

GIDEONS ELITE BOYS CENTRE OF EXCELLENCE

DECEMBER SELF-ASSESSMENT EXAMINATIONS

FORM THREE

(Kenya Certificate of Secondary Education)

Physics paper one

232/1

Form 3

DECEMBER, 2024, Examinations

2 hours

Instructions to candidates

- This paper consists of two sections **A** and **B**.
- Answer **all** the questions in the two sections in the spaces provided after each question
- All working **must** be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers **should be expressed** in the **decimal** notations.
- You may use:
 - ‘gravitational acceleration, g , as 10m/s^2
 - Atmospheric pressure = 100, 000 Pa
 - Density of water = 1g/cm^3
 - Density of air = 1.25kg/m^3
 - Density of mercury = $13\,600\text{kg/m}^3$

For Examiner use only

| SECTION | QUESTION | MAX MARKS | CANDIDATE'S SCORE |
|---------|----------|-----------|-------------------|
| A | 1 – 12 | 25 | |
| B | 13 | 10 | |
| | 14 | 14 | |
| | 15 | 13 | |
| | 16 | 09 | |
| | 17 | 09 | |
| | TOTAL | 80 | |

This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

1. Figure 1 shows a micrometre's screw gauge scale with negative zero error of 0.02mm used for measuring the diameter of a ball bearing. Determine the actual diameter of the ball bearing
(2 marks)

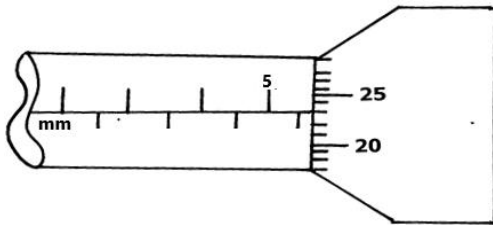
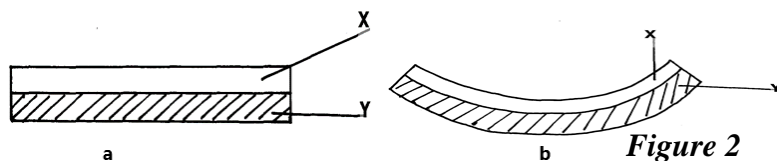


Figure 1

2. A Bunsen burner in the laboratory can be tilted over a large angle and still get back to its original position once the tilting force is withdrawn. State two factors that are responsible for this observation
(2marks)
3. A bullet of mass 20g moving with a velocity of 30m/s penetrates a sand bag and is brought to rest in 0.05s. Find the average retarding force of the sand
(3marks)
4. Explain what is meant by streamline flow.
(1mark)

5. The figure, 2a below represents a bimetallic strip of metals **X** and **Y** at room temperature. The figure, 2b, below shows its shape when dipped into crushed ice.

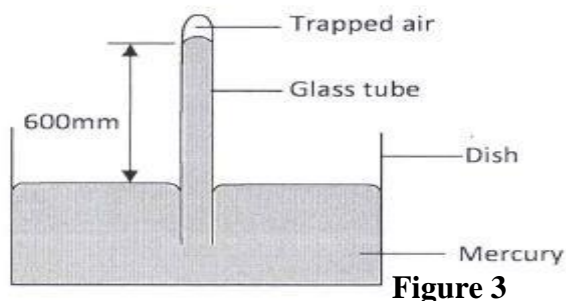


Sketch a diagram in the space given below to show the shape when the strip is heated to a temperature above the room temperature **(1 mark)**

6. A high jumper lands on saw dust. Explain how the saw dust helps in reducing the impact of force.

(2marks)

7. Figure 3 shows some air trapped by mercury in a glass tube. The tube is inverted in a dish containing mercury.



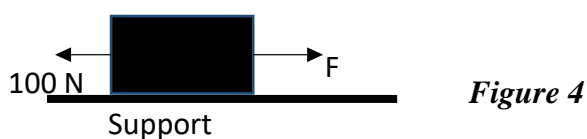
Given that the atmospheric pressure is 760 mmHg and the height of mercury column in the tube is 600 mm, determine the pressure of the air trapped in the tube in mmHg. **(3 marks)**

8. Explain one advantage of mercury over alcohol as a thermometric liquid.

(2 marks)

9. A body of mass M is allowed to slide down an inclined plane. State **two** factors that affect its final velocity at the bottom of the inclined plane. **(2marks)**

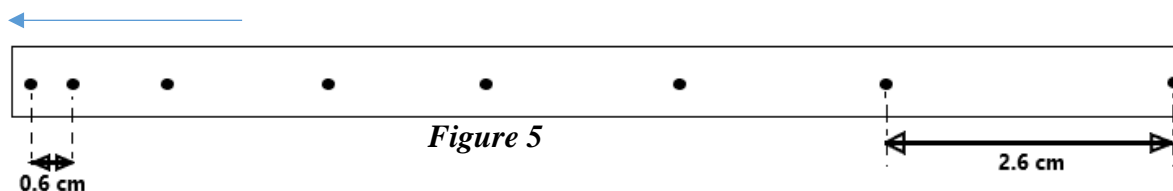
10. Two horizontal strings are attached to a block, resting on a frictionless surface, as shown in figure 4.



A force of 100N pulls on one string. The block does not move. Find the value of the force, F on the other string. **(2 marks)**

11. A wooden bench feels neither warm nor cold when touched by your bare hands. Explain this observation. **(2 marks)**

12. The figure below represents part of a tape pulled through a ticker-timer by trolley moving down an inclined plane. If the frequency of the ticker-timer is 50Hz, calculate the acceleration of the trolley. **(3marks)**



SECTION B (55 MARKS)

13. In an experiment to determine the diameter of oil molecule, two wooden planks were used on the surface of water sprinkled with lycopodium powder as shown in the figure 6 below.

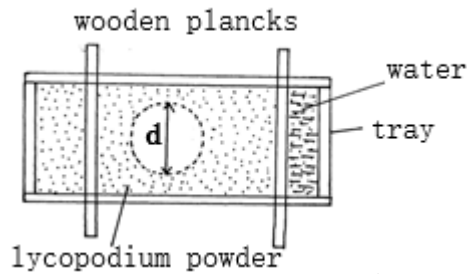


Figure 6

- a) State the function of the lycopodium powder and the wooden planks in the experiment **(2marks)**
- i) Lycopodium powder:
- ii) Wooden planks:
- b) During the experiment, the diameter of the patch was measured to be 20cm for an oil drop of radius 0.25mm. Determine:
- i) The area of the patch **(2marks)**
- ii) The volume of the drop **(2marks)**
- iii) The diameter of one molecule of oil **(2marks)**

- c) State any two assumptions you have made in your estimation of the diameter of the oil molecule
(2marks)

14.

- a) Define the term ‘uniform velocity’

(1 mark)

- b) The graph *figure 7* below shows displacement –time graph of a body in motion.

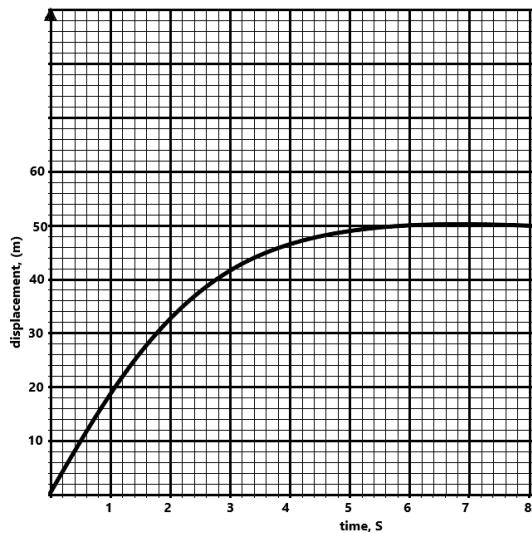


Figure 7

- i) Determine the instantaneous velocities at time, $t = 3\text{s}$ and time, $t = 4\text{s}$
(2 marks)

- ii) Calculate the acceleration of the body between the times, $t = 3\text{s}$ and $t = 4\text{s}$
(2 marks)

- iii) Describe the motion of the body between time, $t = 6\text{s}$ and time, $t = 8\text{s}$.
(1 mark)

- c) A ball of mass 100g is kicked horizontally from the top of a cliff. If the ball takes 4 seconds to hit the ground, determine the height of the cliff
(3 marks)

- d) On the axes provide below, sketch a graph of velocity, V against time, (t) for uniformly accelerated motion given that when $t = 0$, V is greater than zero. **(1 mark)**

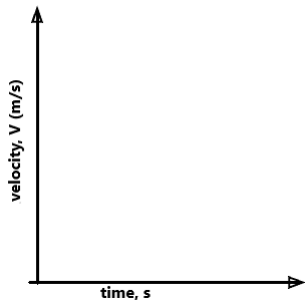


Figure 8

- e) The figure below shows a sphere moving through a section of a viscous liquid in a tall measuring cylinder.

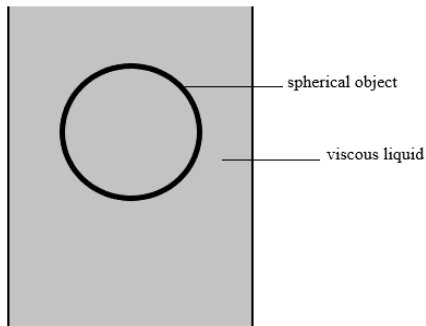


Figure 9

- i) Show on the diagram the forces acting on the sphere immediately the sphere is released into the liquid. **(3marks)**
- ii) State the relationship among the forces in part (i) above **(1 mark)**

- f) A ball at rest is dropped from the top of a high building and it hits the ground after t , seconds. If the downward acceleration is taken as positive, sketch the velocity-time graph for the motion of the ball between the time when it is released and when it hits the ground.

(2 marks)

- g) State Newton's second law of motion.

(1mark)

h) A minibus of mass 2000kg traveling at a constant velocity of 36km/h collides with a stationary car of mass 1000kg. The impact takes 2 seconds before the two move together at a constant velocity for 20 seconds. Calculate:

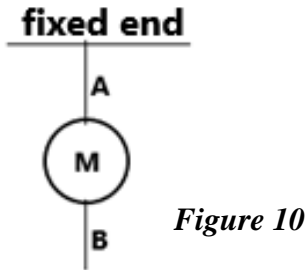
i) The common velocity **(3 marks)**

ii) The distance moved after impact **(2 marks)**

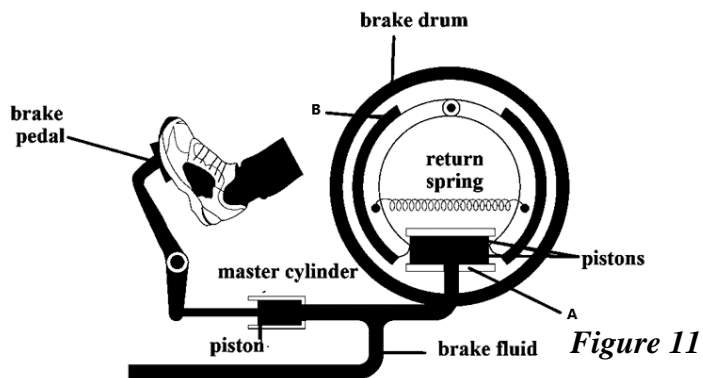
iii) The impulse force **(3 marks)**

15.

- i) Two identical strings A and B are attached to a large mass M as shown below. String A is attached to a fixed point while string B is free. State and explain what happens when string B is suddenly pulled downward with a large force. (2 marks)



16. Figure 11 shows a car braking system.



- a) Identify the parts labelled A and B (2 marks)

A:

B:

b) Briefly describe how the system works. (3 marks)

c) STATE any two properties of the fluid used in the above system (2 marks)

d) Trucks which carry heavy loads have many wheels. Explain (2 marks)

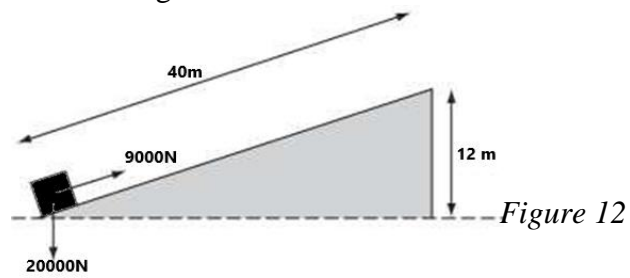
17.

a) Define the following terms used in machines (2 marks)

i) Velocity ratio

ii) Mechanical advantage

- b) A constant force of 9000N, parallel to an inclined plane, moves a body of weight 20000N through a distance of 40 m along the plane at constant speed as shown below. The body gains 12 m in height. Determine:



- i) Work done by effort **(2 marks)**
- ii) Work done on load **(2 marks)**
- iii) Efficiency of the inclined plane **(2 marks)**
- c) Suggest a reason why the efficiency of the inclined plane is not 100% **(1 mark)**

This is the last printed page.