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<i>Invigilator</i>	
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FORM THREE PHYSICS**CAT 2 TERM 1 2016****TIME: 2 HOURS****Instructions:**

- Write your name, class and class number in the spaces provided above.
- This paper consists of two sections: Section A and B.
- Answer **all** questions in sections A and B in the spaces provided.
- All working must be clearly shown on the spaces provided.
- Take $g = 10\text{N/kg}$ and density of mercury $= 13,600\text{Kg/m}^3$.

SECTION A (25 MARKS)

1. State **the SI** unit of thermodynamic temperature (1mk)

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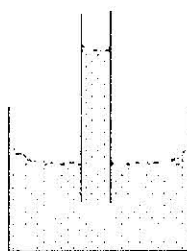
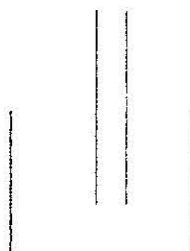
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2. State **one** assumptions made in determining the diameter of an oil patch this experiment.(1mk)

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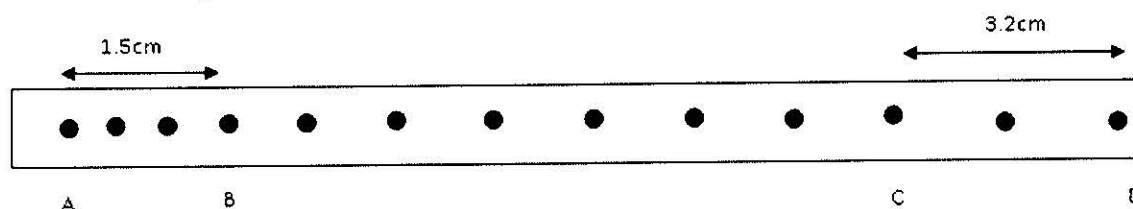
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3. The diagram (a) below shows a capillary tube immersed in water.

**(a)****(b)**

Using figure (b) sketch to show the appearance of the capillary tube if it was inserted in mercury (1mk)

4. A tape attached to an accelerating trolley is run through a ticker timer, the figure below shows a section of the tape running. If the frequency of the timer is 50Hz, determine the;



- (i) Its periodic time. (1mk)

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- (ii) The velocity at intervals AB and CD. (2mks)

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- (iii) The velocity at intervals AB and CD. (2mks)

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- (iv) Acceleration (2mks)

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5. Explain the origin of charge. (2mks)

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6. Calculate the wavelength of the KBC FM radio wave transmitted at a frequency of 100.0 Mega Hertz. (Speed of light in air = 3.0×10^8 m/s) (2mks)

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7. Sketch a velocity-time graph for a body moving with uniform acceleration, a from u m/s to v m/s in t seconds hence use your graph to show that the total distance s is given by $s = ut + \frac{1}{2}at^2$ (3mks)

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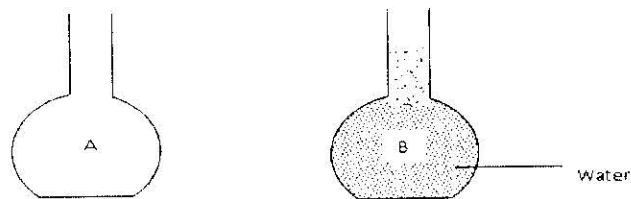
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8. Two flasks A and B were placed on a horizontal surface as shown in the figure below. State and explain which flask is more stable. (2mks)



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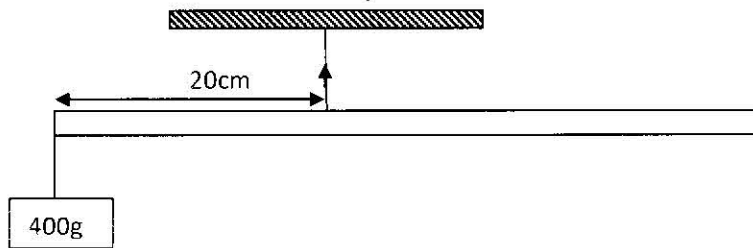
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9. The figure below shows a metre rule balances when a mass of 400g is hung at one end.

Determine the tension T in the string.

(3mks)



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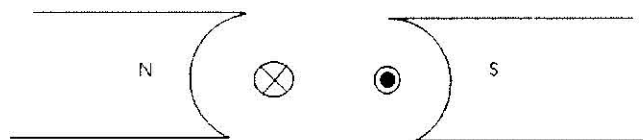
10. State two quantities used to determine whether an accumulator require charging whether charging or not. (2mks)

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11. The figure below shows a cross-section of an electric motor on the diagram, show the direction of the force on the two conductors. (1mark)



SECTION B (55 MARKS)

12. (a) (i) State one assumption made in the study of the fluid flow. (1mk)

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- (ii) Determine the following terms as used in fluid flow (2mks)

I. Critical speed

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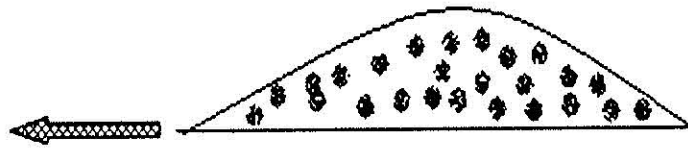
II. Volume flux

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NAME.....CLASS.....ADM/NO.....C/NO.....

(b) The figure below shows the cross section of an aero plane wing, with the aero plane moving in the direction shown by the arrow.



(i) Sketch the streamline to show how air flows past the wing as the aero plane moves. (2mks)

(ii) Explain how dynamic lift of the aero plane is caused is caused by the wing. (3mks)

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(c) A water pipe of a diameter 8.4cm is connected to another pipe of a diameter 14cm. the speed of water in the smaller pipe is 3ms^{-1} , calculate;

(i) The speed of water in the long pipe. (3mks)

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(ii) The mass flux if the density of water is 1g/cm^3 (2mks)

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(e) Explain why tractors have wide tyres especially when used on earth roads. (2mks)

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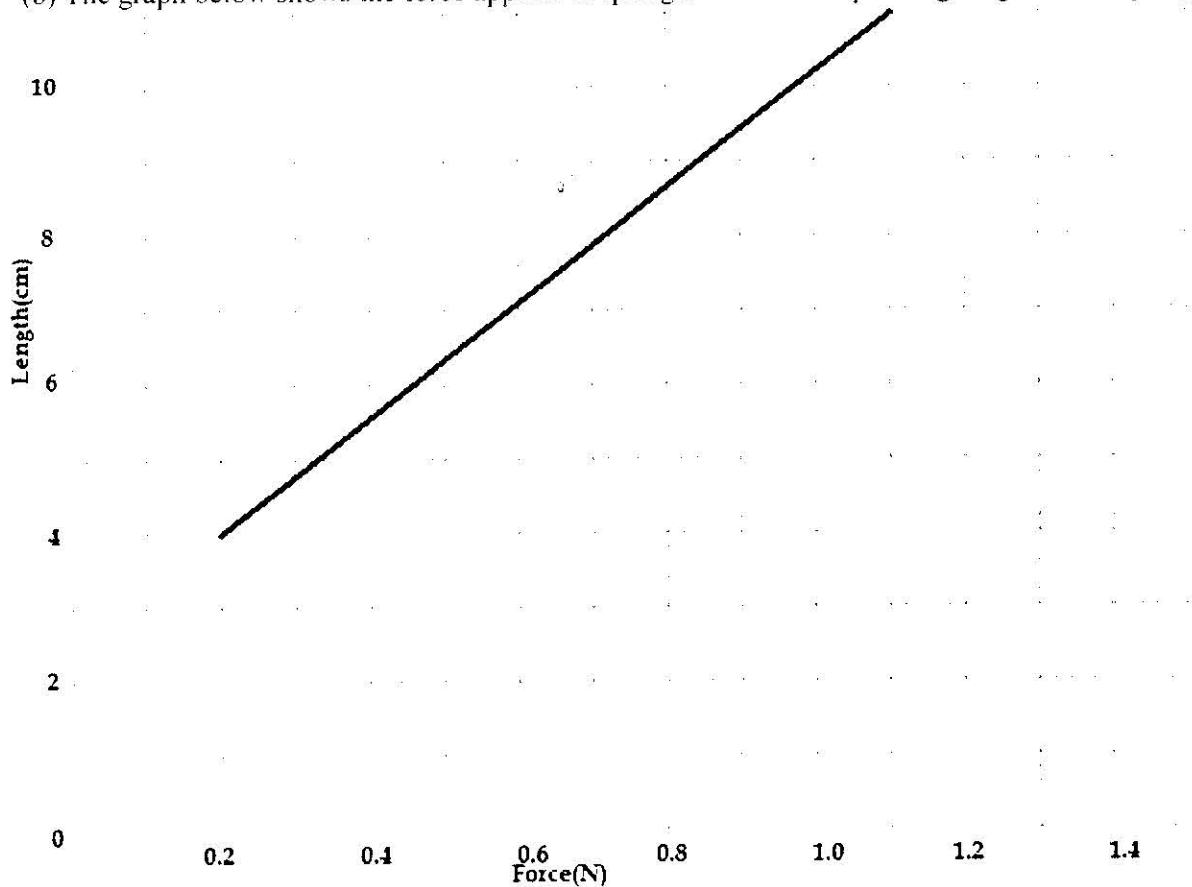
(f) The height of mercury column in a barometer at a place is 64cm. What would be the height of a column of paraffin in a barometer at that place? (Density of mercury= 13600kg/m^3 , density of paraffin= 800kg/m^3) (3mks)

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13. (a) Define the term plasticity as used in the study of materials.

(1mk)

(b) The graph below shows the force applied to spring and the corresponding length of the spring.



Use the graph to determine:

i) The length of the unloaded spring

(2mks)

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ii) The gradient of the graph

(3mks)

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iii) The spring constant of the spring in SI units

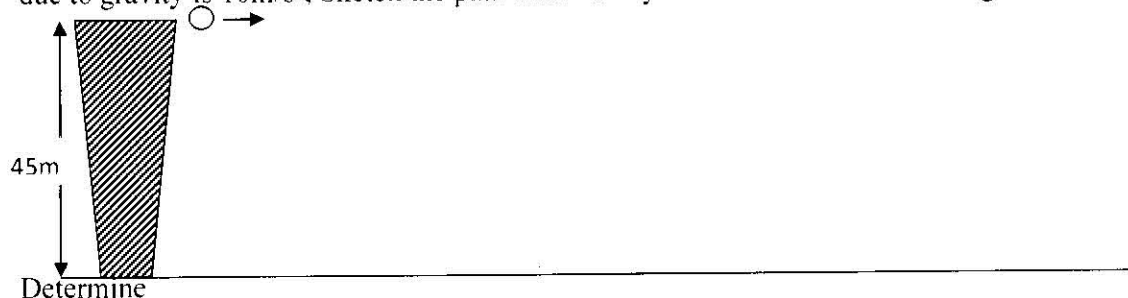
(2mks)

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14. (a) A ball is thrown horizontally from the top of a vertical tower and strikes the ground at a point 50 m from the bottom of the tower. Given that the height of the tower is 45 m and acceleration due to gravity is 10m/s^2 , Sketch the path followed by the ball until it strikes the ground. (1mk)



- i) The time taken by the ball to hit the ground. (3 mks)

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- ii) Its initial horizontal velocity. (2 mks)

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- (b) State what is meant by accuracy of a measuring instrument. (1mk)

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- (c) Give **two** features of a solid whose density can be determined using a density bottle. (2mks)

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- (d) In an experiment to determine the density of a liquid using a density bottle, the following results were obtained.

- Mass of dry empty beaker=26.7g
- Mass of density bottle+liquid=58.3g
- Capacity of density bottle= 25.0cm^3

- Use the information above to calculate the density of the liquid giving your answer in g/cm^3 (3mks)

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(e) A pendulum makes 20 complete oscillations in 30.58 seconds. Determine its periodic time. (1mk)

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15. (a) Explain why steel is selected for use to reinforce a concrete beam. (1mk)

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(b) State two properties of a liquid that are considered when constructing a liquid in a glass thermometer. (2mks)

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(c) What are the advantages of using ultra sonic in echo sounding? (2mks)

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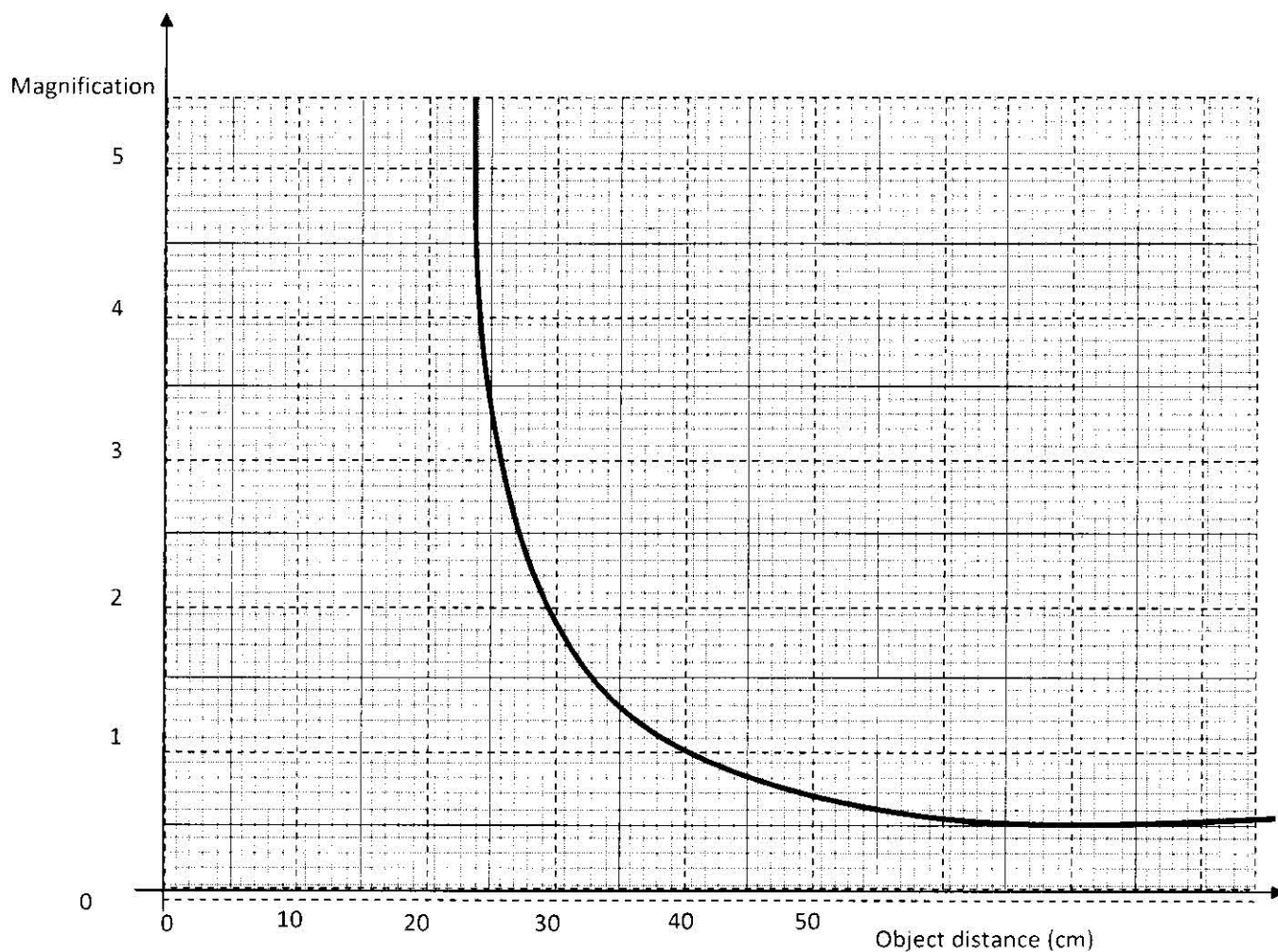
(d) It is not advisable to fix electrical cables tightly the day. Give a reason for this. (1mk)

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(e) A conductor is slowly brought near the cap of a positively charged electroscope. The leaf first collapses and then diverges, state the charge on the conductor. (1mk)

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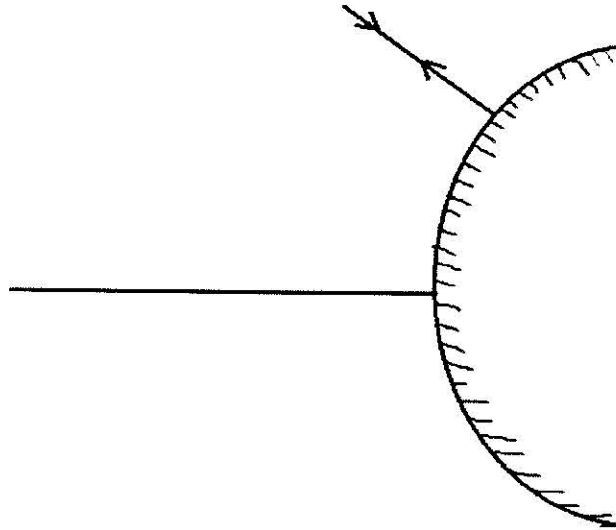
16. (a) The figure below shows a graph of magnification against object distance, for an object placed in front of a curved mirror of focal length 20cm



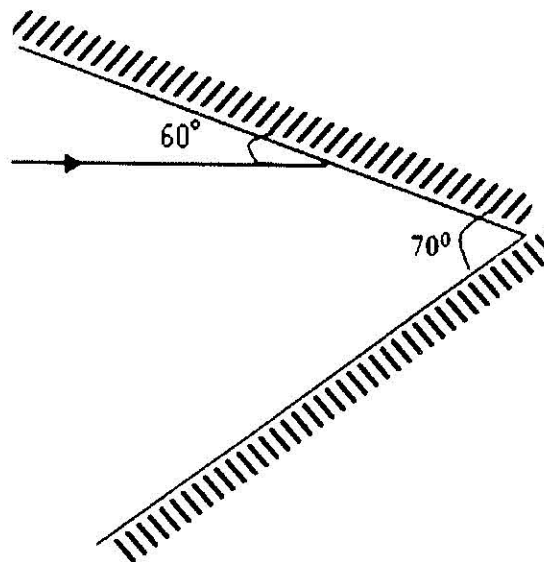
Using the graph;

- (i) State the effect on the size of the image when the object distance is increased from 25cm. (1mk)
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- (ii) Determine the distance between the object and the mirror when the image size is the same as the object size. (1mk)
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- (ii) Determine the image distance when the object distance is 25cm. (2mks)
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(b) The diagram below shows a ray incident in a convex mirror. Complete the diagram to show the position of its principal focus and measure the length of the focal length. (2mks)



(c) The figure below shows two mirrors inclined at an angle of 70° to each other. A ray of light is incident on one mirror as shown. Sketch the path of the ray to show its reflection on the two mirrors hence state the angle of reflection in the second mirror. (3mks)



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