KENYA CERTIFICATE OF SECONDARY EDUCATION

KENYA NATIONAL EXAMINATION COUNCIL 2023

PHYSICS PAPER 232/1

COORDINATED MARKING SCHEME

NB:

The underlined parts of the response are key marking points.

The words/phrases in brackets do not have to be there. They may miss in the response.

The absence of 0 when it is subtracted or added to a number is accepted. Eg Q 18b

The absence of 1 where a number is multiplied or divided with one is accepted. Eg Q4

SECTION A			
NO	**EXPECTED RESPONSE**	**MARKS**	**SIDE NOTES**
1.	Determination of the age of matter/fossils by carbon dating/radioactivity Or Carbon dating in archeology. Or Study of historical photos eg using magnifying equipments. Or Use of magnetim in compass during early day exploration.	1	The response must show aspects in both physics and history
2.	Due to weaker intermolecular forces in gases (than in liquids). Or Gases have lower density. Or Gas molecules have higher kinetic energy.	1	Do not accept lighter for lower density Comparative wording a must
3.	i. Tank A/A/silverly tank√	1	
	ii. Tabk A is a (poor absorber and) a poor emitter of heat√, hence most of the heat gained during the day will be √retained making tank A to have warmer water (than tank B) /tank A has warmer water (than tank B)	2	Comparative wording a must for warmer

4.	(sum of) clockwise moments = (sum of) anticlockwise moments Or $F_1d_1 = F_2d_2$ √ (do not accept $W_1d_1 = W_2d_2$) F x 20 = 1 x 60√ Or Fx0.2 = 1 x 0.6 F = 3N√ F = 3N Accept **F x 20 = 60 for substitution**	3	Award ½ mk for correct answer without units and no mark for wrong units
5.	F =ke√ $k = \frac{2.0 \times 10^{-1}}{16 \times 10^{-2}}$ K = 12.5N/m√ F =ke√ $k = \frac{0.2}{1.6}$ K = 0.125N/cm√ F =ke√ 0.4 = ke 0.6 = k(e +1.6) e = 3.2cm $k = \frac{0.4}{3.2} = 0.125\text{N/cm}$√ Or $k = \frac{0.6}{1.6 + 3.2} = 0.125\text{N/cm}$	2	Award ½ mk for correct answer without units and no mark for wrong units
6.	a) In anticlockwise direction/to the left/cork side/open end b) On heating air (in the tube) expands√ (and cork moves/is pushed to the left) hence shifts the position of the centre of gravity away from pivot √ Or More anticlockwise moment than clockwise moment.	1 2	
7.	As K spins, air below moves faster tha air above √creating a region of lower pressure below. √ / pressure difference. Therefore K experiences greater acceleration due to external force/ greater downward force√ acting on it which is not experienced by L.	1 1 1	Comparative wording a must.
8.	Object move with a certain initial velocity then decelerates non-uniformly to a stop/with decreasing deceleration/retardation. √ Then it accelerates non-uniformly / with increasing acceleration√ back to starting velocity.	1 1	
9.	$KE_{(max)} = mgh$√ = 0.25 x 10 x 0.2√ = 0.5J√ $KE = \frac{1}{2}mv^2$ & $v = \sqrt{2gh}$√ (both) $v = \sqrt{2 \times 10 \times 0.2}$ v =2m/s $KE = \frac{1}{2} \times 0.25 \times 2^2$√ = 0.5J√	3	For formula mark in the second option accept $KE = \frac{1}{2}mv^2$ + any linear motion equation(s) which will give v. Award ½ mk

			for correct answer without units and no mark for wrong units
10.	• Raduis of the curve/path. Accept radius • Mass (of the car) • Nature of the surface/friction/friction between the surfaces • Condition of the tyres	Any one 1	
11.	Steam has (high) latent heat (of vaporisation)/more heat energy (per unit mass) (than boiling water).	1	
12.	Force pump can lift warer to a height greater than 10m/barometric height/atmospheric height. Or Can lift water to greater height (comparative) Or Force pump provides continous flow of water/liquid	1	
13.	• (parallax) error when reading temperature scale & height. • Wrong reading because of non-uniform tube./wrong reading of volume. • Fluctuation of pressure during the experiment.	1 Any one	
	TOTAL	25	
SECTION B			
14.	a) ➢ Has lower freezing/melting point√ ➢ Has higher expansivity √/more sensitive thus gives a longer column than mercury fro the same temperature change b) i. I. X allows for expansion√ (of the liquid) II. To push the indices √ (so that maximum and minimum temperaturs can be measured) ii. Steel is magnetic √hence allows the resetting of the thermometer. iii. When the sorrounding temperature rises, the alcohol expands√ pushing the mercury which pushes	2 1 1 1 3	

	index B upwards. √ When the temperature drops alcohol contracts but index B remains at the highest temperature point√ hence readingf is noted when required. iv. Mercury has stronger cohesive forces than adhesive forces. v. Heat/warm the neck of the bottle √to increase its size/expand √thus allowing the cork to be removed. Allow expansion of bottle or air inside the bottle.	1 2	
	Total	11	
15.	a) i. Due to friction/frictional force√ Kinetic energy of the trolley is used to work against friction √ (hence it stops eventually when all the energy is used) ii. When the vehicle is stopped, the passenger tends to continue moving√ (with the speed of the vehicle) due to inertia√ (causing the forward jerk) b) X It attains a higher (terminal) velocity √caused by less viscous drag √due to water. Or Water is less viscous/less sticky/ has lower viscosity √ (than glycerine) hence allows higher (terminal) velocity. √ c) W =m(g +a) √ = 60(10 +0.25) √ =615N√ Or 60(g + 0.25) √ =15+ 60g√ Allow no units Allow use of other correct values of g and follow through. d) ○ Lubrication/oiling/greasing ○ Use of rollers.	2 2 1 2 3 1	

	○ Use of ball bearings. ○ Air cushioning. ○ Smoothening. ○ Magnetic repulsion. ○ Levitation.	any	
	Total	11	
16.	a) i. Q sinks deeper/ more. √ ii. So as to displace equal volume of water√ to achieve equal upthrust as P. √ Or it has a smaller cross sectional area to achieve equal upthrust as P. Or i. Q sinks. √ ii. It will displace less volume of water compared to P√ hence will experience less upthrust√ b) i. $RD\ of\ metal = \frac{wight\ of\ block(\ in\ air)}{loss\ of\ weight\ in\ water(upthrust\ in\ water)}\sqrt{}$ $= \frac{0.6}{0.6-0.5}\sqrt{} = \frac{0.6}{0.1}$ = 6√ ii. $RD\ of\ the\ liquid = \frac{upthrust\ in\ liquid\ L}{upthrust\ in\ water}\sqrt{}$ $= \frac{0.6-0.54}{0.6-0.5} = \frac{0.06}{0.1}\sqrt{}$ = 0.6√ iii. Density of liquid L = RD $_L$ X density of water√ = 0.6 x 1000 = 600kg/m^3 √ Or 0.6 x 1 = 0.6g/cm^3 Or 0.6ρ	1 2 3 3 2	Look out for Transfer of Error (TE) from part ii
	Total	11	

17.	a) i. I. Diameter of patch = 8cm Area of patch = πr^2√ =3.142 x 4 x 4 = 50.272cm^2√ Or $^{22}/_7$ x 4 x4 = 50.29 cm^2 (4 sf must)	2	4 sf must
	II. $diameter\ of\ molecule = \frac{volume\ of\ drop}{area\ of\ patch}$√ Or $\frac{4}{3}\pi r^3 = \pi R^2 h$ Where h = diameter/size/thickness of molecule $d = \frac{6.55 \times 10^{-5}}{50.272}$√ =1.302 x 10^{-6}cm√	3	Look out for Transfer of Error (TE) from part i
	ii. ○ The oil drop is a <u>perfect</u> sphere. ○ The oil patch is a <u>perfect</u> circle. ○ The patch is monolayer/ one molecule thick. ○ The patch is <u>perfect</u> cylinder one molecule thick	2	
	iii. (parallax) error when measuring diameter of the patch. √ Temperature changes during experiment which might affectthe diameter of the patch. √	2	
	b) Obtain the volume spilled. √ Use the thickness of the molecule of theoil to calculate the extent/area of spillage using A = $^V/_t$√	2	
	Total	11	

18.	a) i. M has higher reading (than L) or L has lower reading (than M) ii. M has lower <u>specific</u> heat capacity√ hence requires <u>less</u> heat energy √to cause the (same) temperature change as L or by 1^0C. iii. Lagging using a poor conductor of heat Covering the calorimeter. Polishing /painting shiny b) Heat lost (by water) = heat gained (by ice) √ Or $m_w c_w \Delta T = m_i L_f + m_i c_w \Delta T$ $0.05 \times 4200 \times (25-T)$ √= $0.005 \times 3.5 \times 10^5 + 0.005 \times 4200 \times (T-0)$ √ $T = 15.15^0C$√ at least 4 sf c) When covered, the <u>pressure above the food increases</u>√ hence <u>raising the boiling point</u>√ of water making the food to boil at a higher temperature hence cooking faster.	1 1 1 2 1 2 1 2	
	Total	11	
	SECTION B TOTAL	55	