Name _____ Index No. _____

232/1
PHYSICS
PAPER 1
JULY / AUGUST 2010
2 HOURS

FORM FOUR MID YEAR CONTINUOUS ASSESSMENT TEST 2010
Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
2 HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) This paper consists of TWO sections A and B.
(c) Answer ALL the questions in sections A and B in the spaces provided.
(d) All working MUST be clearly shown
(e) Mathematical tables and silent electronic calculators may be used.

FOR EXAMINER'S USE ONLY

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This paper consists of 15 printed pages

Turn Over

SECTION A (25 MRKS)
Answer all the questions

1. The fig. 1 below shows a vernier caliper with an error of -0.02. Determine its reading. (1 mark)
Fig. 1

2. When drops of water are sprinkled on a greasy glass plate they form spherical shapes. Explain. (1 mark)

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3. The height of mercury column in a barometer is found to be 67cm at a certain place. What would be the height on a water barometer in the same place. (Density of water is $1000kg/m^3$ and density of mercury is $13600kg/m^3$). (3 marks)

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4. Two identical solid cuboids A and B are placed on a uniform metre rule pivoted at its centre as shown in fig. 2 below.

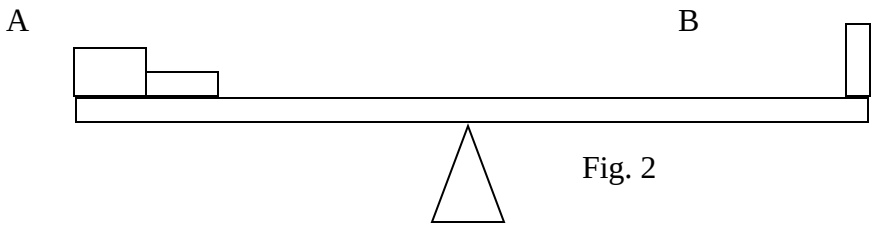

Fig. 2

State and explain the observations made. (1 mark)

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5. Fig. 3 below shows a cross-section of an aeroplane wing when the aeroplane is moving at constant height and constant speed. An upward force equal and opposite to its weight is exerted on its wing. Use it to answer questions 5(a) and 5(b)

Direction of motion Upward force Fig. 3

(a) State with a reason, what causes the upward force. (1 mark)

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(b) Give a reason why the shape of the wing crucial in producing this upward force. (1 mark)

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6. A wheel has a radius of o.4m and makes 16 revolutions per second.
Determine its centripetal acceleration. (3 marks)

7. A glass tumbler whose cross-sectional area is $20cm^2$ and height 20cm is pushed into water upside down and held at depth, h as shown in fig. 4.

Fig 4

Initially the tumbler was full of air at atmospheric pressure. Calculate the depth h, at which volume of air is compressed to $380cm^3$. (Density of water is $1000kg/m^3$, atmospheric pressure is 10^5Pa) (4 marks)

8. A steel sphere released in water attains a constant velocity after a while. The same object released in air falls at a constant acceleration. Explain with a reason the difference in its motion in water and in air. (2 marks)

9. Using kinetic theory of matter, explain why solids expand when heated. (1 mark)

10. A bus of mass 2500kg initially moving at 20m/s is brought to rest over a distance of 20m. Determine the force required to achieve this. (3 marks)

11. A test-tube does not float upright on water, but floats upright when loaded with sand. Give one reason for this observation. (1 mark)

12. Fig. 5 below shows two cups of tea of equal volume but of different diameter A and B. Explain why hot tea cools faster in a wider cup A than in a narrower cup B. (1 mark)

Fig 5

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13. State one feature of a solar heater that enable it to absorb and retain more heat. (1 mark)

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14. A heavy load is suspended on a wire. Give any one factor that will determine extension in the wire. (1 mark)

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SECTION B (55 MARKS)

Answer all questions

15. The graph below shows how speed of a car varies as it travels between two towns on a horizontal road.

From the graph

(a) (i) Determine the maximum speed of the car. (1 mark)

(ii) The acceleration of the car during the first two minutes of the journey. (2 marks)

(iii) The time during which the car is decelerating. (1 mark)

(iv) The total distance in metres between the two towns a long the road. (3 marks)

(v) The average speed in m/s . (2 marks)

(b) Describe the motion represented by lines

(i) PQ. (1 mark)

(ii) QR (1 mark)

(c) Line OP is steeper than line QR. What does this show about the rates at which the car speeds up and slows down ? (1 mark)

(d) A stone is allowed to fall freely from the top of a tower 60m high. At exactly the same time, a second stone is thrown vertically upward with a velocity of 20m/s from the ground. Determine the time taken by the two stones before they meet. (3 marks)

16. (a) State one advantage of hydraulic brakes over mechanical brakes. (1 mark)

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(b) The device represented below may be used for controlling the vertical movement of a body which may be attached to the piston handle.

Piston handle Trapped air Rubber material Liquid Fig. 6

(i) Explain what happens to the trapped air when a load is placed on the piston handle. (2 marks)

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(ii) Suggest with a reason a liquid which is more suitable than water for use in such a device. (2 marks)

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(iii) Give an example where such a device is used. (1 mark)

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(c) The U-tube below contains water and liquid X as shown in fig 7. below. Determine the density of the liquid X. (Take density of water = $1g/cm^3$) (3 marks)

17. (a) State the law of conservation of energy. (1 mark)

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(b) Draw a block and tackle system with a velocity ratio of 5. (2 marks)

(c) The block and tackle system in (b) above was used to lift a load of 80kg. Given that its efficiency is 80%. Calculate the effort applied to lift the load. (4 marks)

(d) Give two reasons why the efficiency of the machine above is less than 80%. (2 marks)

(e) An effort of 60N is applied to the brake of a car jack whose hand moves through a circle of radius 17.5cm. The pitch of the screw is 2.5mm. Determine the velocity of the screw jack. (3 marks)

18. (a) State Boyle's law. (1 mark)

(b) Air is trapped inside a glass tube by a thread of mercury 250mm Hg long. When the tube is held horizontally, the length of the air column is 250mm. What is the length of the air column when:-

250mm

Atmospheric pressure = 760mmHg

(i) Vertical with the open end up. (3 marks)

(ii) Vertical with open end down (inverted). (2 marks)

(c) Explain why

(i) It is difficult to remove the lid from a preserving jar which was closed when the space above the food was full of steam. (2 marks)

(ii) A force pump must be used instead of a lift pump to raise water from a deep well over 10m (2 marks)

19. (a) Define specific latent heat of vaporization. (1 mark)

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(b) In an experiment to determine the specific latent heat of vaporization of water, steam at 100^0C was passed into water contained in a well lagged copper calorimeter.

The following measurements were made

Mass of calorimeter = 50g
Initial mass of water = 70g
Initial temperature of water = 5^0C
Final mass of calorimeter + water + condensed steam = 123g
Final temperature of mixture = 30^0C

Specific heat capacity of water is $4200JKg^{-1}k^{-1}$ and specific heat capacity of copper is $390JKg^{-1}k^{-1}$)

(I) Determine the:-

(i) Mass of condensed steam. (2 marks)

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(ii) Heat gained by the calorimeter and water. (2 marks)

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(II) Given that L is the specific latent heat of vaporization of steam.

(i) Write an expression for the heat given out by the steam. (1 mark)

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(ii) Determine the value of L. (3 marks)