URANGA PHYSICS EXAMINATION

Kenya Certificate of Secondary Education

232/1 PHYSICS **Paper 1**

(Theory)

4TH EDITION (JAN. 2022) – TIME 2 Hours

Name:……..…….……School: ……..…….……

Class ……..Adm No…….. …… Index Number……...……

Candidate's Signature…… Date: ……

Instructions to candidates

*i. Write your **name, index number, class** and **school** in the spaces provided above.*
*ii. **Sign** and **Write** the date of Examination in the spaces provided above.*
*iii. This paper consists of **two** sections; **A** and **B.** Answer **all** the questions in section **A** and **B** in the spaces provided.*
*iv. All working **must** be clearly shown.*
*v. **Silent non-programmable** electronic calculators may be used.*
*vi. Candidates should answer the questions in **English**.*

FOR EXAMINERS USE ONLY

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	16	
	13	08	
	14	09	
	15	12	
	16	10	
TOTAL SCORE		**80**	

This paper consists of 14 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

Answer all the questions in this section

1. A burette has an initial reading of 40.0 cm^3. Some 24 drops of water each of volume 0.5cm^3 are added into the instrument. What is the final volume of water in it? **(2 marks)**

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2.

(a) Name two forces that determine the shape of liquid drop on a solid surface. **(2 marks)**

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(b) If an umbrella is touched with finger on inner surface when it is raining, it allows the rain water to leak through. Give a reason. **(1 mark)**

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3. The barometric height in a town is 55cmHg. Given that the standard atmospheric pressure is 76cmHg and the density of mercury is 13.6g/cm^3, determine the altitude of the town. (Density of air is 1.25kg/m^3) **(2 marks)**

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4.

i. What is Brownian motion? **(1 mark)**

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ii. A measuring cylinder contains $20cm^3$ of water. $10cm^3$ of salt is added and stirred. Explain why the new volume is not $30cm^3$. **(1 mark)**

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5. **Figure 1** shows samples of same liquid in beakers B and C being heated through a well-lagged copper rod of non-uniform thickness. A thermometer is placed on each sample for some time.

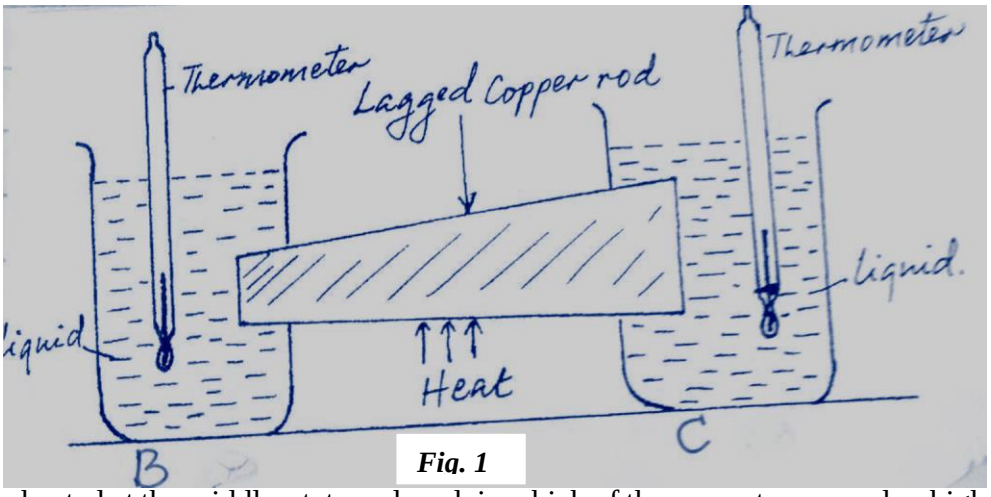

Fig. 1

If the rod is heated at the middle, state and explain which of thermometers records a higher temperature. **(2 marks)**

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6. **Figure 2** shows a uniform meter rule balancing when a mass of 200g is hung at one end.

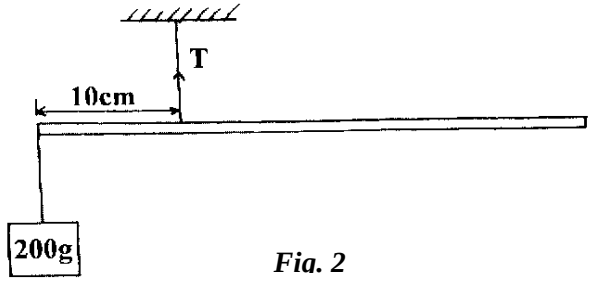

Fig. 2

Determine the tension T in the string. **(2 marks)**

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7. State the Hooke's Law. **(1 mark)**

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8. **Figure 3** shows a Bunsen burner.

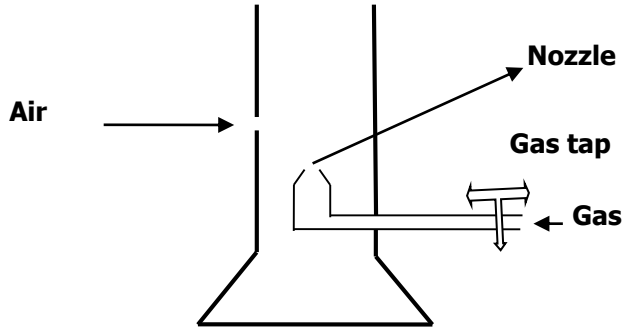

Fig. 3

Explain how air is drawn into the burner when the gas tap is open. **(2 marks)**

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9. A can containing only air is tightly screwed and left in strong sunlight. Using kinetic theory of gases explain how the pressure inside the can will be affected. **(3 marks)**

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10. A form four girl did an experiment using a simple pendulum of length **120 cm** to determine the acceleration due to gravity. She timed for **50** oscillations (***using a stop watch***) and got the result indicated in **figure 4** below.

Fig. 4

(a) Record the indicated time in SI units. **(1 mark)**

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(b) From the information above, determine the value of acceleration due to gravity, g, from the formula $\boldsymbol{T}^2 = \frac{\boldsymbol{4\pi^2 l}}{\boldsymbol{g}}$ where **T** is periodic time. (Take $\pi = 3.142$) **(3 marks)**

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11. A machine consists of a wheel of radius 40cm and axle of radius 10cm. Determine the efficiency of the machine when used to lift a load of 300N using an effort of 100N. **(2 marks)**

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SECTION B (55 MARKS)

Answer all the questions in this section

12.

(a) State the Archimedes' principle. **(1 mark)**

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(b) A cork of volume $100cm^3$ is floating on water. If the density of the cork is $0.25\ gcm^{-3}$;

(i) Calculate the mass of the cork. **(2 marks)**

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(ii) Find the upthrust force on the cork. **(2 marks)**

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(iii) What minimum force is required to immerse the cork completely? **(2 marks)**

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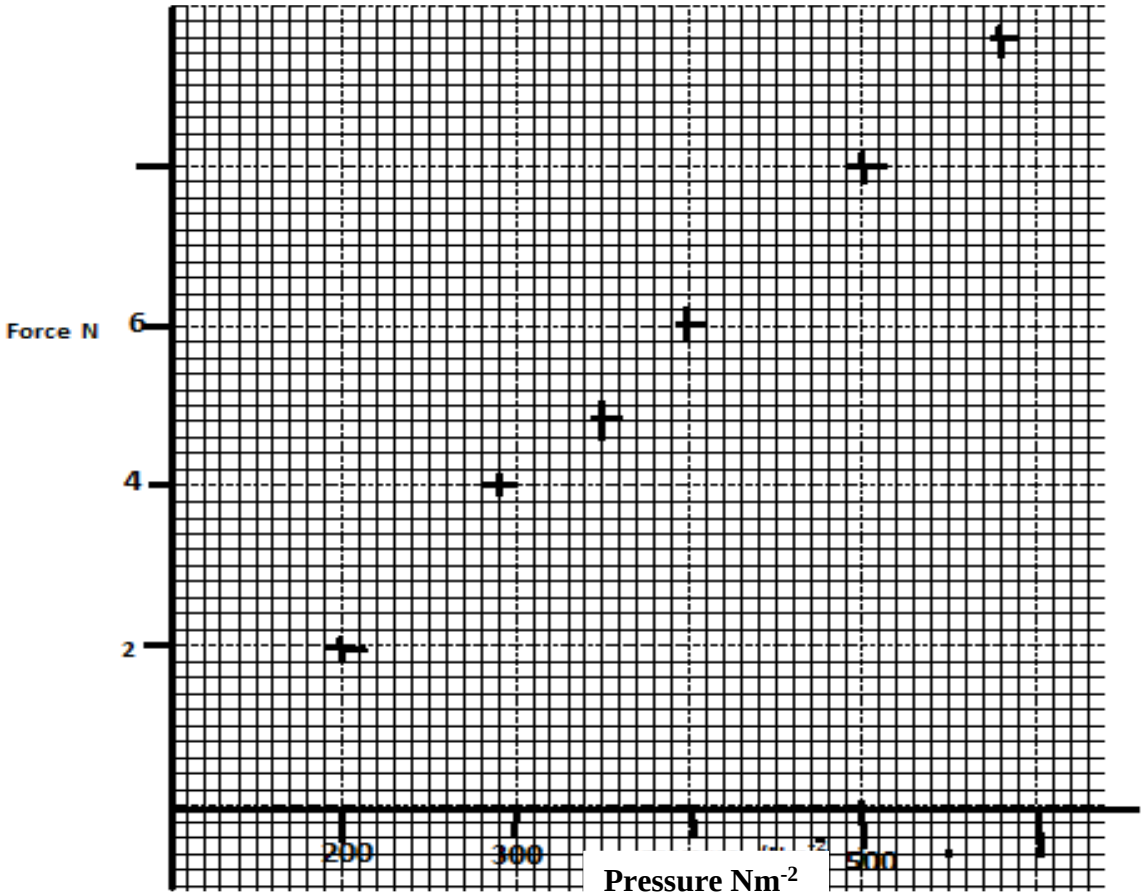
(c) The graph below shows the variation of pressure produced at the end of piston as the force is applied on it.



i. Draw the line of the best fit. **(1 mark)**

ii. From the graph determine the area of the piston. **(3 marks)**

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iii. On the same graph draw a line showing the pressure produced when the same force was applied on a wider piston. **(1 mark)**

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(d) In construction of a mercury barometer care is taken to make sure it has no gas in the space above mercury.

i) How would you test whether there is a gas above mercury? **(1 mark)**

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ii) State the problem caused by the presence of gas in the barometer. **(1 mark)**

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(d) Find the total pressure experienced by a diver 8 meters below the sea surface. (Take Atmospheric pressure = 103 360N, Density of sea water = 1030 kg/m^3) **(2 marks)**

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13.

(a) What is meant by acceleration? **(1 mark)**

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(b) **Figure 5** shows a displacement-time graph for a rally vehicle.

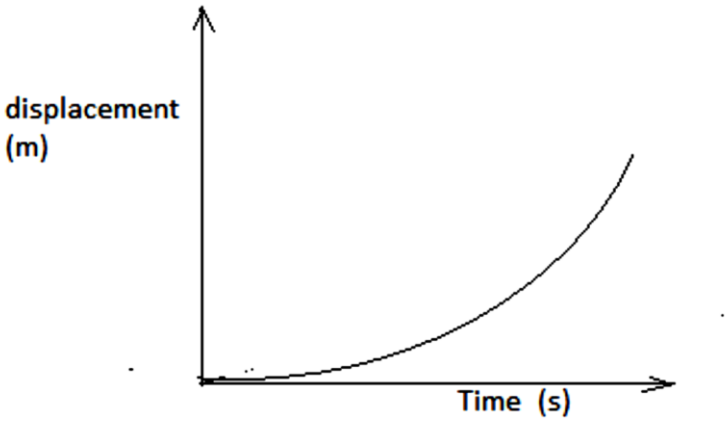

Fig. 5

(i) Describe the way the vehicle is moving. **(1 mark)**

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(ii) Sketch a velocity-time graph for this vehicle. **(1 mark)**

(c) A bullet is fired horizontally at a velocity of 400m/s from a cliff which is 50m tall as in **figure 6** below.

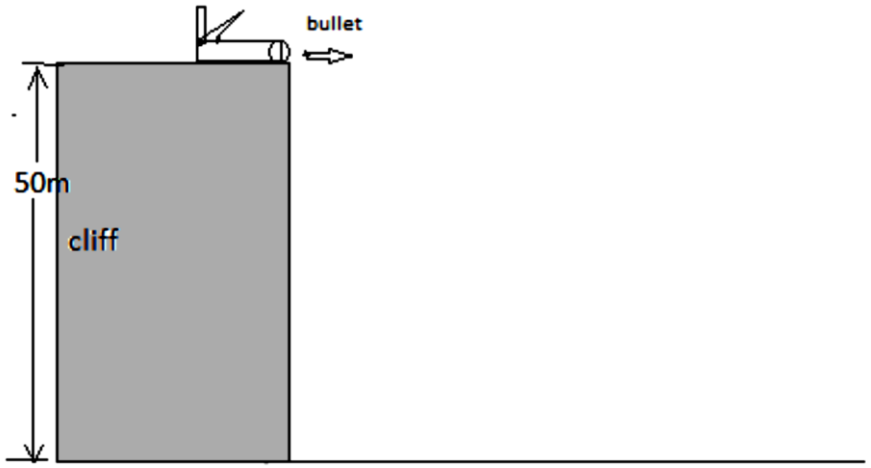

Fig. 6

I. On the diagram draw the trajectory of the bullet until it comes to rest. **(1 mark)**

II. Find the time taken for the bullet to hit the ground. **(2 marks)**

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III. Find the horizontal range. **(2 marks)**

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14.

(a) Define the following terms. **(2 marks)**

i) Latent heat of vaporization

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ii) Specific latent heat of vaporization.

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(b) A beaker of mass 100g and negligible heat capacity contains 25g of water at 18^0C. A student heats water to produce steam at 100^0C. The steam is then passed into the water for some time as shown in **figure 7 below.** After the experiment, the mass of the beaker and its contents is found to be 128g.

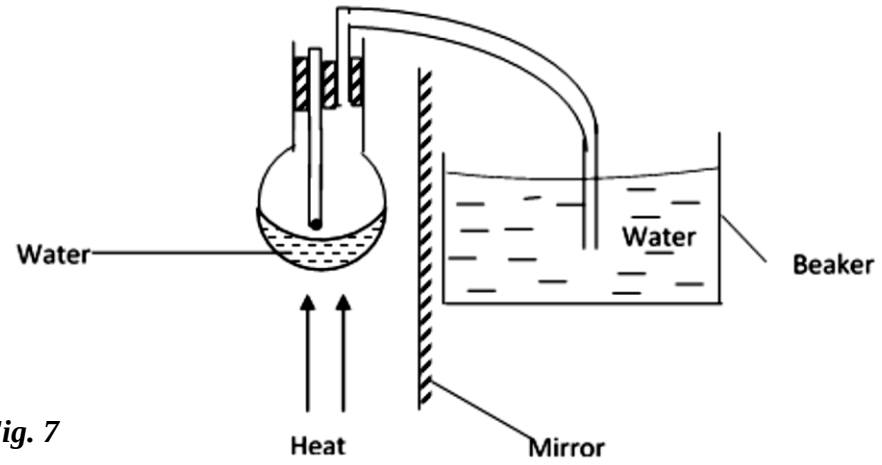

Fig. 7

Given that the specific latent heat of vaporization of water is 2.26×10^6 Jkg^{-1} and specific heat capacity of water is 4200 $Jkg^{-1}K^{-1}$.

I. Give the reason why the thermometer is placed slightly above the water surface. **(1 mark)**

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II. Give the purpose of the mirror in the experiment. **(1 mark)**

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III. Find the mass of steam that converted to water. **(2 marks)**

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IV. Determine the final temperature of the water in the beaker correct to 1 decimal place. **(3 marks)**

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15.

(a) A small ball of mass 30g is spinning on a string of length 80cm in a horizontal circle.

(i) Which force produces the centripetal force? **(1 mark)**

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(ii) Explain why the speed of the ball is constant but the velocity is not. **(1mark)**

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(b) Two masses of 0.9kg and 1.8kg are attached on an inelastic string as shown in **figure 8.**

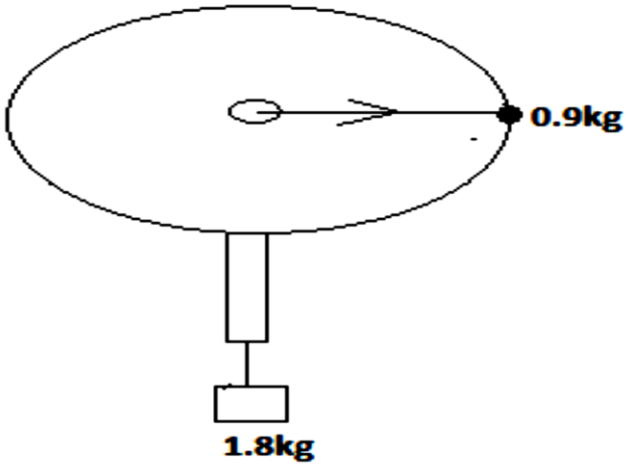

Fig. 8

The radius of the circle through which the 0.9kg mass spins is 0.5m. Find the:

(i) Tensional force that will keep the system in circular motion. **(2 marks)**

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(ii) Angular velocity at which the 0.9kg mass must spin in order that the 1.8kg mass does not slide downwards. **(3 marks)**

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(c) An object k is at the edge of a turntable as in **figure 9**.

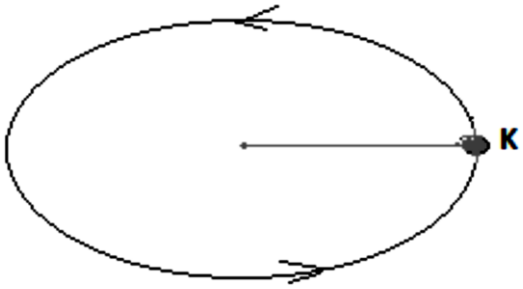

Fig. 9

The table spins anticlockwise. What factors will affect the force acting on the object? **(2 marks)**

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(d) An electron of mass 9.1×10^{-31} kg is spinning around an atom of radius 6.2×10^{-11} m at a speed of 3.0×10^{8} m/s.

(i) Determine the centripetal force acting on the electron. **(2 marks)**

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(ii) If the electrostatic force on the electron was suddenly removed, how will the electron move?

(1 mark)

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16.

(a) A lawn tennis ball is thrown such that it hits a wall perpendicularly at a speed of 6.5m/s as in **figure 10** and rebounds at 4.5m/s.

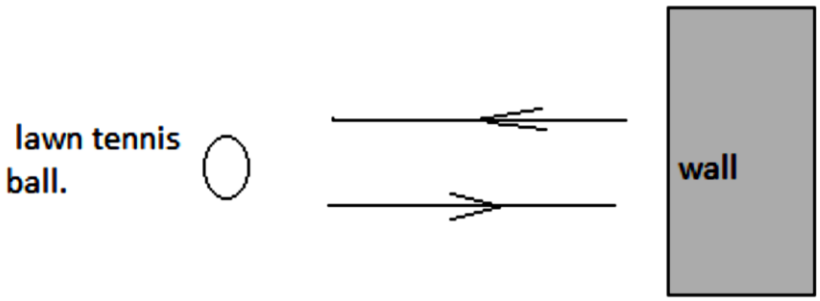

Fig. 10

The ball has a mass of 50g and it is in contact with the wall for 0.02s.

(i) What is meant by impulse? **(1 mark)**

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(ii) Find how much force is applied to the wall by the ball. **(3 marks)**

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(iii) Determine the change in momentum of the ball. **(2 marks)**

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(iv) Giving your reason state the type of collision that the ball undergoes. **(2 marks)**

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(b) Basing your argument on Newton's second law, explain why the athletes for high jump land on a thick soft mattress and not on a hard ground. **(2 marks)**

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