



(Kenya Certificate of Secondary Education)



INTERNAL MOCK EXAM  
**PHYSICS**  
(THEORY)  
Dec. 2020– 2 Hours

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## MARKING SCHEME

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### Instructions to candidates

- a) Write your Name, Index, Admission number and stream in the spaces provided above.
  - b) Sign and write the examination date on the spaces provided above.
  - c) This paper consists of Two sections; **A** and **B**
  - d) Answer all the questions in sections A and B in the spaces provided
  - e) All workings **must** be clearly shown.
  - f) Non-programmable silent electronic calculators may be used.
  - g) All your answers must be written in the spaces provided in the question paper.
  - h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
  - i) **Candidates must answer the questions in English.**
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1. Volume =  $12 - 3 = 9 \text{ cm}^3$ . ✓  
 Density =  $\frac{\text{mass}}{\text{volume}}$  or  $\rho = \frac{m}{V}$  ✓  
 or  
 $\rho = \frac{18.0}{9}$   
 $= 2.0 \text{ g cm}^{-3}$  ✓
2. The volume decreases ✓. The pressure exerted on the balloon due atmospheric air increase ✓.
3.  $F = 100 \text{ N}$  ✓.
4. The pollen grains move faster / more vigorously ✓. The kinetic energy/velocity of the water molecules increase transferring more kinetic energy to the pollen grains ✓.
5. Brass expands more than invar ✓. The bimetallic strip curls more moving the pointer in the clockwise ✓.
6. The bench, the stand and the hand all have the same temperature ✓. No conduction of heat ✓.
7. Volume of oil drop = volume of oil patch  
 $= \pi r^2 t$  ✓  
 $6.0 = \pi \left(\frac{350}{2}\right)^2 t$   
 $t = 6.234 \times 10^{-5} \text{ mm}$  or  $6.234 \times 10^{-8} \text{ m}$  ✓
8. (Sum of )clockwise moments = (Sum of )anticlockwise moments/  $F_1 d_1 = F_2 d_2$  ✓  
 or  
 $40 \times 0.5 = W \times 0.5 + 10 \times 1.5$   
 $W = 10 \text{ N}$  ✓
9. B has more weight/mass at the top than A ✓ hence the position of its centre of gravity is higher ✓.
10. The diameter of pipeline decreases. } Any one ✓  
 The pipeline has a sharp bend. }
- 11.

✓

12. The milk in the bottle covered with wet is cooled by evaporation while the milk in the bottle in cold water is by rise in temperature of cold the water ✓. Evaporation requires more heat than that needed to raise the temperature of water ✓

13.

✓

14. Wire of spring A is thicker than that of spring B. }  
Diameter of spring A is smaller than that of spring B. } Any two ✓✓  
Spring A has fewer turns (per unit length) than spring B }

15. a) (i) The sphere accelerates ✓ with reducing acceleration ✓ until it attains terminal velocity or acceleration becomes zero.  
 (I)  $60\text{ms}^{-1}$  ✓  
 (II) It remains constant until the sphere reaches the bottom ✓
- (ii) Distance = 'area under the graph' ✓  
 $= (35 + \frac{1}{2} \times 10) \text{ squares} \times 100$  ✓  
 $= 4000\text{m}$  ✓
- b) (i) A – Viscous drag ✓ B – weight ✓.  
 (ii) Weight = Upthrust + Viscous drag/ B = U + A ✓
16. a) (i) Velocity ratio =  $\frac{\text{Effort distance}}{\text{Load distance}} = \frac{2\pi R}{2\pi r}$  ✓ =
- (ii) I.  $V.R = \frac{R}{r} = 5$  ✓
- II.  $\eta = \frac{M.A}{V.R} \times 100\% = \frac{45}{5} \times 100\%$  ✓  
 $90\% = \frac{100}{5} \times 100\%$   
 $W = 450\text{N}$  ✓
- b) (i) Total momentum before collision = total momentum after collision  
 $\frac{100}{1000} \times 250 = (19.9 + 0.1)v$  ✓  
 $v = 1.25\text{ms}^{-1}$  ✓
- (ii)  $\Delta K.E = \frac{1}{2}(0.1 \times 250^2 - 20 \times 1.25^2)$  ✓  
 $= 3109.375\text{J}$  ✓
- (iii)  $\frac{1}{2}mv^2 = mgh$   
 $\frac{1}{2} \times 20 \times 1.25^2 = 20 \times 10h$  ✓  
 $h = 0.078125\text{m}$  ✓
17. a) (i)  $m_2$  ✓. it requires a larger centripetal force than  $m_1$  ✓.  
 (ii) Friction( between the masses and the turntable ✓).
- b) (i) Weight ✓ and tension ✓.  
 (ii)  $\omega = \frac{v}{r} = \frac{0.12}{0.2 \times 0.5}$  ✓  
 $= 1.2\text{rads}^{-1}$  ✓
- (iii)  $F = mr\omega^2 = 0.3 \times 0.2 \times 1.2^2 = 0.0864\text{N}$  ✓
18. a) (i) Similarity - both involve the change of state from liquid to gaseous/both require heat energy ✓  
 Difference – evaporation occurs only on the surface of the liquid while boiling occurs throughout the liquid/ Evaporation at all temperature boiling occurs at a specific temperature. ✓

- (ii) P. ✓ In P heat is used raise water to a higher temperature while in Q some heat is used to melt ice hence the temperature rise is lower ✓
- b) 
$$Q = mc_i\Delta\theta_i + mL_f + mc_w\Delta\theta_w + Cc\Delta\theta + mL_v$$
$$= 0.5 \times 2100 \times 20 + 0.5 \times 3.36 \times 10^5 + 0.5 \times 4200 \times 100 + 300 \times 120 + 2.26 \times 10^6$$
$$= 1.565 \times 10^6 \text{ J}$$
- c) (i) Energy required when the gas expands is obtained from the gas molecule thus cooling the gas.

$$(ii) \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \checkmark = \frac{4.0 \times 10^5 \times 0.5}{300} = \frac{P_2 \times 10}{290} \quad \checkmark$$

$$P_2 = 1.933 \times 10^4 \text{ Pa} \quad \checkmark$$

19. a)

✓  
✓

b) In water, the weight of the object is greater than the upthrust while in liquid L, the weight is equal to the upthrust.

c) (i)  $U = mg + T = V\rho_w g \quad \checkmark$   
 $= 10 \times 10 + 50 = 1000 \times 10 \text{ V} \quad \checkmark$   
 $V = 0.015 \text{ m}^3 \quad \checkmark$

(ii)  $\rho = \frac{m}{V} \quad \checkmark = \frac{10}{0.015} = 666.67 \text{ kgm}^{-3} \quad \checkmark$

d) The air is compressed ✓ and more enters the test tube ✓. The average density of the test tube and its contents becomes greater than the density of water ✓