

232/1 -

PHYSICS
(THEORY)

- Paper 1

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	
	14	12	
B	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.

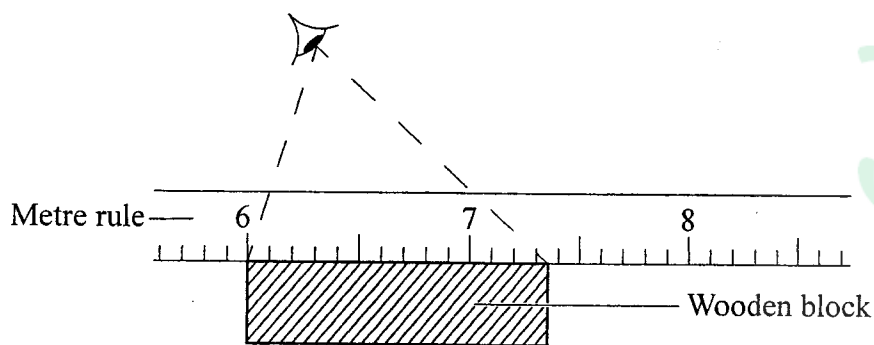


Figure 1

- 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.

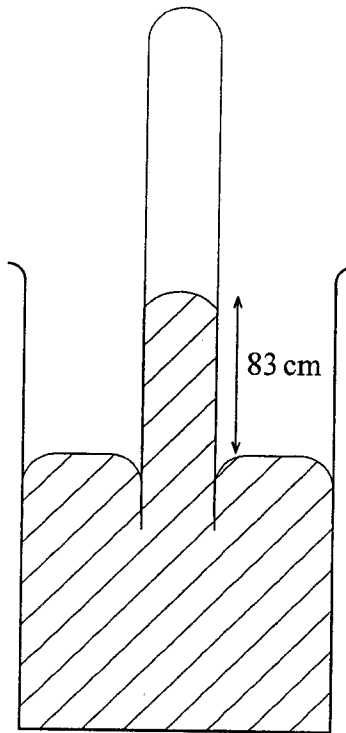


Figure 2

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.

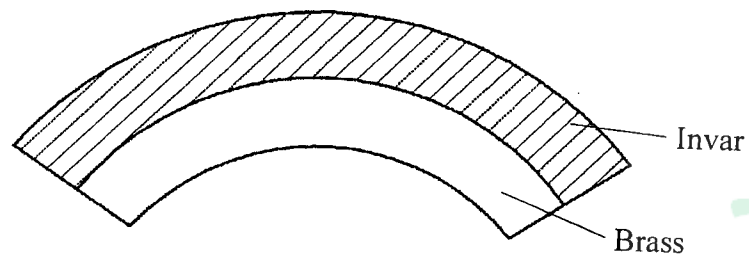


Figure 3

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.

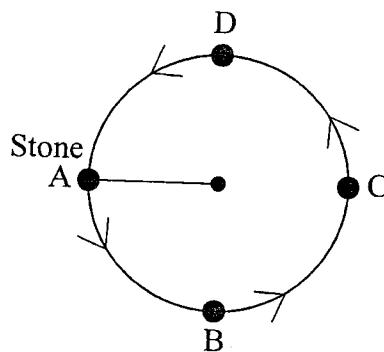
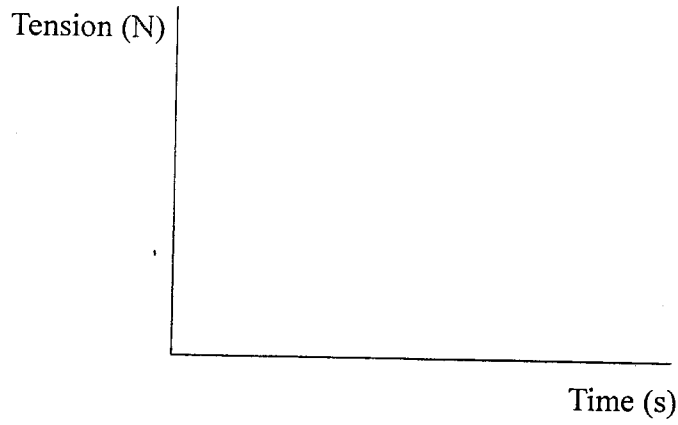


Figure 4

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.

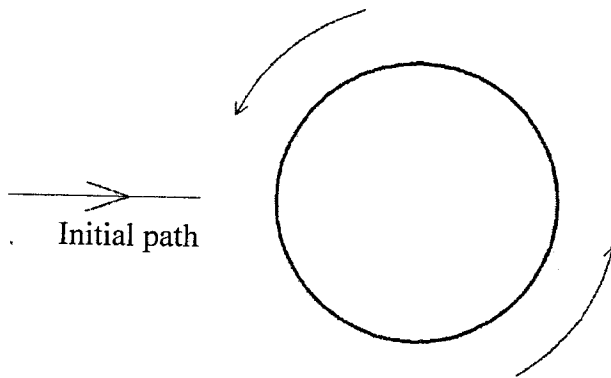


Figure 5

- (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.

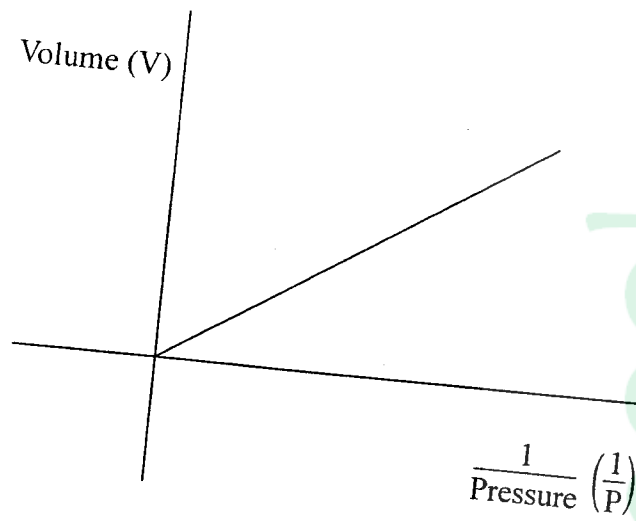


Figure 6

Name the law that the gas obeys.

(1 mark)

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

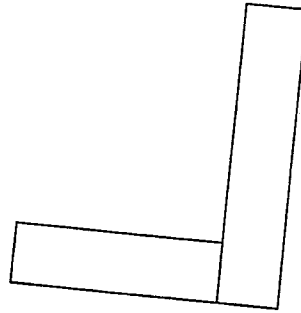


Figure 7

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

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

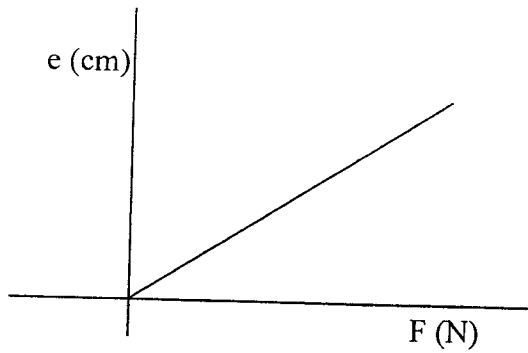


Figure 8

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)

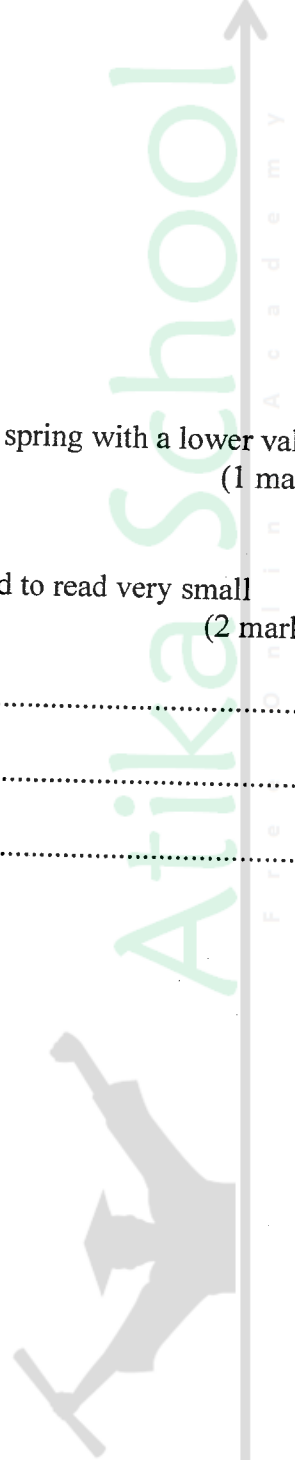
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SECTION B (55 marks)

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 $2.26 \times 10^6 \text{ Jkg}^{-1}$, latent heat of fusion for ice is $3.34 \times 10^5 \text{ Jkg}^{-1}$ and specific heat capacity of water is $4.2 \times 10^3 \text{ Jkg}^{-1}$)

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 .

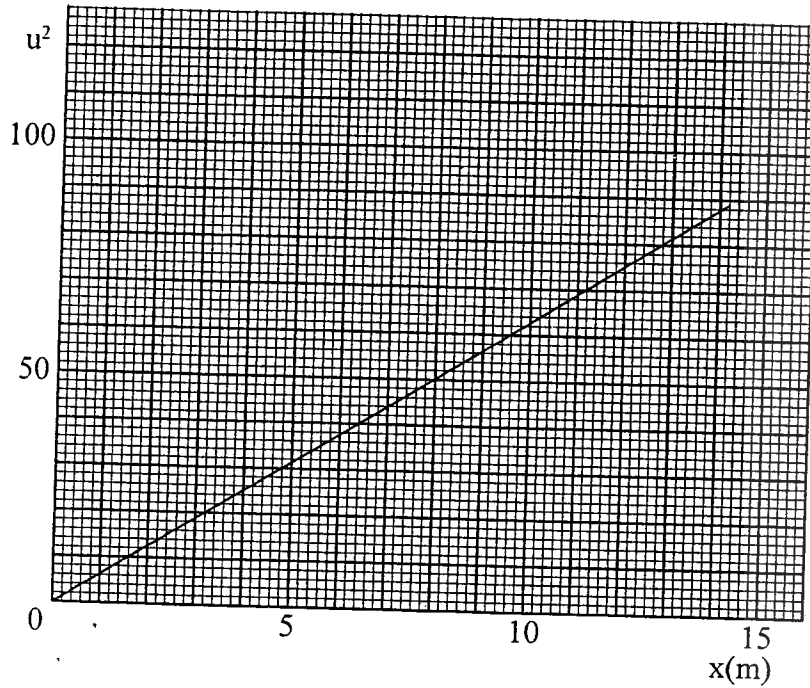


Figure 9

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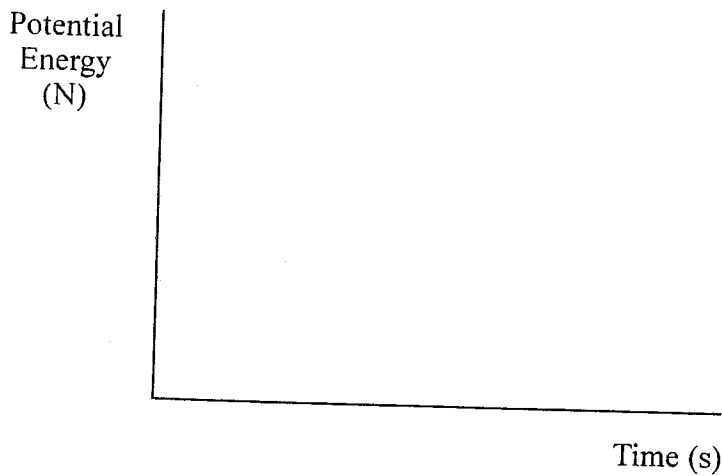
III efficiency of the crane whose motor is rated 2.5×10^4 W. (2 marks)

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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)



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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).

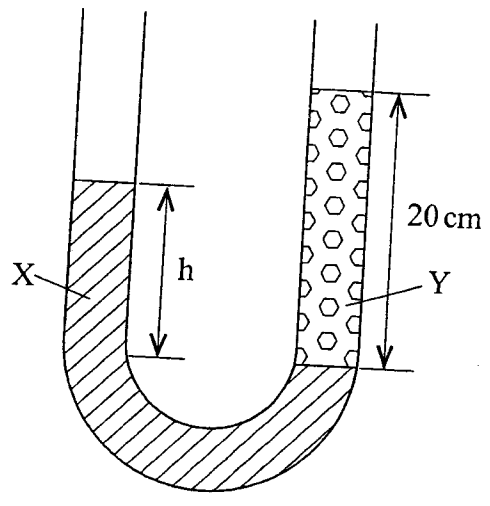


Figure 10

(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)

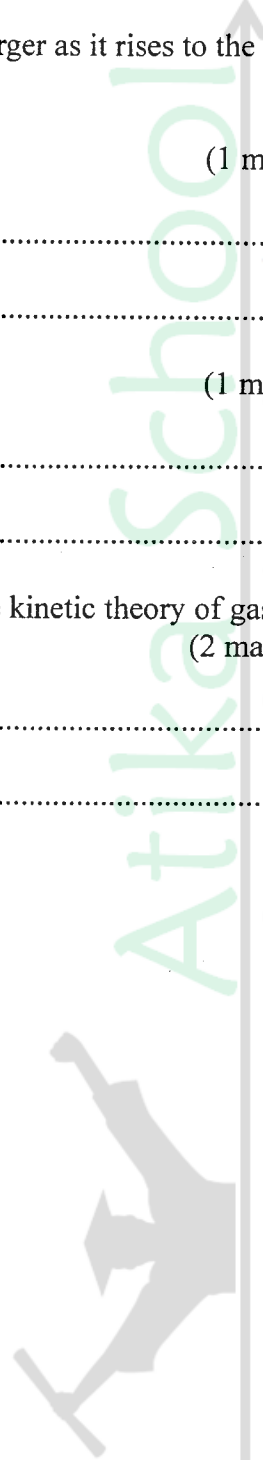
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(c) State **two** assumptions made in explaining the gas laws using the kinetic theory of gases. (2 marks)

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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.

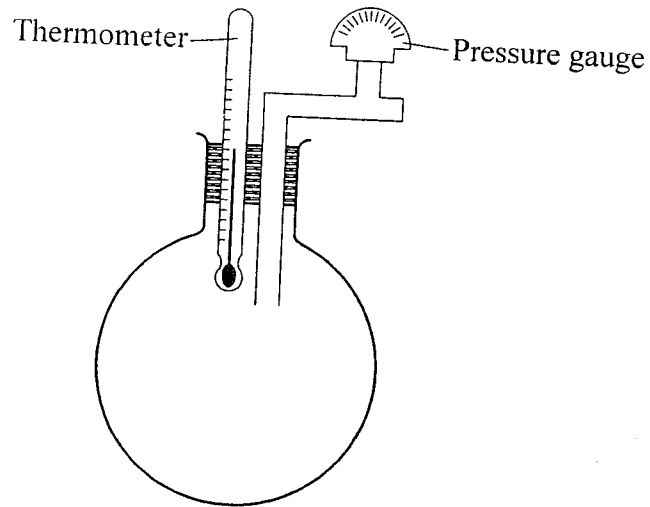


Figure 11

- (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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