NAME.....INDEXNO.....ADM NO.....

SCHOOL.....SIGN.....DATE.....

ACK MASENO WEST JOINT EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION

232/1 - PHYSICS - Paper 1

MARCH 2025 – 2 HOURS

FORM FOUR

Instructions to candidates

(i) This paper consists of two sections *A* and *B*.
(ii) Answer **all** the questions in the two sections in the spaces provided after each question
(iii) All working **must** be clearly shown.
(iv) Electronic calculators and Mathematical tables may be used.
(v) All numerical answers **should be expressed** in the **decimal** notations.
(vi) ***This paper consists of 13 printed pages.***
(vii) ***Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.***
(viii) ***Candidates should answer the questions in English.***

FOR EXAMINERS' USE ONLY

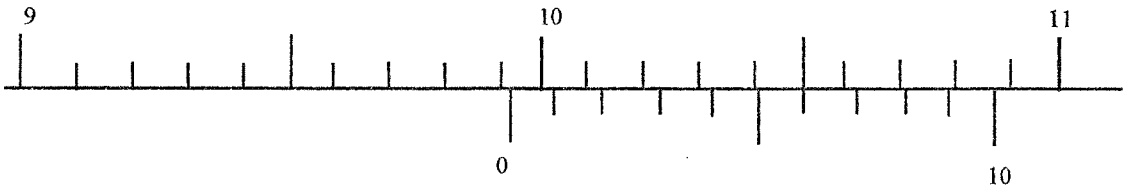
SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
SECTION A	1-13	25	
SECTION B	14	11	
	15	10	
	16	11	
	17	12	
	18	11	
	TOTAL	80	

SECTION A (25MKS)

Answer all questions in the spaces provided.

1. The figure I below shows the reading of a vernier calipers used to get the diameter of a cylindrical tin.

Fig 1.



If the vernier caliper had a negative error of 0.02cm, find the actual diameter of the tin. (2 marks)

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2. Sweating is an important activity of the body. Explain how it helps to regulate body temperature (2 marks)

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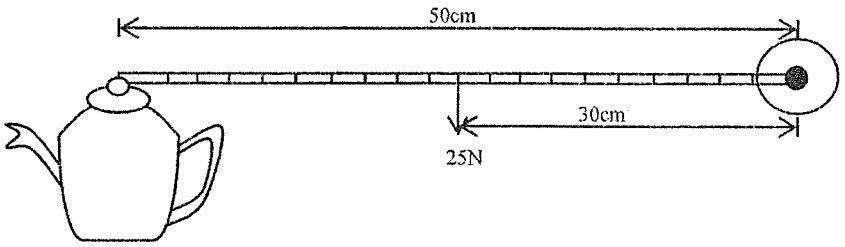
3. Water is heated in an air tight kittle whose lid has an area of $10cm^2$. The lid just opens when a force of 25N is applied at the position shown in figure 2.

Fig 2



Determine the pressure of steam in the kettle (3 marks)

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4. Fig 3 shows a hot water bath with metal rods inserted through one of its sides. Some wax is fixed at the end of each rod. Use this information to answer questions 4(a) and 4(b)

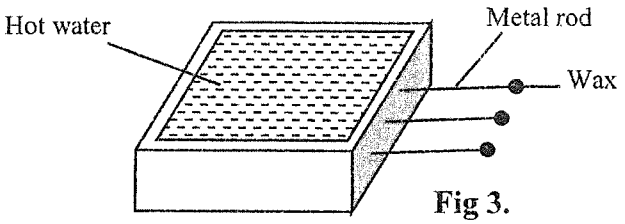

Fig 3.

(a) State the property of metals being tested using this set-up (1 mark)

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(b) besides the length of the rods that is kept constant, what else should be kept constant when comparing the property for different metal rods (1 mark

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5. The stability of an object can be increased by increasing the base area and lowering its centre of gravity. State one way of lowering its centre of gravity (1 mark

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6. A student wants to siphon water from a tank to container using a flexible pipe. State two conditions for the siphon to work. (2 marks)

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7. Water at 24^0C falls through a height 72m to the bottom of a dam. Determine the temperature of water at the bottom of the dam assuming all the stored energy is converted to heat. (Take specific heat capacity of water as 4200 kg^{-1} k^{-1}) (3 marks)

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8.Two stones of equal mass are hung as shown below one hangs from an inextensible thread while the other hangs from an inextensible thread tied to a light spring as shown below. When the two masses ar raised to the same height and suddenly dropped thread A breaks while B does not.

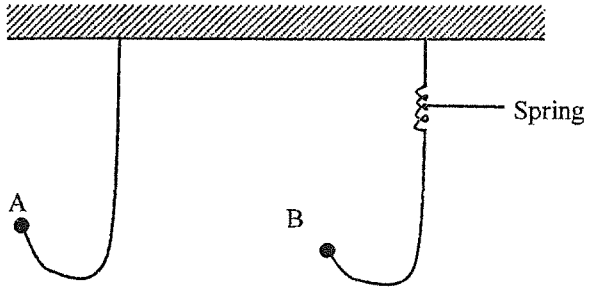

Fig 4

Explain (2 marks)

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9. Figure 5 shows dots which were made by a ticker timer on a tape attached to a trolley

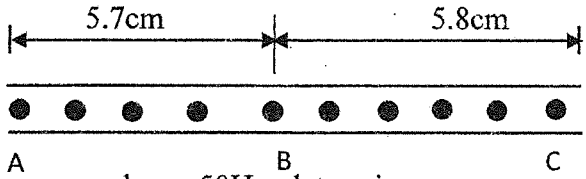

Fig 5

If the frequency used was 50Hz, determine;

(a) The velocities between AB and BC (2 marks)

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(b) The deceleration of the trolley (2 marks)

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10. A student observed that pollen grains were moving randomly on the surface of water. State what causes this motion. (1 mark)

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11. State how the number of turns per unit length affects the spring constant of a spring. (1 mark)

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12. A student holds a sheet of paper at one end so that it hangs in the position A shown in figure 6.

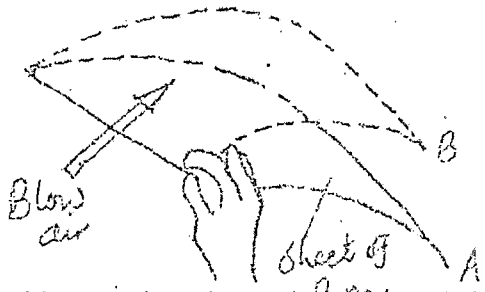

Fig 6

Explain why the paper rises to the position B when the student blows air in the direction shown by the arrow. (2 marks)

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13. State one assumption made when estimating the size of an oil molecule in the oil drop experiment (1 mark)

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SECTION B (55 MARKS)

Attempt all questions

14.(a) Explain the meaning of centripetal force (1 mark)

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(b) State the differences between angular velocity and linear velocity. (2 marks)

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(c) Figure 7 shows a toy car moving in a circular rail in a vertical plane. The mass of the toy car is 300g and the radius of the rail is 2m.

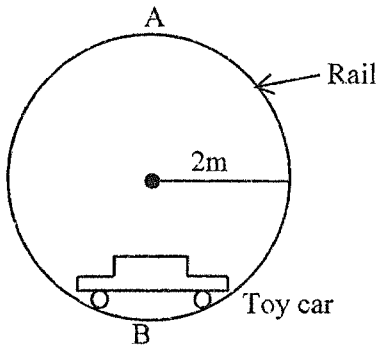

Fig 7

Determine

i) Minimum velocity at which the toy passes point A (3 marks)

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ii) If the toy was tied by a string at the centre of the rail path, following the same circular path whe whirled. State the position (A or B) the string experience maximum tension. Explain your answer.
(2 marks)

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(d) State three applications of uniform circular motion (3 marks)

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15. A student used the set up in the figure below to investigate the variation of the volume of trapped mass
of air with pressure at constant temperature.

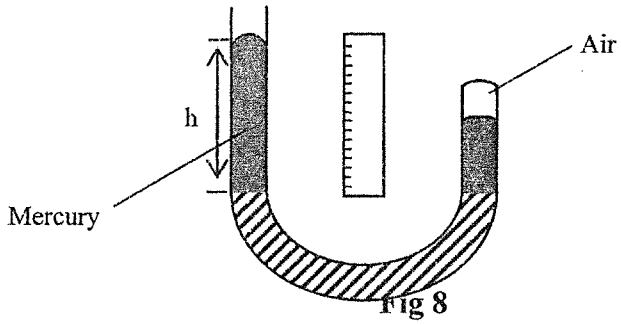

Fig 8

By raising the open end of the tube, the student measured the corresponding values of the length L, of air column and the excess pressure.

(a) In determining the volume,V of the air the student measured the length L of the air column.

i) What is the relationship between L and V (1 mar

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ii) State the assumption made. (1 mar

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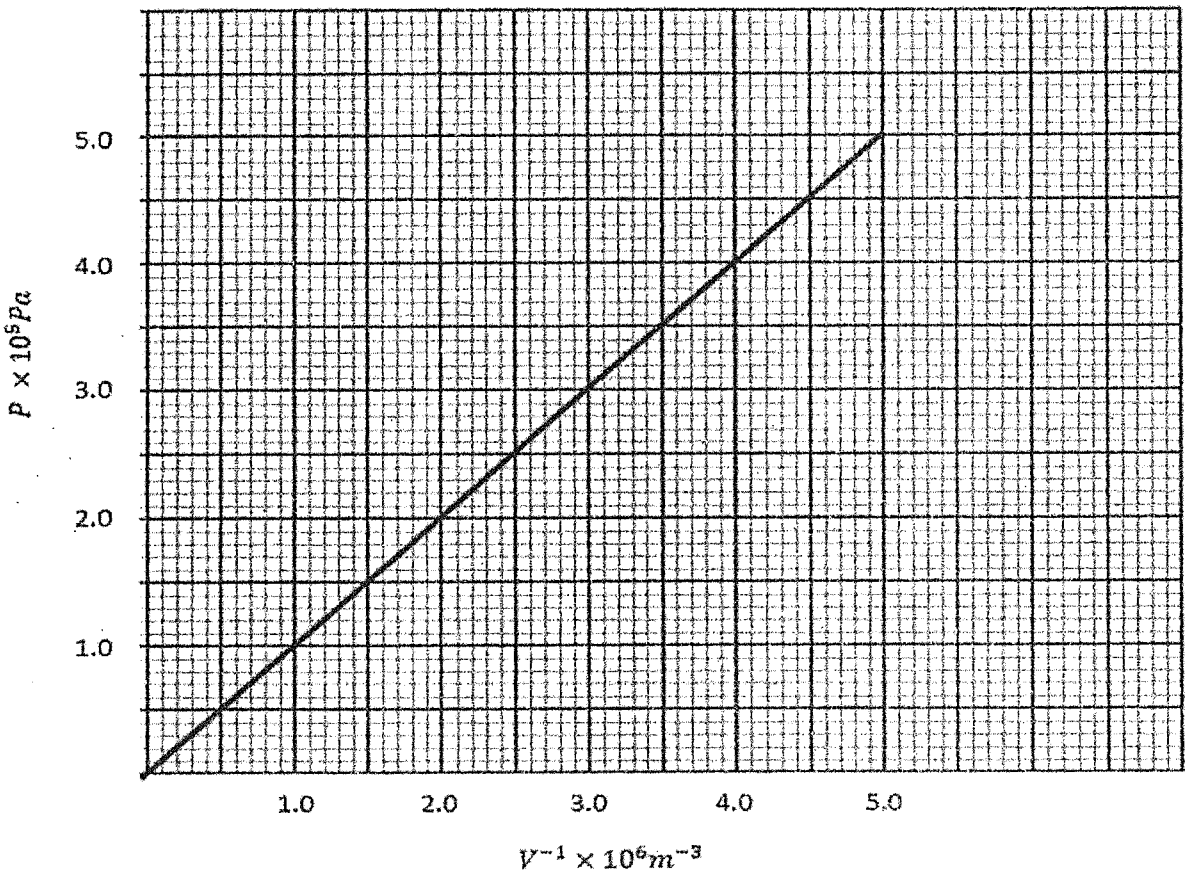
(b) The pressure acting on a gas in a container was changed steadily while the temperature of the gas was maintained constant. The volume V of the gas was measured for various values of pressure. The graph below shows the relation between P and $\frac{1}{V}$.



i).Suggest how temperature of the gas could be kept constant. (1 mark)

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ii.)Given that the relation between P and V of the gas is PV = K, use the graph to determine the value of K. (3 marks)

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iii. State the physical quantity d represented by K? (1 mark)

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(c) A gas occupies a volume of 400 litres at temperature 37^0C and normal atmospheric temperature. Determine the new volume of the gas if it is heated at constant pressure to a temperature of 67^0C. (3 marks)

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16. (a) State Newton's second law of motion. (1 mark

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(b) A body A of mass 4.0 kg and body B of mass 5.0 kg are moving with equal momentum. Write a reason the body that is moving at higher velocity. (2 marks)

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(c) A high jumper usually lands on thick soft mattress. Explain how the mattress helps in reducing th force of impact. (2 marks)

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(d) A bullet of mass 10.0g is fired at close range into a block of mass 4.99 kg suspended from a rigid support by a string. It becomes embedded in the blocks as illustrated in figure 14 below. The block rises to a height 2.50 cm before coming to rest.

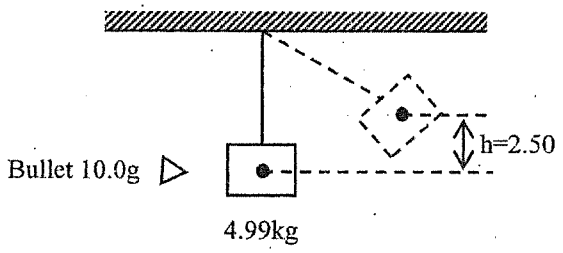

Fig 14

Assuming no energy losses;Determine

(i) the velocity of the system at lowest position. (3 marks)

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ii) The initial velocity of the bullet. (3 marks)

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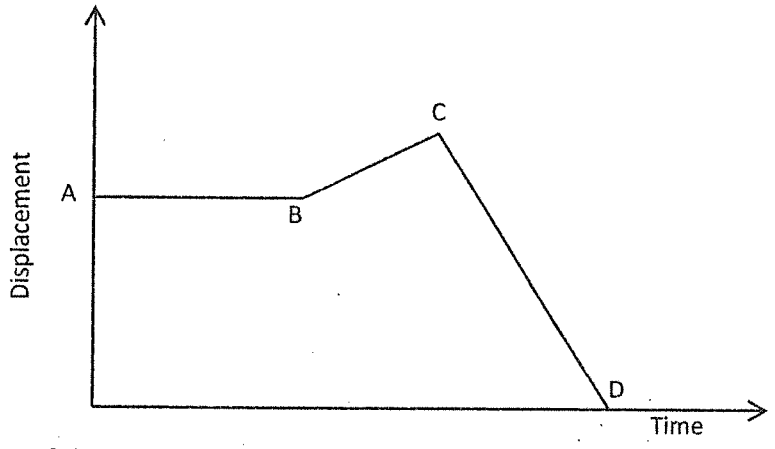
17. (a) The figure below shows the displacement time graph of the motion of a particle.

Fig 15



State the nature of the motion of the particle between.

i) A and B (1 mark)

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ii) B and C (1 mark)

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iii) C and D (1 mark)

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(b) A ball is thrown horizontally from the top of a vertical tower and strikes the ground at a point 50m from the bottom of the tower. Given that the height of the tower is 45m. determine the;

i) Time taken by the ball to hit the ground (3 marks)

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ii) Vertical velocity of the ball, just before striking the ground. [(Take acceleration due to gravity (g) as $10m/s^2$ (3 marks)

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(c) Explain how submarines are able to float and sink below the surface of water if required.

(3 marks)

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18. (a) Define velocity ratio of a machine (1 mark

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(b) A block and tackle system of V.R = 3 is used to lift a load of 1500N. An effort of 800N is used to move the load a distance of 12m.

(I) Sketch a possible arrangement of the pulleys showing how the rope is wound. (2 marks)

(II) Determine the efficiency of the system. (3 marks)

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(III) State two reasons why the efficiency of the system is not 100%. (2 marks)

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(c) A student observed a hydrometer used to measure the density of milk in the school dairy unit.
State:

(i) the role of lead shots stuck to the bottom of the instrument. (1 mark)

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(ii) the reason why the bulb is wide. (1 mark)

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(iii) the reason why the stem is narrow. (1 mark)

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