

URANGA PHYSICS EXAMINATION

Kenya Certificate of Secondary Education



232/1

PHYSICS

Paper 1

(Theory)

4TH EDITION (NOV. 2021) – TIME 2 1/2 Hours

Name:.....School:

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

Candidate's Signature..... Date:

INSTRUCTIONS TO CANDIDATES

- 1) Write your name and fill in the other details in the spaces provided above.
- 2) This paper consists of two sections; **A** and **B**
- 3) Answer **all** questions in section **A** and **B** in the spaces provided below each question.
- 4) All working **must** be clearly shown.
- 5) Non programmable silent electronic calculators may be used.
- 6) This paper consists of **14 printed pages**. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.
- 7) **All questions must be answered in English**

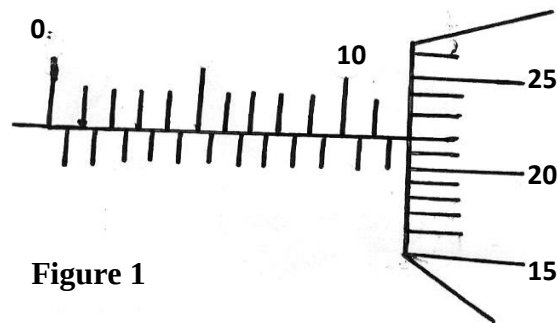
For Examiners Use

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 - 12	25	
B	13	10	
	14	11	
	15	12	
	16	11	
	17	11	
	TOTAL	80	

SECTION A (25 MARKS)**Answer ALL Questions in the spaces provided**

1.

- a) **Figure 1** below shows a micrometer screw gauge being used to measure the diameter of a metal rod. The thimble scale has 50 divisions.

**Figure 1**

What is the actual diameter of the rod

(1 mark)

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- b) Suppose the micrometer screw gauge above had a negative error of 0.02mm, what reading would it have shown? (1 mark)

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2. Ventilations in a house are normally placed high on a wall near the ceiling. Explain. (2 marks)

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3. One way of making a body more stable is by lowering its centre of gravity. Explain how this can be achieved. (1 mark)

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4. A body is projected vertically upwards from the top of a building. Assuming that it lands at the base of the building. Sketch the velocity time graph of the motion. (1 mark)

5.

- (a) When a drop of olive oil of known volume is carefully placed on the surface of water in a large trough it spread out to form a large circular patch. State one assumption made when the size of the molecule of olive oil is estimated. (1 mark)

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- (b) Fifty drops of oil have a volume of 1.0cm^3 . If a drop of oil forms an oil patch of diameter 20cm, determine the size of the oil molecule. (2 marks)

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6. Using the idea of particles, explain why the pressure inside the tyre is increased when it is pumped up. (2 marks)

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7. **Figure 2** below shows a small toy boat floating in water in a basin. **P** and **Q** are two points near the toy.



Drops of soap solution was added at point Q

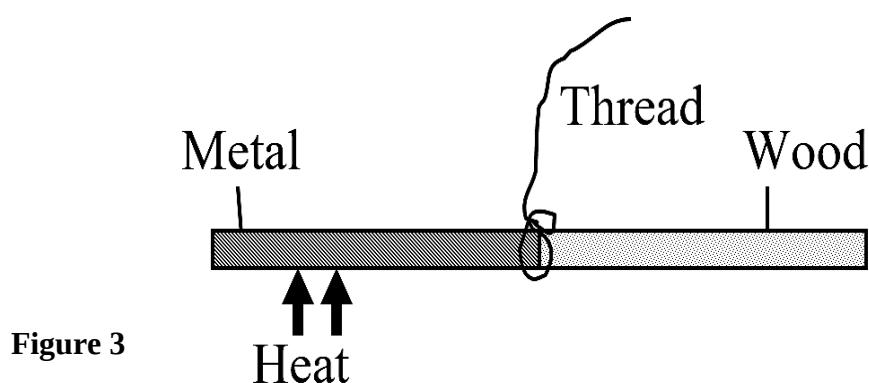
- (a) State what was observed. (1 mark)

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- (b) Explain the observation. (2 marks)

8. State the factors that determine the height (level) to which a given liquid rises in a capillary tube at a given place. (2 marks)

9. The following **Figure 3** shows a rod made of wood on one end and metal on the other end suspended freely with a piece of thread so that it is in equilibrium.



The side made of metal is now heated with a Bunsen flame. State with a reason, the side to which the rod is likely to tilt. (2 marks)

10. At 30°C the pressure of a gas is 100cm of mercury. At what temperature would the pressure of the gas fall by 20cm of mercury. Give the temperature in $^{\circ}\text{C}$. (2 marks)

11. State the reason why a tractor used for ploughing land has wide tyres. (1 mark)

12. The **Figure 4** below a Bunsen burner.

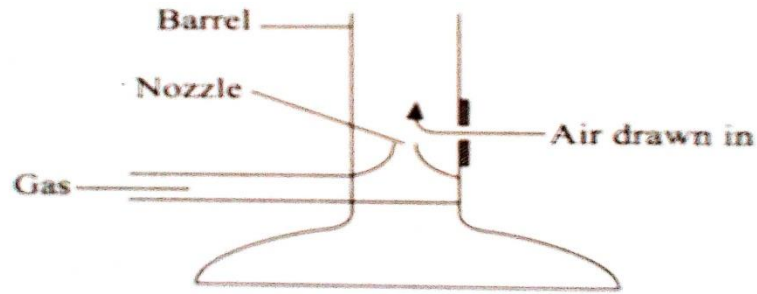


Figure 4

Use the Bernoulli's principal to explain how air is drawn into the burner when the gas tap is opened. (2 marks)

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13. **Figure 5** shows a uniform wooden plank of length 4m and weight 10N. The plank is held at equilibrium by a weight of 40N placed at one end as shown below.

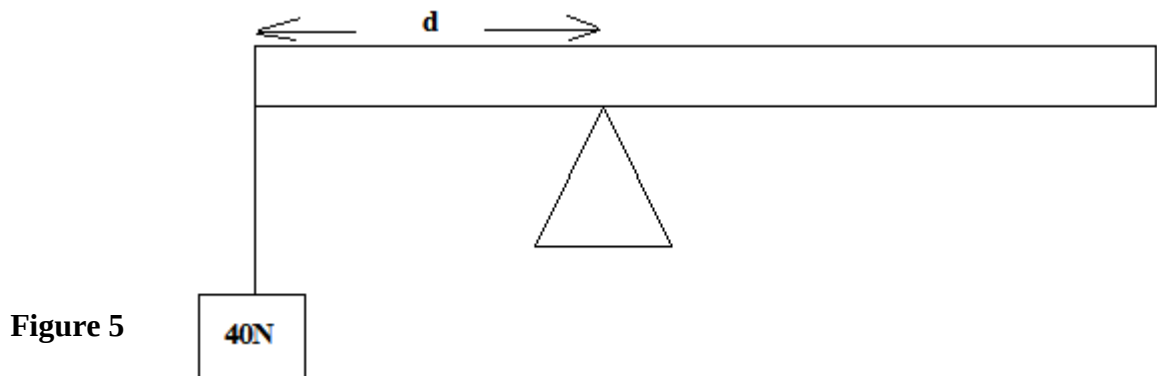


Figure 5

Determine the distance d . (2 marks)

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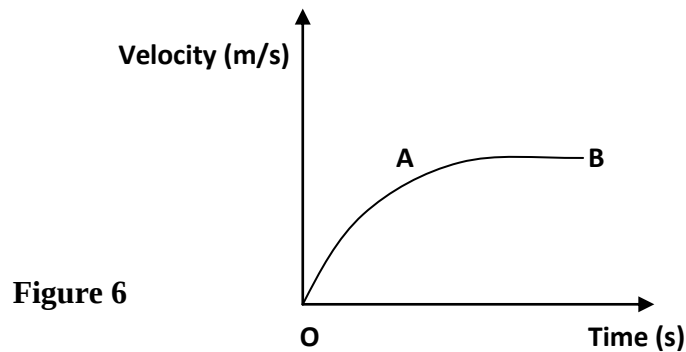
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SECTION B (55 MARKS)**Answer ALL Questions in the spaces provided**

14.

- a) **Figure 6** shows a graph of velocity against time for a ball bearing released at the surface of a viscous liquid.



Explain the motion of the ball bearing for parts.

- i) **OA.** (1 mark)

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- ii) **AB.** (1 mark)

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b)

- i) A boy on moving truck throws a tennis ball vertically upwards. If the truck is moving at a constant velocity, give the reason why the ball lands back exactly the same point where it was projected. (1 mark)

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- ii) A high jumper usually lands on a thick soft mattress. Explain the role of the mattress in this case. (2 marks)

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- c) An experiment was performed to investigate the behaviour of a spiral spring on a stretching force

- i. Draw a well labelled diagram of the possible set up for this experiment. (2 marks)

- ii. Explain how the spring constant can be determined from the experiment. (3 marks)

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15.

- (a) In an experiment to determine the specific latent heat of vaporization of water, steam at 100°C was passed into water contained in a well-lagged copper calorimeter. The following measurements were made:

- Mass of calorimeter = 55g
- Initial mass of water = 75g
- Final mass of calorimeter + water + condensed steam = 133g
- Final temperature of the mixture = 30°C

[Specific heat capacity of water = $4200\text{JKg}^{-1}\text{k}^{-1}$ and specific heat capacity of copper = $390\text{JKg}^{-1}\text{k}^{-1}$]

Determine the:

- (i) mass of condensed steam. (1 mark)

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- (ii) heat gained by the calorimeter and water if the initial temperature of the calorimeter + water = 20°C . (2 marks)

(iii) given that L is the specific latent heat of vaporization of steam,

- (I) Write an expression for the heat given out by steam. (2 marks)

- (II) Determine the value of L . (2 marks)

- (b) Formation of ice on roads during winter in cold countries is known to hamper vehicles. State **two** ways in which the melting point of ice may be lowered to solve this problem. (2 marks)

- (c) Some ether is put in a combustion tube and two glass tubes inserted into the tube through a cork as shown in the **figure 7** below. The combustion tube is then put into a small beaker containing some water and a thermometer dipped in the water. When air is blown into the ether as shown, the reading in the thermometer lowers. Explain this observation. (2 marks)

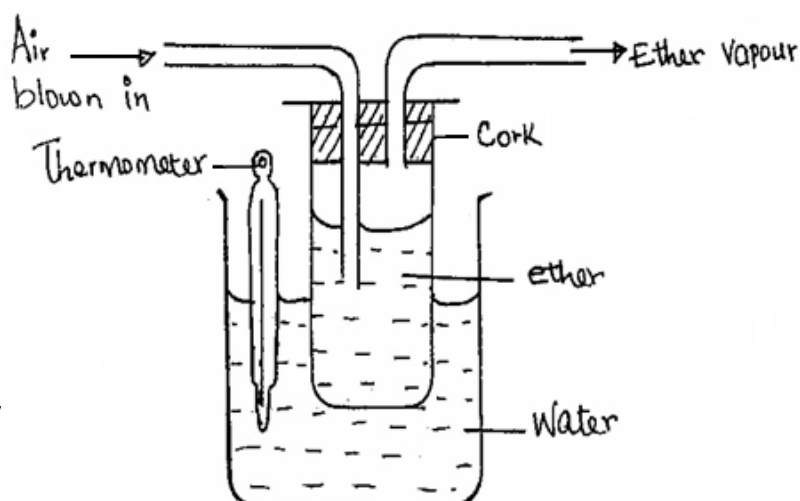


Figure 7

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16.

a) State the law of flotation.

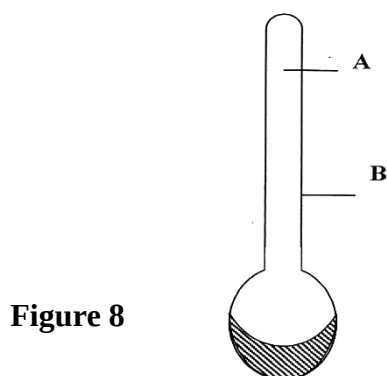
(1 mark)

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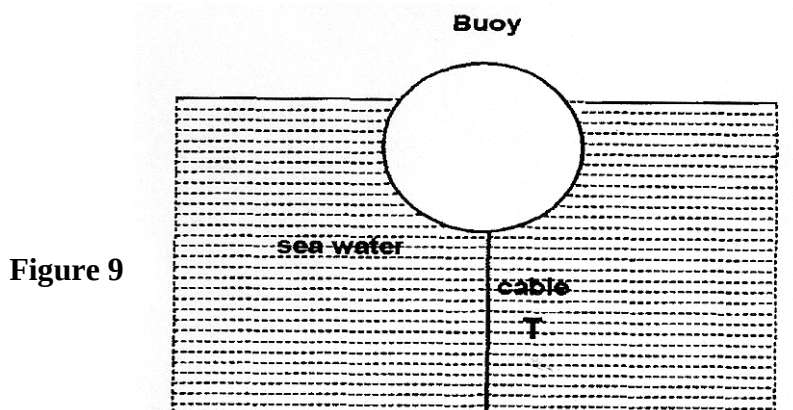
b) **Figure 8** below shows a diagram of a hydrometer which is suitable for measuring the densities of liquids varying between 1.0 and 1.2gcm^{-3} .



On the diagram indicate the label corresponding to 1.0 and 1.2g/cm^3 .

(2 marks)

c) **Figure 9** shows a buoy, B, of volume 40 litres and mass 10kg . It is held in position in sea water of density 1.04gcm^{-3} by a light cable fixed to the bottom so that $\frac{3}{4}$ of the volume of the buoy is below the surface of the sea water. Determine the tension T in the cable. (4 marks)



d) You are provided with the following:-

An overflow can

A beaker

A spring balance

A metal block

Water and

A String

Describe an experiment to verify Archimedes principle.

(5 marks)

17. (a) Define angular velocity.

(1 mark)

(b) Figure 10 below shows a car of mass (m) moving along a curved part of the road with a constant acceleration.

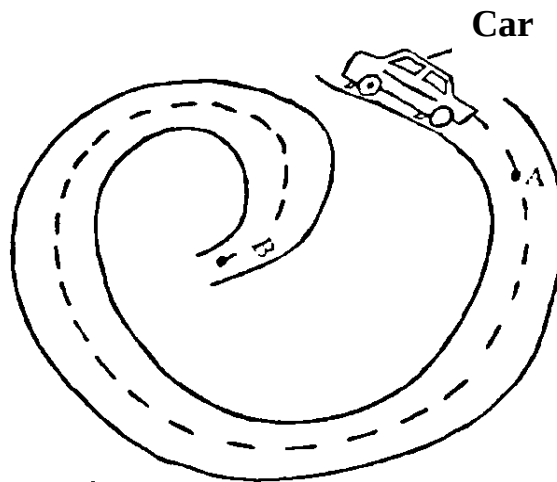


Figure 10

- i) Explain why the car is more likely to skid at B than at A. (1 mark)

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- ii) If the radius of the path at B is 250m and the car has a mass of 6000kg, determine the maximum speed the car can be driven while at B without skidding. The coefficient of friction between the road and the tyre is 0.3. (3 marks)

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- (c) A string of length 70cm is used to whirl a stone of mass 0.5kg in a circle of vertical plane at 5 rev/s. Determine the period. (2 marks)

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- (d) Figure 11 below shows a graph that was plotted by a student investigating the variation of centripetal force with radius, r of the circular path in which a body rotates.

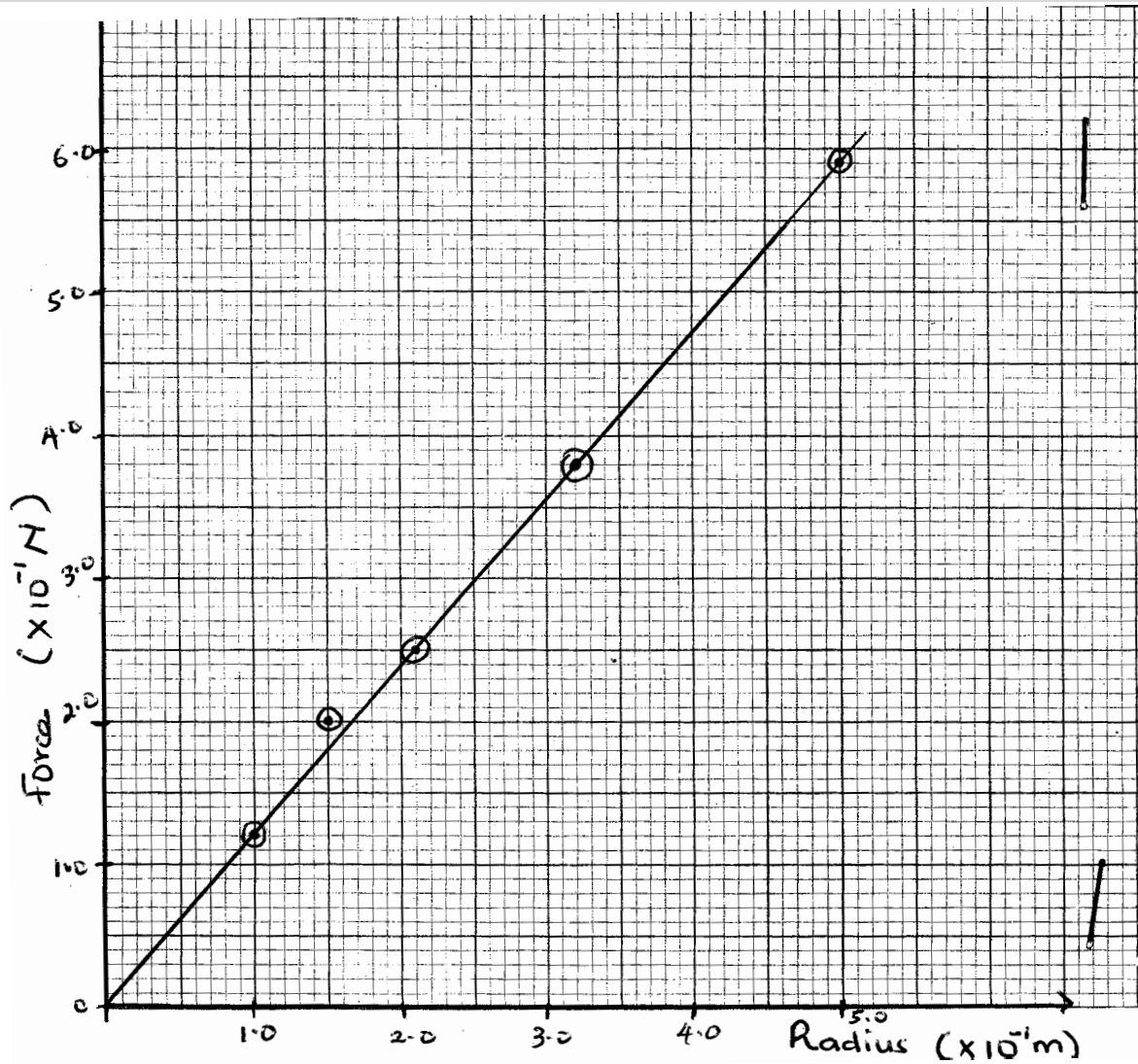


Figure 11

Given the mass of the body is a 100g, use the graph to determine the angular velocity, ω of the body. (4 marks)

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18.

(a) State the law of conservation of energy.

(1 mark)

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(b) State two factors that affect the efficiency of a pulley system.

(2 marks)

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(c) Sketch a labelled diagram to show how arrangement of a single pulley may be used to provide a velocity ratio of 2.

(2 marks)

(d) **Figure 12** below shows a pulley system with the load rising at uniform speed.

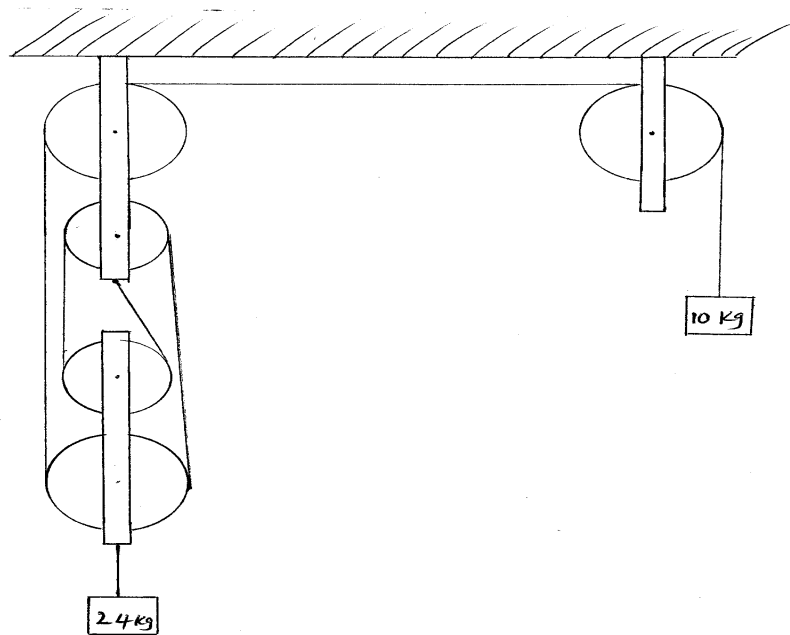


Figure 12

From the information given calculate;

i) Velocity ratio of the machine

(1 mark)

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(2 marks)

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(3 marks)

[illegible]

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