



Name: Admission No

Class:

Date:

School:

Signature

Instructions to Candidates

- (a) Write your name, index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided.
- (c) This paper consists of **TWO** Sections: **A** and **B**.
- (d) Answer **ALL** the questions in section **A** and **B** in the spaces provided.
- (e) All working **MUST** be clearly shown.
- (f) KNEC mathematical tables and silent non-programmable electronic calculators may be used.
- (g) **This paper consists of 10 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer the questions in English.**

Take: Acceleration due to gravity, $g = 10 \text{ m/s}^2$

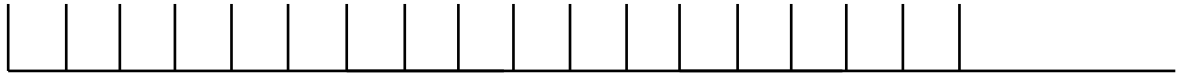
For Examiner's Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	13	
	15	11	
	16	10	
	17	11	
	18	10	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all questions in the spaces provided.

1. The figure below shows a section of a vernier calipers. Insert a vernier scale to show a reading of 3.50 cm. (1mark)



2. Explain why a man using a parachute falls through air slowly when the parachute is open than before. (2marks)

.....

.....

.....

.....

3. The diagram below shows a bimetallic metal strip.



Explain how the bimetallic strip can be used in a fire alarm circuit. (2marks)

.....

.....

.....

4. The retort stand used in the lab have heavy and a wide base. Explain how the wide base affect its stability. (2marks)

.....

.....

.....

.....

5. When strong winds blew over a building, the roof was blown away. Explain the cause of this. (2marks)

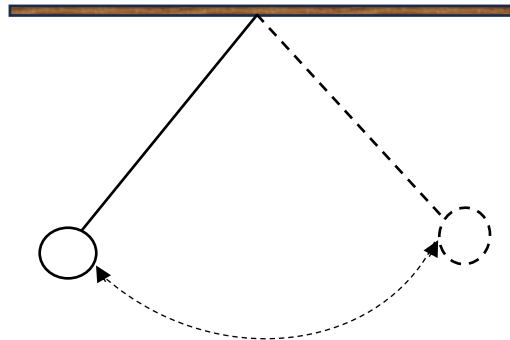
.....

.....

.....

.....

6. The figure below shows a pendulum swinging freely.



On the axis provided, sketch a momentum- time graph for the pendulum for half oscillation and state the quantity represent by the slope of the graph. (2marks)



7. Explain why a body falling through a fluid reaches the term terminal velocity after sometime. (2 marks)

.....

.....

.....

.....

8. A certain lever has its effort arm 2.4 m long and its load arm 50 cm long. Calculate the velocity ratio of the lever. (2 marks).

.....

.....

.....

9. A fixed mass of gas occupies a volume of 600 cm^3 at a pressure of $1.0 \times 10^5 \text{ Pa}$. Calculate the new volume of the gas when its pressure is increased to $1.5 \times 10^5 \text{ Pa}$ at constant temperature. (2marks)

.....

.....

.....

.....

.....

.....

10. An object of mass 0.5 kg is whirled in a vertical. If the length of the string is 2 m and the velocity is 8 m/s , determine the maximum tension on the string. (2marks)

.....

.....

.....

.....

11. A submarine can be made to either float or sink in the ocean. Explain how the submarine is made to sink. (2marks)

.....

.....

.....

.....

.....

.....

12. State two precautions that should be taken to minimise parallax error when reading the level of a liquid in a burette. (2marks)

.....

.....

.....

13. A passenger standing in a moving bus is thrown forward when the bus suddenly stops. Explain this observation. (2 marks)

.....

.....

.....

.....

SECTION B (55 MARKS)

Answer all questions in the spaces provided.

- 14. (a)** State the Archimedes principle. (1 mark)

.....

.....

.....

.....

- (b)** A balloon of volume 10m^3 filled with hydrogen floats in the atmosphere. The mass of the balloon fabric is 10.3kg . (density of hydrogen $= 0.09\text{kgm}^{-3}$.) Calculate the density of the surrounding air. (3marks)

.....

.....

.....

.....

- (c)** (A solid glass block weighs 6.0 N in air. When completely immersed in water, it weighs 4.2 N . When completely immersed in an unknown liquid X, it weighs 4.5 N .

- (i) Determine the upthrust experienced by the block in water. (take density of water as 1.0gcm^{-3}) (1 mark)

.....

.....

.....

.....

- (ii) Calculate the volume of the glass block. (2 marks)

.....

.....

.....

.....

- (iii) Calculate the density of the unknown liquid X. (3 marks)

.....

.....

.....

.....

(d) A hydrometer floating upright in a cylinder filled with a liquid is used to determine its relative density.

(i) State the purpose of the lead shots placed at the bottom bulb. (1 mark)

.....

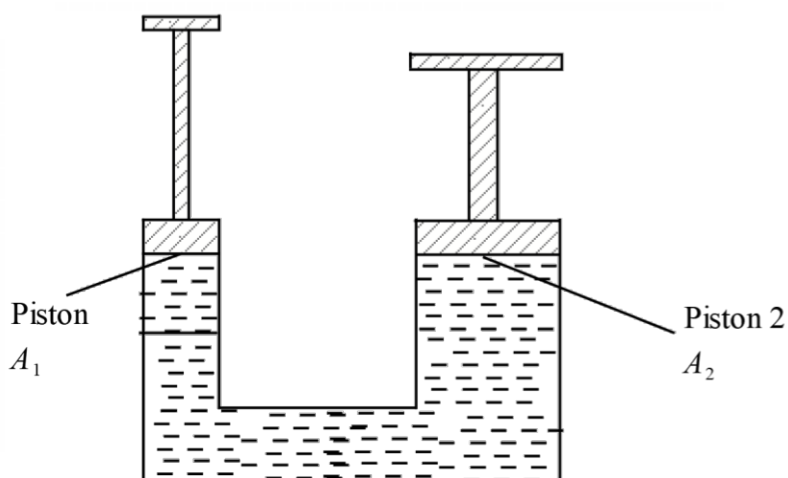
(ii) Explain why the stem of a standard hydrometer is made narrow. (2 marks)

.....

15. (a) Define the term *velocity ratio* as used in machines. (1 mark)

.....

(b) The figure below shows a simple hydraulic lift system.



(i) Given that the areas A_1 and A_2 are 0.2 m^2 and 4 m^2 respectively, determine the maximum load that can be lifted at piston 2, when a force of 20 N is applied at piston 1. (3 marks)

.....

(ii) Determine the efficiency of the hydraulic machine. (3marks)

.....

.....

.....

.....

(iii) State two properties of the liquid used in the above machine. (2marks)

.....

.....

.....

(iv) In real life, a machine cannot be 100% efficient. Explain. (2marks)

.....

.....

.....

.....

16. (a) Define the term centripetal acceleration. (1 marks)

.....

.....

.....

(b) A small stone of mass 150 g is tied to the end of a light, inextensible string of length 0.8 m. The stone is whirled in a horizontal circle at a constant speed, completing 5 revolutions per second.

(i) Determine the period T of the motion. (1 mark)

.....

.....

(ii) Calculate the angular velocity ω of the stone. (3 marks)

.....

.....

.....

(iii) Calculate the tension in the string. (3 marks)

.....

.....

.....

(c) Explain how banking a road surface reduces the risk of a vehicle skidding off at high speeds compared to a flat circular road. (2 marks)

.....

.....

.....

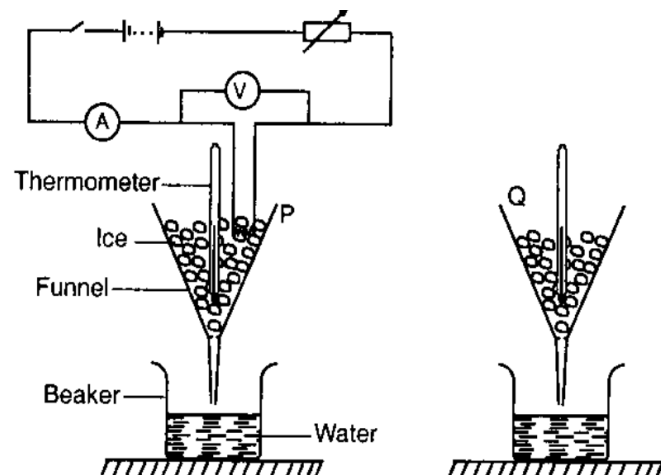
17. (a) Define the term specific latent heat of fusion of a substance. (1mark)

.....

.....

.....

(b) In an experiment to determine the specific latent heat of fusion of ice, an electric heater rated 120 W was embedded in a filter funnel containing crushed ice at 0°C. The mass of water collected in a beaker in 5 minutes was found to be 230 g. A control experiment without the heater running collected 20 g of water in the same duration.



(i) State the purpose of the control experiment. (1 mark)

.....

.....

.....

(ii) Determine the mass of ice melted purely by the electric heater. (1 mark)

.....

.....

(iii) Calculate the experimental value for the specific latent heat of fusion of ice. (3 marks)

.....

.....

.....

(c) Explain why a dog would expose its tongue outside when it is hot. (3marks)

.....

.....

.....

.....

(d) Water is commonly used as coolant for car engines. Give a reason for this (2marks)

.....

.....

.....

.....

.....

18. (a) State the *law of conservation of linear momentum*. (1mark)

.....

.....

.....

.....

(b) Space exploration by astronaut has increased a lot in the recent times. Explain how the rocket carrying astronauts propelled to the outer space. (3marks)

.....

.....

.....

.....

.....

(c) State the principle of moments. (1mark)

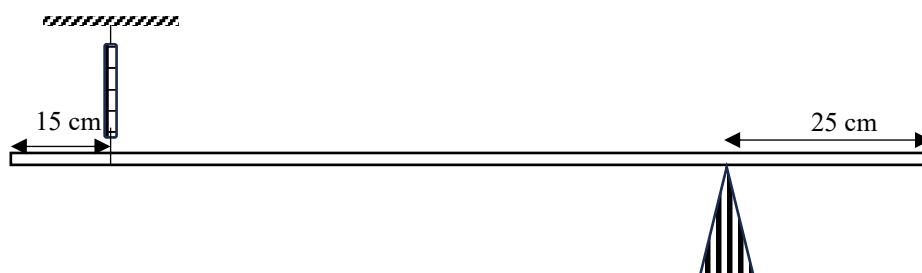
.....

.....

.....

.....

(d) The figure below shows a uniform metre rule pivoted near one end. The bar is kept at equilibrium by spring balance as shown. The reading on the balance is 0.8N. Determine the weight of the metre rule. (3marks)



.....

.....

.....

.....

(f) Explain why it is easier to use a spanner with a longer handle than the one with a shorter handle. (2marks)

.....

.....

.....

.....

THIS IS THE LAST PRINTED PAGE