &= \frac{1.0 \times 10^5 V_2}{273} \checkmark \end{aligned}$$

$$\begin{aligned} V_2 &= \frac{1.5 \times 10^5 \times 1.6 \times 273}{285 \times 1.0 \times 10^5} \checkmark \\ &= 2.299\text{m}^3 \checkmark \end{aligned}$$

17. a) Impulse equal change in momentum or force x time ✓

$$\begin{aligned} \text{b) i) Impulse} &= mv = mu \\ &= 1000 \times 0 - 1000 \times 10 \checkmark \\ &= -10,000 \text{ kgm/s} \checkmark \end{aligned}$$

$$\begin{aligned} \text{ii) Impulse} &= Ft \\ F &= \frac{-10000}{0.4} \checkmark = -25,000\text{N} \checkmark \end{aligned}$$

c) i) When two or more bodies collide their total momentum remains a constant provided no external forces are acting ✓

$$\begin{aligned} \text{ii) I. } m_1 u_1 + m_2 u_2 &= m_1 v_1 + m_2 v_2 \checkmark \\ 5 \times 10 + 10 \times 4 &= 5 \times 7 + 10 v_2 \checkmark \\ 90 &= 35 + 10 v_2 \\ v_2 &= \frac{90 - 35}{10} \checkmark \\ &= 5.5\text{m/s} \checkmark \end{aligned}$$

II. Elastic collision ✓