THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

232/1 – PHYSICS – Paper 1

(THEORY)

Nov. 2018 – 2 hours

Name ..... **Index Number** .....

Candidate's Signature ..... **Date** .....

Instructions to candidates

(a) *Write your name and index number in the spaces provided above.*
(b) *Sign and write the date of examination in the spaces provided above.*
(c) *This paper consists of **two** sections **A** and **B**.*
(d) *Answer **all** the questions in sections **A** and **B** in the spaces provided.*
(e) ***All** working **must** be clearly shown.*
(f) *Silent non-programmable electronic calculators may be used.*
(g) ***This paper consists of 15 printed pages.***
(h) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***
(i) ***Candidates should answer the questions in English.***

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1–13	25	
B	14	12	
	15	11	
	16	9	
	17	11	
	18	12	
	Total Score	**80**	

SECTION A: (25 marks)

Answer all the questions in this section in the spaces provided.

1. State the reason why an object on earth has a higher weight than on the moon. (1 mark)

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2. **Figure 1** shows the position of a students eye while measuring the length of a wooden block using a metre rule.

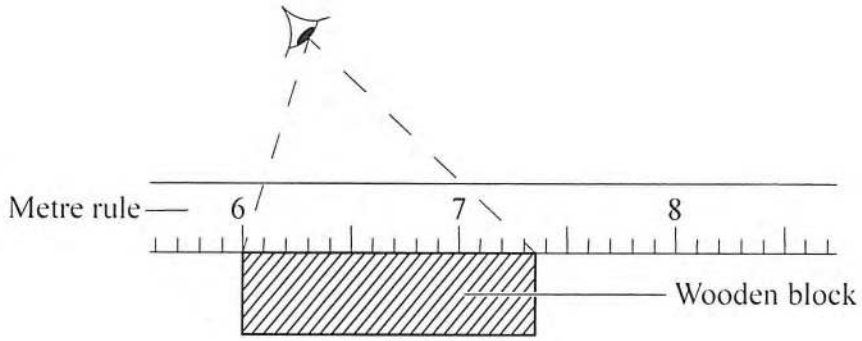

Figure 1

Determine the length of the block as viewed by the student. (1 mark)

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3. Describe how the knowledge of the oil drop experiment may be used to estimate the area of oil spillage from a ship in the sea assuming the surface water is not disturbed. (3 marks)

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4. **Figure 2** shows an instrument used to measure atmospheric pressure.

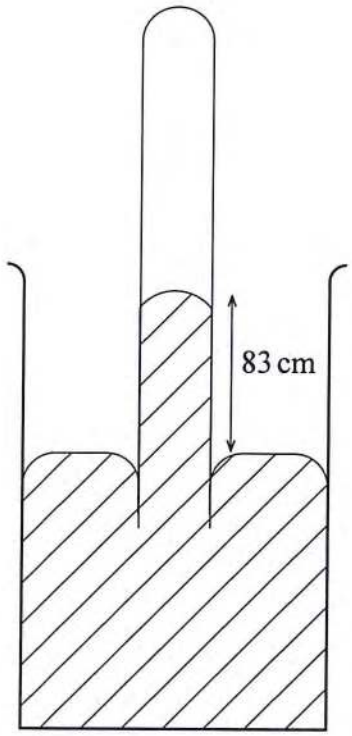

Figure 2

State with a reason the modification that would be required in a similar set up if mercury were to be replaced with water. (2 marks)

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5. It is observed that a drop of milk carefully put into a cup of water turns the water white after some time. State the reason for this observation. (1 mark)

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6. **Figure 3** shows the shape of a bimetallic strip after it was cooled below room temperature.

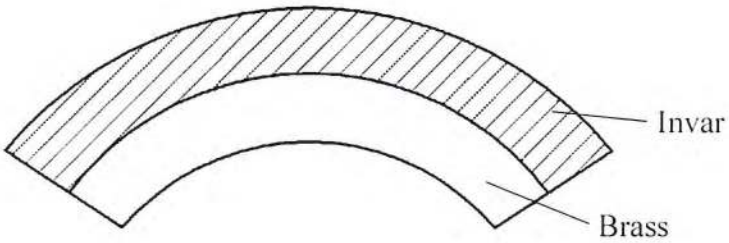

Figure 3

Explain why the strip curved as shown. (2 marks)

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7. A wooden cube of side 0.5 m floats in water fully submerged. Determine the weight of the cube. (*density of water = 1 gcm^{-3}*). (2 marks)

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8. **Figure 4** shows a stone whirled in a vertical circle.

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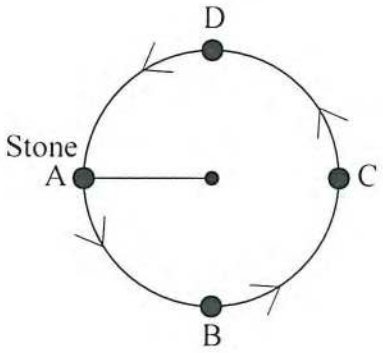
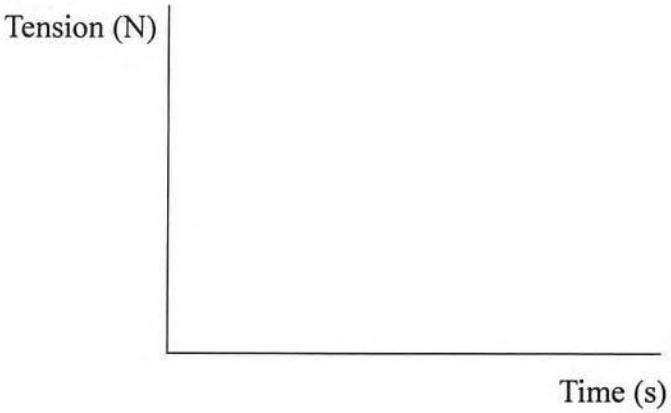


Figure 4

On the axes provided, sketch a graph of tension against time as the stone moves through point A, B, C and D. (3 marks)



9. **Figure 5** shows a ball spinning as it moves.

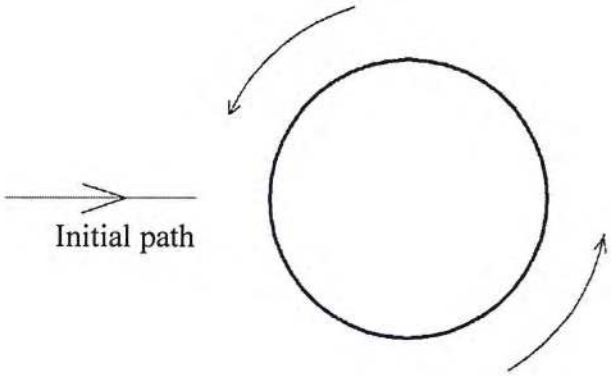


Figure 5

(a) On the diagram, sketch the path followed by the ball as it moves. (1 mark)

(b) Explain why the ball takes that path. (3 marks)

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10. **Figure 6** shows the relationship between volume and pressure for a certain gas.

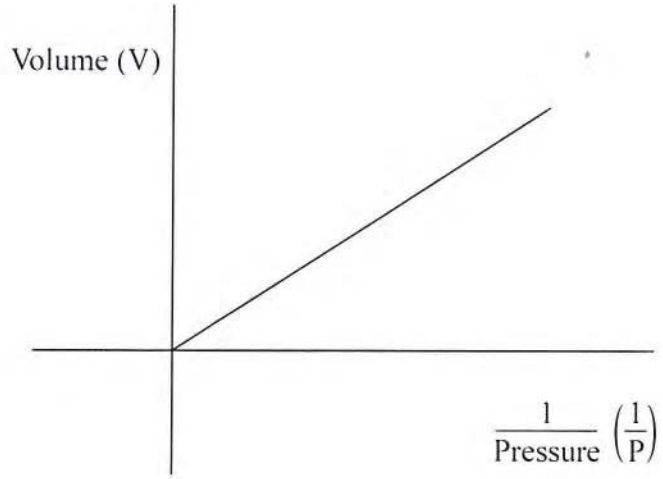

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Figure 6

Name the law that the gas obeys. (1 mark)

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11. **Figure 7** shows an L-shaped wooden structure.

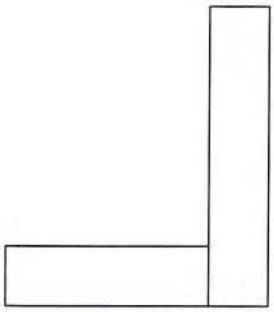

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Figure 7

On the diagram, construct appropriate lines to show the position of the centre of gravity for the structure. (2 marks)

12. **Figure 8** shows the graph of extension against force for a certain helical spring.

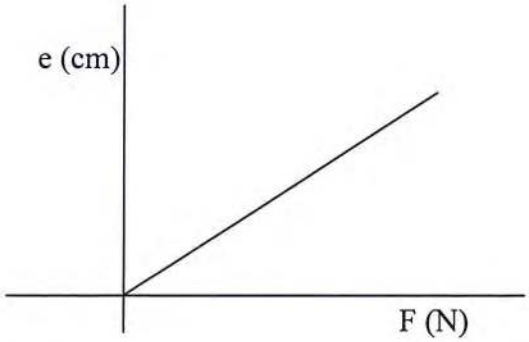

Figure 8

On the same diagram sketch the graph of extension against force for a spring with a lower value of spring constant. (1 mark)

13. State **two** ways in which a mercury based thermometer can be modified to read very small temperature changes. (2 marks)

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SECTION B (55 marks)

*Answer **all** the questions in this section in the spaces provided.*

14. (a) State **two** differences between boiling and evaporation. (2 marks)

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(b) State **three** ways in which loss of heat by conduction is minimised in a vacuum flask. (3 marks)

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(c) In a certain experiment, 50 g of dry steam at 100 °C was directed into some crushed ice at 0 °C. (*Latent heat of vaporisation of water is* $2.26 \times 10^6\ Jkg^{-1}$, *latent heat of fusion for ice is* $3.34 \times 10^5\ Jkg^{-1}$ *and specific heat capacity of water is* $4.2 \times 10^3\ Jkg^{-1}$)

Determine the:

(i) quantity of heat lost by steam to change to water at 100 °C. (2 marks)

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(ii) quantity of heat lost by water to cool to 0 °C. (2 marks)

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(iii) mass of ice melted at 0 °C. (3 marks)

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15. (a) State Newton's first law of motion. (1 mark)

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(b) A wooden block resting on a horizontal bench is given an initial velocity u so that it slides on the bench for a distance x before it stops. Various values of x are measured for different values of the initial velocity. **Figure 9** shows a graph of u^2 against x.

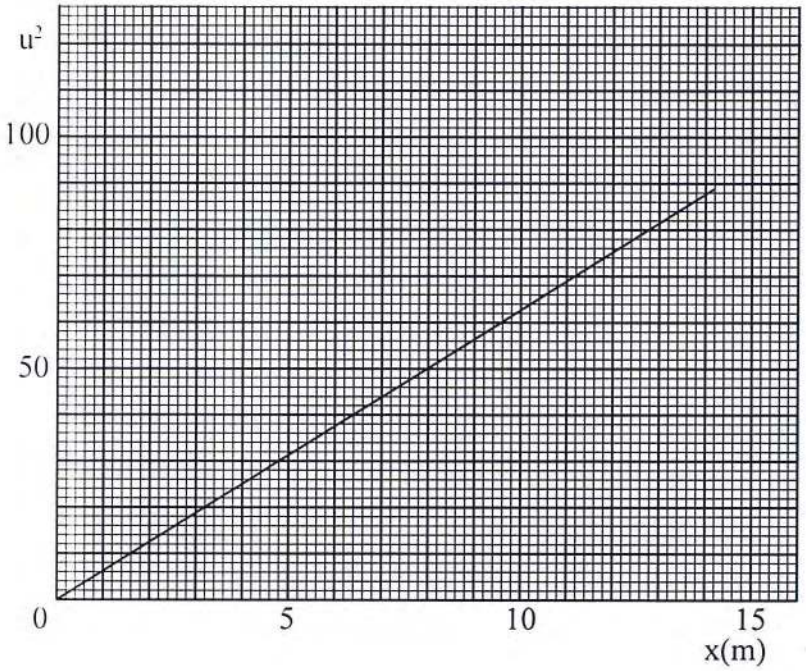

Figure 9

(i) Determine the slope S of the graph. (3 marks)

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(ii) Determine the value of **k** given that $u^2 = 20kd$ where **k** is a frictional constant for the surface. (2 marks)

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(iii) State with a reason what happens to the value of **k** when the roughness of the bench surface is reduced. (2 marks)

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(c) An object is thrown vertically upwards with an initial velocity of $30\,ms^{-1}$. Determine its maximum height (*acceleration due to gravity g is 10 ms^{-2}*). (3 marks)

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16. (a) An electric crane uses 8.0×10^4 N of energy to lift a load of 2.0×10^4 N in 4 s.

(i) Determine the;

I power developed by the crane, (2 marks)

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II height to which the load is lifted, (2 marks)

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III efficiency of the crane whose motor is rated 2.5×10^4 W. (2 marks)

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(ii) State **two** forms of energy transformation that lead to the crane's inefficiency. (2 marks)

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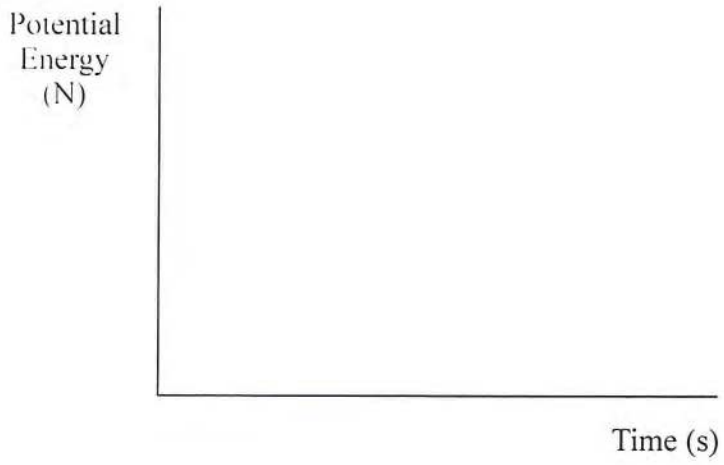
(b) A stone is dropped from the top of a building to the ground. On the axes provided, sketch a graph of potential energy against time for the stone. (1 mark)



17. (a) State Pascal's principle of transmission of pressure in liquids. (1 mark)

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(b) **Figure 10** shows heights of two immiscible liquids X and Y in a U-tube (drawn to scale).

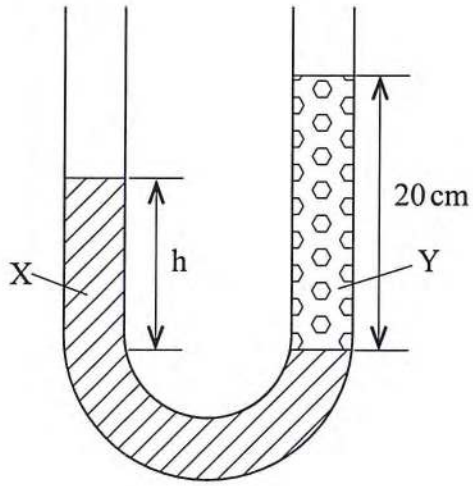

Figure 10

(i) State with a reason which of the two liquids X and Y has a higher density. (2 marks)

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(ii) Determine the value of **h**. (2 marks)

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(iii) Given that the density of liquid Y is **ρ**, write down an expression for the density **d** of liquid X in terms of **ρ**. (2 marks)

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(c) (i) With the aid of a diagram, describe how a liquid may be siphoned from one container to another using a flexible tube. (3 marks)

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(ii) State **one** application of the siphon. (1 mark)

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18. (a) State two quantities that must be kept constant in order to verify Boyle's law. (2 marks)

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(b) An air bubble at the bottom of a beaker full of water becomes larger as it rises to the surface. State the reason why;

(i) the bubble rises to the surface, (1 mark)

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(ii) it becomes larger as it rises. (1 mark)

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(c) State **two** assumptions made in explaining the gas laws using the kinetic theory of gases. (2 marks)

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(d) **Figure 11** shows an incomplete experimental set up that was prepared by a student to verify one of the gas laws.

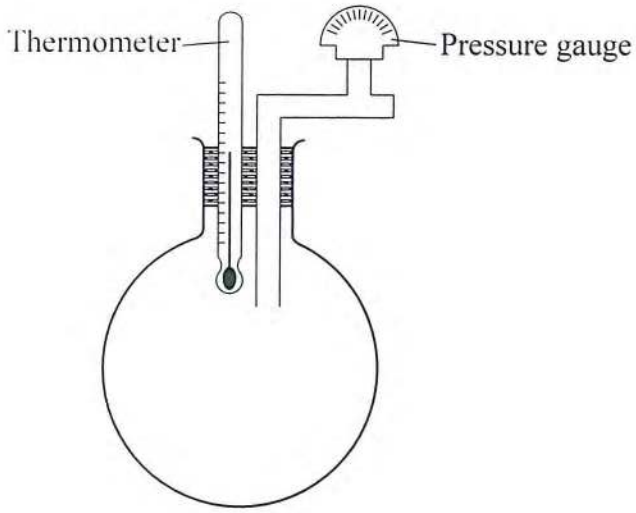

Figure 11

(i) State with a reason which one of the laws may be verified using the set up. (2 marks)

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(ii) State what the student left out in the diagram of the set up. (1 mark)

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(e) The volume of a fixed mass of a gas reduced from 500 cm^3 to 300 cm^3 at constant pressure. The initial temperature was 90 K. Determine the final temperature. (3 marks)

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