FORM FOUR TERM ONE EXAM 2017

PHYSICS PAPER 1
TIME: 2 HOURS

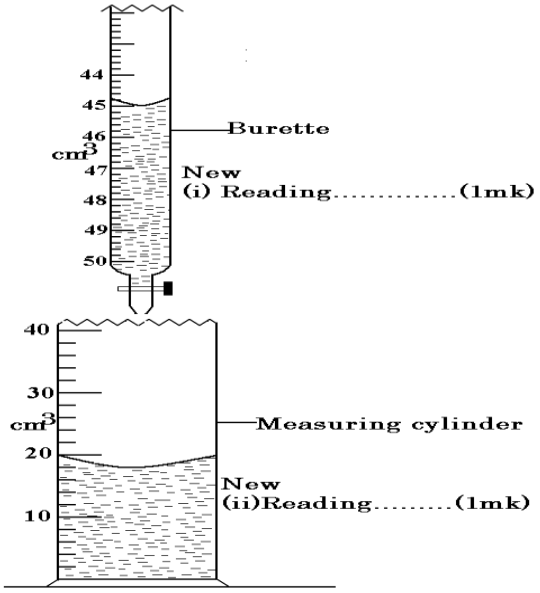
SCHOOLS NET KENYA
Osiligi House, Opposite KCB, Ground Floor
Off Magadi Road, Ongata Rongai | Tel: 0711 88 22 27
E-mail:infosnkenya@gmail.com | Website: www.schoolsnetkenya.com

This paper consists of 8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

Answer questions in the spaces provided.

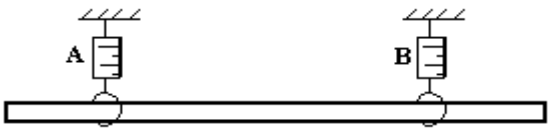
1. The figure below shows a measuring cylinder containing some water.



Another 3cm^{3}of water was added in to the cylinder from a burette delivering volumes from 0cm^3 to 50 cm ^{3}. Record in the spaces provided the **new reading** indicated on each vessel. (2 marks)

2. Sketch a vernier callipers scale reading 3.41 cm. (1mark)

3. A uniform metallic bar of length 100cm and mass 40kg is supported horizontally by two vertical spring balances A and B as shown below.



Balance A is 20cm from one end while balance B is 30cm from the other end. Find the reading of each individual balance AB. (3 marks)

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4. The reading on a mercury barometer at Mombasa is 760mm. Calculate the pressure at Mombasa (density of mercury is $1.36 \times 10^{4} Kgm^{-3}$) (3 marks)

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5. Explain the cause of random motion of smoke particles as observed in Brownian motion experiment using a smoke cell. (1 mark)

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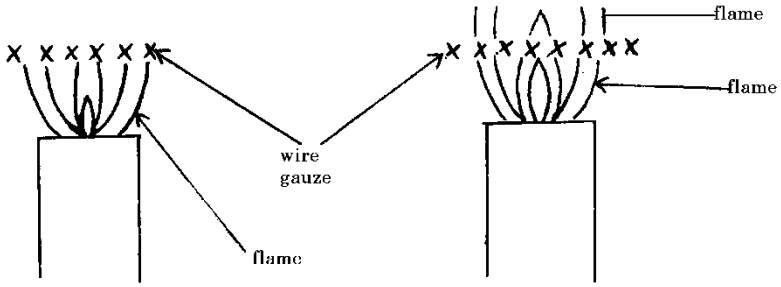
6. When a Bunsen burner is lit below a wire gauze, it is noted that the flame initially burns below the gauze as shown in the figure below. After sometime the flame burns below as well as above the gauze.



Explain this observation (2 marks)

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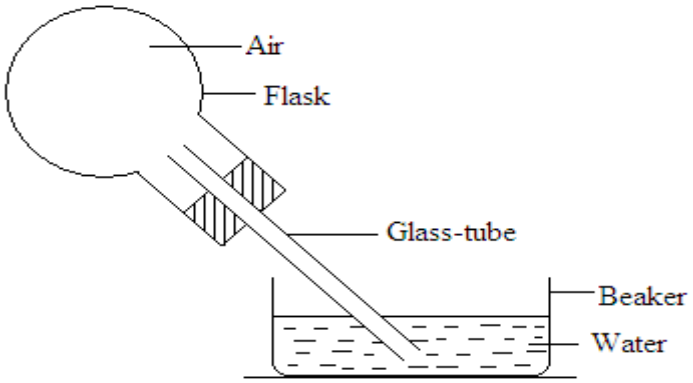
7. The diagram below shows a flask fitted with a glass tube dipped into a beaker containing water at room temperature. The cork fixing the glass tube is tight.



State with reason what would be observed if cold water is poured on to the flask. (2marks)

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8. A resultant force F acts on a body of mass 'm' causing an acceleration of a_1 on the body. When the same force acts on a body of mass 2m, it causes an acceleration of a_2.Express a_2 in terms of a_1. (3 marks)

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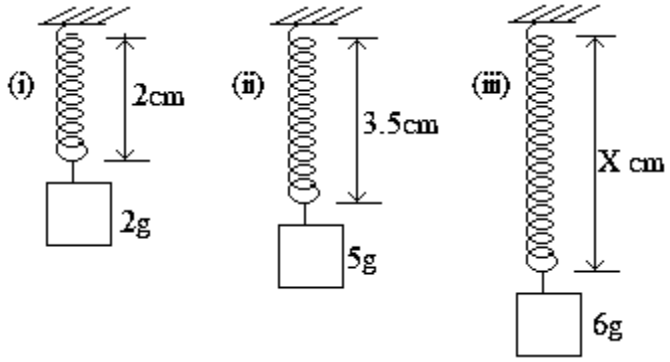
9. The diagram below shows three identical springs which obey Hooke's law.



Determine the length X. (3 marks)

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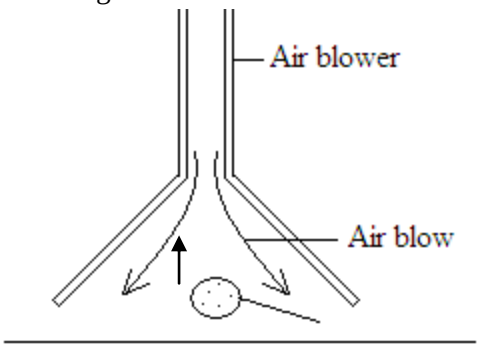
10. The figure below shows a pith ball being lifted in to a funnel end of a blower.



Explain this observation (2 marks)

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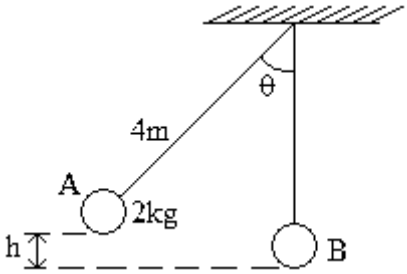
11. A metal ball suspended vertically with a wire is displaced through an angle θ as shown in the diagram below. The body is released from A and swings back to 'B'.



Given that the maximum velocity at the lowest point B is 2.5 m/s. Find the height h from which the ball is released $\left(g = 10m/s^2\right)$ (3 marks)

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SECTION B (55 MARKS)

Answer questions in the spaces provided.

12. (a) When is work done? (1mark)

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(b) The table below shows energy conversion from form A to form B and the transducers in use.

Complete the table (5marks)

Form A	**Form B**	**Transducer**
(i) Chemical	Electrical	_____
(ii) Solar	_____	Plants
(iii) _____	Electrical	Thermocouple
(iv) Electrical	Kinetic	_____
(v) Electrical	_____	Loudspeaker

(c) When an electric pump whose efficiency is 70% raises water to a height of 15m, water is delivered at the rate of 350 litres per minute.

(i) What is the power rating of the pump? (3marks)

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(ii) What is the energy lost by the pump per second? (3marks)

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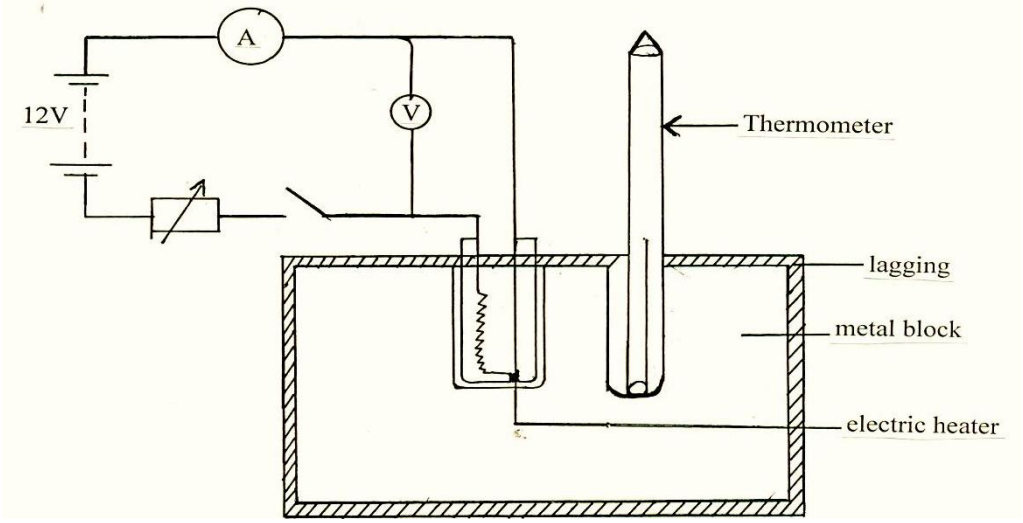
13. The figure below shows a set up that can be used to determine the specific heat capacity of a metal block.



(i) State the measurement that should be taken in the experiment to determine specific heat capacity of the metal block. (3marks)

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(ii) Show how the measurement above can be used to determine the specific heat capacity of the metal block. (2marks)

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(iii) State the function of the following in the set up

(I) Lagging (1mark)

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(II) Drops of oil in the holes containing thermometer and the electric heater (1mark)

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(b) A copper can together with stirrer of total heat capacity 600J/K contains 200g of water at 15^0C. Dry steam at 100^0C is passed through the water while stirring until it reaches a final temperature of 55^0C. Calculate the mass of the steam condensed. Take specific heat of capacity of water as 4200J/Kg and specific latent heat of steam as 2,260,000J/kg (5marks)

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14. (a) A car is negotiating unbanked circular track. State two factors that will determine the critical speed of the car. (2marks)

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(b) Given that the car above has a mass of 1000kg and the circular path has a radius of 25m. Determine the maximum speed with which the motorist can travel so as not to skid if the frictional force between the tyres and the road is 6500N. (3marks)

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(c) A 200g mass tied to a string is being whirled in a vertical circle of radius 32cm with uniform speed, At the lowest position the tension in the string is 10.5N. Calculate:-

(i) The speed of the mass (3marks)

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(ii) The tension in the string when the mass is at the uppermost position of the circular path (Take g = 10m/s^2) (3marks)

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15. a) (i) State Archimedes' principle. (1 mark)

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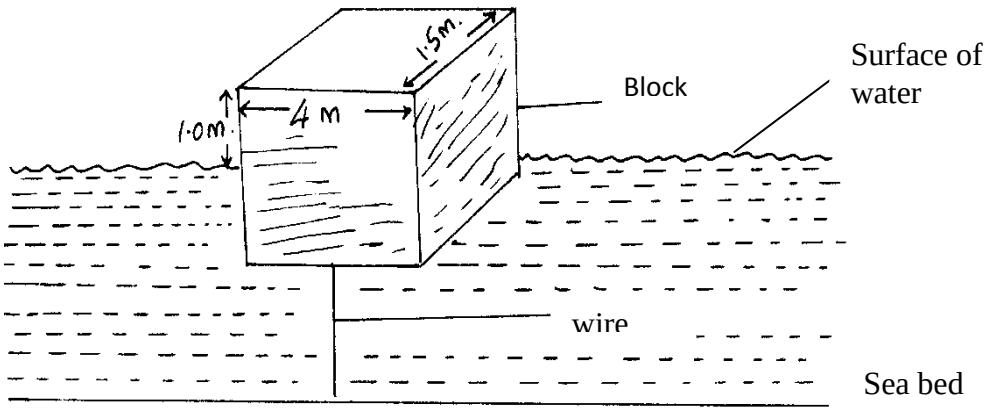
(ii) The figure below shows a rectangular object of mass 100kg tethered to the sea-bed by a wire. The dimensions are 4m x 1.5m x 2m.



Calculate the :-

(I) Weight of sea water displaced by the buoy (density of sea water = 1100kg/m^3) (3 marks)

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(II) Upward force exerted on the buoy by the water. (1mark)

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(III) Tension in the wire (2 marks)

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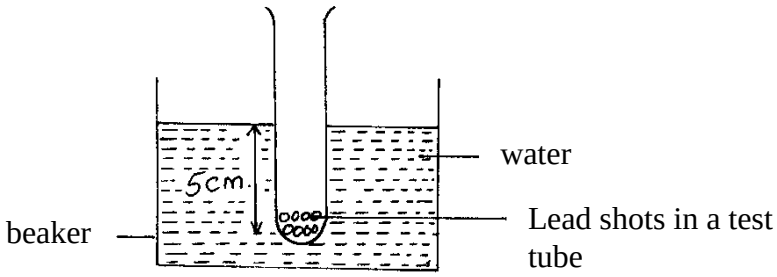
(b) A test tube of mass 10g and uniform cross-sectional area $4cm^2$ is partly filled with lead shots and floats vertically in water with 5cm of its length submerged.



Find the:-

(i) Mass of the lead shots.(density of water = $1g/cm^3$) (3 marks)

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(ii) Length of the test tube that would be submerged in a liquid of density $0.75g/cm^3$. (2 marks)

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16. (a) A car sets out from rest with constant acceleration of $0.5m/s^2$ for 10s. It then continues at a constant velocity for further 25s and then decelerates to rest in 5s.

(i) Draw a velocity-time graph for the whole journey. (2 marks)

(ii) find the average speed for the whole journey. (3 marks)

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(b) A body is moving eastwards at 10m/s and it decelerates at 2.0m/s^2. Determine its velocity after it has traveled 24m. (3 marks)

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