

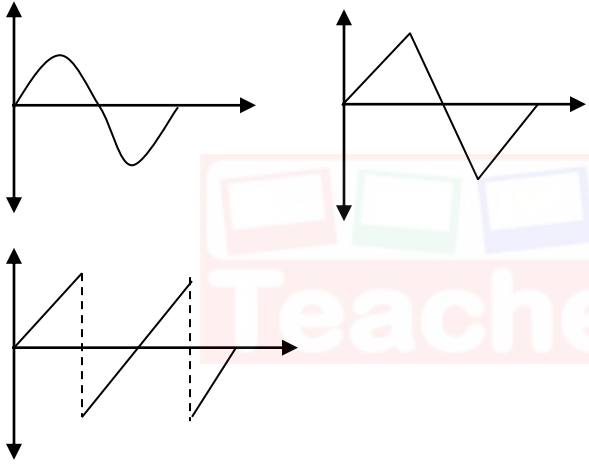
KCSE PHYSICS PAPER 232/1 2024

MARKING SCHEME.

NOTE:

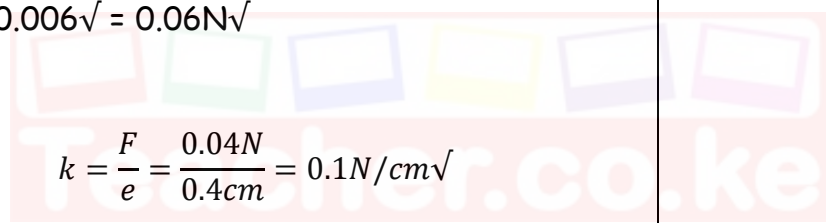
- The underlined part indicates the marking point and must be seen in the response or its equivalent as indicated in the side notes.
- What is enclosed in the brackets may be omitted in the response.
- Formula can be implied in the correct substitution.
- **CORRECT SUBSTITUTION** does not make a wrong formula correct.

NO	EXPECTED RESPONSE.	SIDE NOTES	MAR KS
1.	At 3.1cm√ The coincidence of the 5 th vernier mark √	Do not mark on student's own diagram. Mark 2 is dependent of mark 1. 3.0cm mark of the main scale must be indicated. 4.0cm not a must indicated. Coincidence must be before the 4.0 mark.	2
2.	Weight is (dependent on force of gravity which is) always <u>directed towards the centre</u> (of the Earth/planet/celestial body)(hence a vector quantity.)		1
3.	Meta A expands more/faster than B (forcing it to bend inwards). Or Metal A has higher expansivity.		1
4.	The <u>turning effect of a force is given by Force x Distance.</u> √/clockwise moment equals anticlockwise <u>moment</u> Heavier child has higher force hence to balance, <u>the distance should be reduced.</u> √	Emphasis on reduction of distance and balancing(principle of moment) Deny reduction of	2

		force.	
5.	By leaning on the opposite side. Or Raising the opposite/other hand.	Any one	1
6.	When the piston is pushed inwards, <u>the air above the tube moves faster/with increased velocity/with higher velocity/speed, √</u> Causing <u>a region of low(er) pressure√</u> above the tube hence the liquid rises and mixes with air and is sprayed out. The vent allows the <u>higher atmospheric pressure to act on the liquid to push√</u> it up the tube/higher atmospheric pushes the liquid up/ pressure difference causes the liquid to rise up.		3
7.		√ positive side √ negative side √ complete cycle. Marks are independent. The cycle must start with positive at zero/origin.	3
8.	Viscosity is friction/resistance (to motion) in fluids. or Friction in fluids. or Resistance in fluids.	Allow friction or resistance alone	1
9.	$VR = \frac{\text{effort distance } E. d.}{\text{load distance } L. d.} = \frac{0.32}{0.2} \sqrt{=} 1.6\sqrt{}$	If the formula is correct and substitution, award the substitution mark at the formula.	2
10.	As the bubble rises up, <u>the pressure due to the water column surrounding the bubble is reduced√</u> therefore	Deny pressure of the bubble.	2

<p>15.</p>	<p>a)</p> <p>i. Hooke's law or its correct statement.</p> <p>ii. Stand, clamp and boss (<i>accept just stand</i>)</p> <p>iii. (recording the length and the mass) determine the extension and force. ✓ Plot a graph of Force against extension. ✓ It is a straight line through the origin. ✓</p> <p>Or</p> <p>Determine the extension and force. ✓ Compute $F/e = k$. (several values.) ✓ F/e is constant. ✓</p> <p>b) $k = \frac{F}{e} = \frac{0.04N}{0.004m} = 10N/m$ ✓</p> <p>When $e = 0.006m$ $F = 10 \times 0.006 = 0.06N$ ✓</p> <p>Or</p> $k = \frac{F}{e} = \frac{0.04N}{0.4cm} = 0.1N/cm$ <p>When $e = 0.6cm$ $F = 0.1 \times 0.6 = 0.06N$ ✓</p> <p>Or</p> <p>0.4cm \implies 0.04N 0.6cm \implies F</p> $F = \frac{0.6 \times 0.04}{0.4} = 0.06N$ <p>Or</p> $F = \frac{0.04}{0.004} \times 0.006 = 0.06N$ <p>Or</p> $\frac{F_1}{e_1} = \frac{F_2}{e_2} \quad \frac{0.04}{0.004} = \frac{F_2}{0.006}$ <p>$F_2 = 0.06N$ ✓</p>	<p>Watch out for contradiction</p>	<p>1</p> <p>1</p> <p>3</p> <p>3</p>
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Download this and other FREE revision materials from https://teacher.co.ke/notes</p>	<p>c)</p> <ul style="list-style-type: none"> ➤ Using a thinner rod to coil the wire hence reduce the diameter of the spring. ➤ Make turns closer so as to have more turns per unit length. ➤ Using a shorter piece of wire to have a shorter spring/reduce the length of the spring. ➤ Reduce turns to make a shorter spring. ➤ Reduce distance between the turns/coils. ➤ Compressing spring until elastic limit is reached. 	<p>(any two)</p> <p>No mark for shorter wire only.</p> <p>No mark for compressing spring only.</p>	<p>2</p>
			<p>10</p>
<p>16.</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Download this and other FREE revision materials from https://teacher.co.ke/notes</p>	<p>a)</p> <ol style="list-style-type: none"> I. Switch on the ticker timer and release the ball to fall freely. ✓ II. Get the time between dots from the frequency of the timer. ✓ III. Determine the initial and final velocities. IV. Use $a = \frac{v-u}{t}$ to determine acceleration due to gravity. ✓ <p>Or</p> <ol style="list-style-type: none"> I. Switch on the ticker timer and release the ball to fall freely. ✓ II. Obtain total time for several dots. ✓ III. Determine u and v. ✓ IV. Measure the distance between u and v and determine the acceleration a(g) using $v^2 = u^2 + 2gS$ or $S = ut + \frac{1}{2} gt^2$ ✓ <p>or</p> <ol style="list-style-type: none"> I. Switch on the ticker timer and release the ball to fall freely. ✓ II. Using distance charts, obtain the average velocities. ✓ III. Plot a average velocity against time graph. ✓ IV. Determine the slope of the graph which is the acceleration due to the gravity a. ✓ 	<p style="text-align: center; opacity: 0.5;">Teacher.co.ke</p>	<p>4</p>

b) At maximum height $T = 0$ when the velocity required is minimum.

Centripetal force = weight of the stone

$$\frac{mv^2}{r} = mg$$

$$v = \sqrt{rg}$$

$$v = \sqrt{1 \times 10} = 3.162 \text{ m/s} \quad (4 \text{ sf a must})$$

Or

$$\frac{mv^2}{r} - mg = T \quad \text{and } T = 0$$

$$\frac{mv^2}{r} = mg$$

$$V = 3.162 \text{ m/s}$$

Or

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$T = 2 \times 3.142 \times \sqrt{\frac{1}{10}} = 1.985236$$

$$T = \frac{2\pi}{\omega}$$

$$\omega = \frac{2\pi}{1.985236} = 3.1626$$

$$v = \omega r$$

$$= 3.1626 \times 1 = 3.162 \text{ m/s}$$

c)

- Construction of speed governors.
- Separation of mixtures using centrifuges
- Launching of satellites.
- Somersaulting.
- Banking tracks.
- Rounding a bend.
- Merry go round.
- Turn tables
- Hammer and discus throwing.
- washing machines.

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$T = \frac{2\pi}{\omega}$$

$$v = \omega r$$

(1 formula mark for the three formulas together)

4

Any application of circular motion

2

10

<p>17.</p>	<p>a) salt is <u>an impurity</u> which <u>lowers the melting point</u></p> <p>b) -weight of the solid/force applied/load -base area/area of contact. (<i>deny surface area</i>)</p> <p>c) i. Heat lost (by hot water) = heat gained (by cold water) Or $m_h c \Delta T = m_c c \Delta T$ / $m_h c \Delta \theta = m_c c \Delta \theta$ $2c(70 - \theta) = 3c(\theta - 22)$ or $2 \times 4200 \times (70 - \theta) = 3 \times 4200 \times (\theta - 22)$ $\theta = 41.2^\circ\text{C}$ <i>Substitution can also be $2(70 - \theta) = 3(\theta - 22)$ since c cancels out.</i> Or $2 \times 4200 \times 70 + 3 \times 4200 \times 22 = 5 \times 4200 \times \theta$ $\theta = 41.2^\circ\text{C}$ Or Let the change for cold water be θ. New temperature will be $22 + \theta$ New temperature change for warm water = $70 - (\theta + 22)$ $2c(70 - (\theta + 22)) = 3c\theta$ $\theta = 19.2^\circ\text{C}$ New temperature = $19.2 + 22 = 41.2^\circ\text{C}$ Or Let the reference temperature be 20 (or any other temp) and change in temperature to the new final temperature be θ $2c(70 - 20) + 3c(22 - 20) = (2 + 3)\theta$ $100 + 6 = 5\theta$ $\theta = 21.2^\circ\text{C}$ new final temp = $20 + 21.2 = 41.2^\circ\text{C}$ or</p>	<p>2</p> <p>2</p> <p>3</p> <p>Formula Substitution Answer</p>	<p>2</p> <p>2</p> <p>3</p>
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Let the reference temperature be 100 (or any other temp) and change in temperature to the new final temperature be θ

$$2c(100-70) + 3c(100-22) = (2+3)c\theta$$

$$60 + 3 \times 78 = 5\theta$$

$$60 + 234 = 5\theta$$

$$\theta = 58.8^\circ\text{C}$$

therefore new temperature = $100 - 58.8 = 41.2^\circ\text{C}$

ii.

Heat absorbed by the container.

Conduction by the container.

Evaporation (of the hot water).

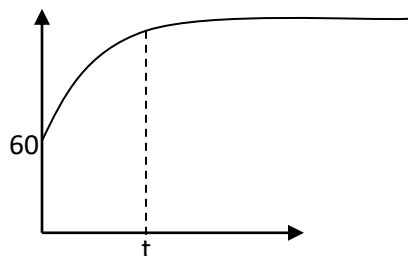
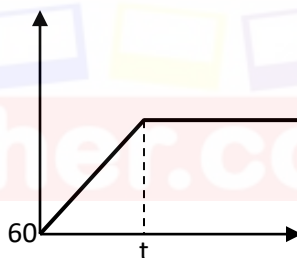
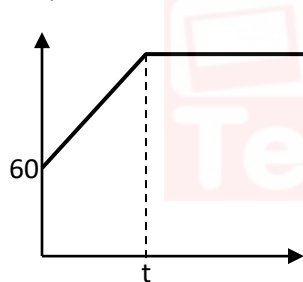
Radiation of the heat from the container.

Heat lost through convection.

(deny heat lost to the environment or surrounding only)

d)

i.



ii. Temperature of the water rises until it reaches boiling point/100/becomes constant. ✓
 When there is change of state at constant ✓temperature/constant temperature because of absorption of latent heat (of vaporisation)
 Latent heat absorbed to change state to gas.

2

Any two

2

✓ for the shape.
 ✓ for indication of 60 and t

The two marks are independent.

2

13

18.	<p>a) Pressure in liquids increases with depth $P = \rho gh$ / pressure at bottom is greater than at the top. The bottom should be thicker to <u>withstand the high(er) pressure.</u></p> <p>b)</p> <p>i. $\frac{F_1}{A_1} = \frac{F_2}{A_2}$ Alt. $P_1 = P_2$ $P = \frac{F}{A} = \frac{200}{0.2} = 1000$ $F_2 = \frac{200 \times 4}{0.2}$ $= 4000N$ $F = 4000N$</p> <p>ii. Water is corrosive (to internal parts) Water vaporises easily. Water has low viscosity. Water has high freezing point. Water has low boiling point Water becomes lubricant.</p> <p>c)</p> <p>i.</p> <div data-bbox="406 1176 844 1407" data-label="Diagram"> <p style="text-align: center;">Figure 8</p> </div> <p>ii. <u>Increasing load arm</u> by putting the load as far as possible from the fulcrum. Or <u>Reducing the effort distance</u> by bringing effort closer to the fulcrum/ holding closer.</p> <p>iii. Increasing the efficiency</p>	<p>3</p> <p>3</p> <p>Any two</p> <p>2</p> <p>All three must be labelled correctly</p> <p>1</p> <p>2</p> <p>1</p>	<p>3</p> <p>3</p> <p>2</p> <p>1</p> <p>2</p> <p>1</p> <p>10</p> <p>55</p>
SECTION TOTAL		55	