

232/1

THE EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education



PHYSICS (Theory)

Nov. 2024 – 2 hours

Paper 1

Candidate's signature: Date:

Instructions to Candidates

- (a) Confirm that this question paper has your name and the correct index number.
- (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 in the spaces provided in this booklet.
- (f) Non-programmable silent electronic calculators may be used.
- (g) **This paper consists of 12 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	10	
	15	10	
	16	10	
	17	13	
	18	12	
Total Score		80	



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SECTION A (25 marks)

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

- 1 **Figure 1** shows the vernier scale of a vernier calliper.

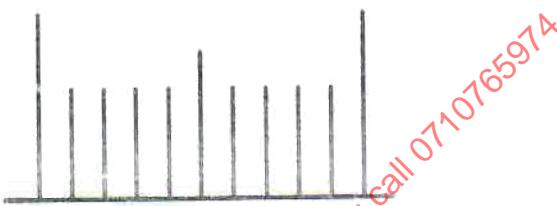


Figure 1

On the figure, include the main scale so that the vernier calliper shows a reading of 3.15 cm.
(2 marks)

- 2 Explain why weight of an object is a vector quantity. (1 marks)

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- 3 **Figure 2** shows the shape of a bimetallic strip made of metals A and B when heated.

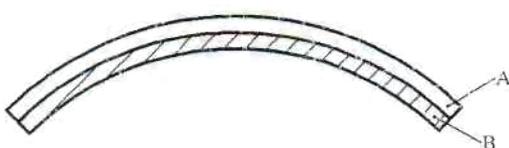


Figure 2

State the reason why the strip appears as shown. (1 mark)

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- 4 It is observed that in order to balance a sea-saw, the heavier child sits closer to the pivot. State the reason for this observation. (2 marks)

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- 5 Explain one way in which a person maintains stability when carrying a bucket of water in one hand. (1 mark)

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- 6 Figure 3 shows a simple hand sanitizer dispenser.

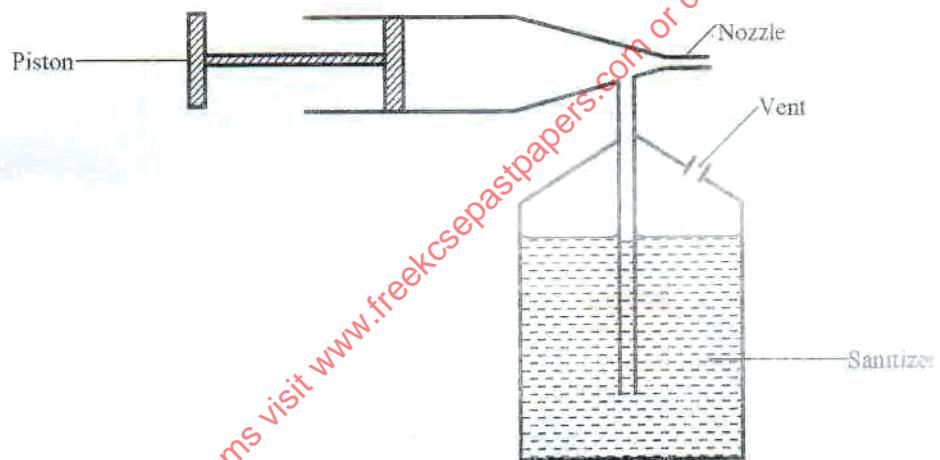


Figure 3

- Explain how it works. (3 marks)

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- 7 Figure 4 shows a marble that is set into oscillations when released in a bowl.

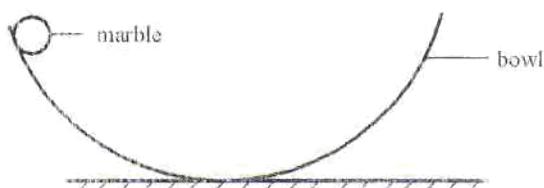
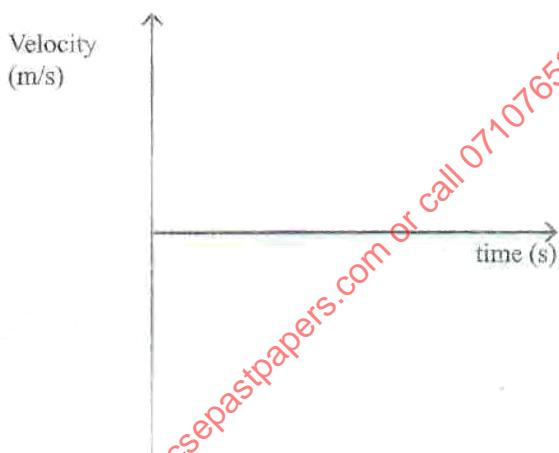


Figure 4

On the axes provided, sketch the velocity-time graph for the motion of the marble in one complete oscillation. (3 marks)



- 2 8 State the meaning of the term *viscosity* as used in fluids. (1 mark)

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- 3 9 A machine raises a mass of 20 kg through a distance of 0.2 m when an effort of 100 N is moved through a distance of 0.32 m. Determine the velocity ratio of the machine. (2 marks)

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- 10 A gas bubble is released at the bottom of a pond containing water. It is observed that as the bubble rises to the water surface, it expands. Explain this observation. (2 marks)

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- 11 A stone of mass 200 g tied at the end of a string 1 m long is whirled in a horizontal circle at an angular velocity of 10 radians per second. Determine the centripetal force acting on the stone. (3 marks)

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- 12 An object is released into a eureka can full of water. It is observed that the weight of the displaced water is equal to the weight of the object. Explain this observation. (2 marks)

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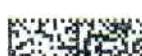
- ark) 13 A student observed that smoke particles in a smoke cell move randomly. State what:

(a) causes this motion. (1 mark)

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(b) happens to the motion of the particles if the temperature in the cell is increased. (1 mark)

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SECTION B (55 marks)

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

- 14 (a) (i) State the meaning of the term *relative density*. (1 mark)

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- (ii) State **two** areas of application of relative density in daily life. (2 marks)

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- (b) A student blew air into a balloon, tied it up and released it into the air. It floated for some time but slowly descended to the ground and settled.

- (i) Explain why the balloon settled on the ground. (2 marks)

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- (ii) State **two** ways in which the balloon could be made to keep floating in the air. (2 marks)

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- (c) A hollow metallic cube of volume 1000 cm^3 is submerged in a liquid of density 1100 kg m^{-3} . Determine the upthrust acting on it. (take g as 10 N kg^{-1}) (3 marks)

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- 15 (a) During an experiment to verify a certain law, a student was provided with some masses, a spring and a metre rule.

- (i) State the law the student wanted to verify. (1 mark)

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- (ii) State **one** other apparatus the student needed in order to carry out the experiment. (1 mark)

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- (iii) Explain how the measurements taken during the experiment are used to verify the law in part (i). (3 marks)

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- (b) A load of 0.04 N causes an extension of 0.4 cm on a certain spring. Determine the load that will cause an extension of 0.6 cm on the same spring. (3 marks)

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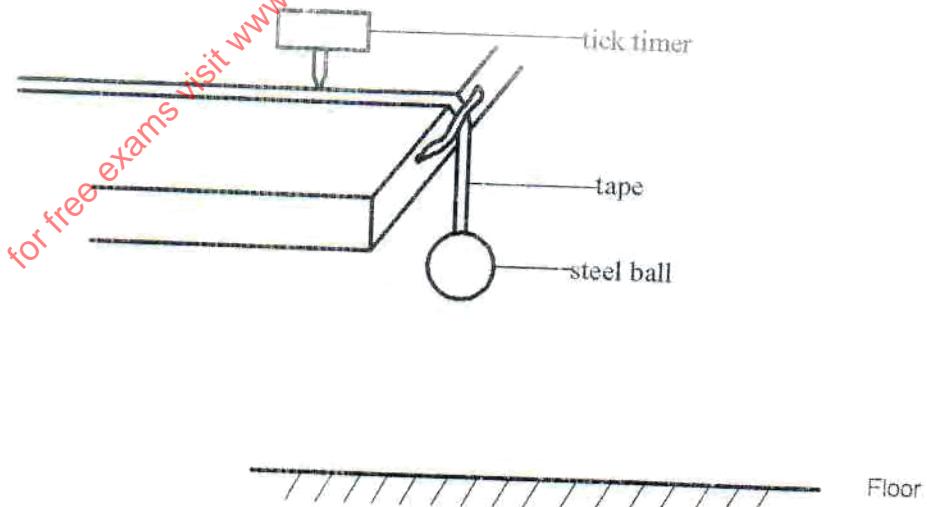
- 14 (c) A student was provided with a piece of wire and asked to make a spring. After coiling the wire on a rod, the spring appeared as shown in **figure 5**.

**Figure 5**

State **two** ways in which the student can modify the spring to make it stiffer.

(2 marks)

- 16 (a) **Figure 6** shows a set up that may be used to determine acceleration due to gravity.

**Figure 6**

Describe how the set up may be used to determine the acceleration due to gravity. (4 marks)

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- (b) A stone of mass 0.02 kg tied at the end of a string is whirled in a vertical circle of radius 1.0 m. Determine the minimum velocity required for the stone to maintain circular motion. (*acceleration due to gravity g is 10 ms^{-2}*). (4 marks)

- (c) State **two** applications of centripetal force. (2 marks)

- (a) It is observed that when salt is sprinkled onto the surface of ice at -2°C , the ice melts. Explain this observation. (2 marks)



- (b) State **two** factors that determine the pressure exerted by solids. (2 marks)

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- (c) (i) A person mixed 2 kg of hot water at 70°C with 3 kg of cold water at 22°C for bathing. Given that the specific heat capacity of water is $4200 \text{ J kg}^{-1} \text{ K}^{-1}$, determine the final temperature of the mixture, assuming there was no heat loss. (3 marks)

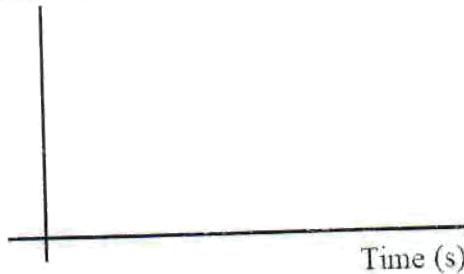
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- (ii) State **two** possible factors that can lead to heat loss in (i). (2 marks)

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- (d) Some water at 60°C was heated until it started to boil after a time t seconds.
 (i) On the axes provided, sketch a graph of temperature against time for the water till it boiled. (2 marks)

Temperature $^{\circ}\text{C}$

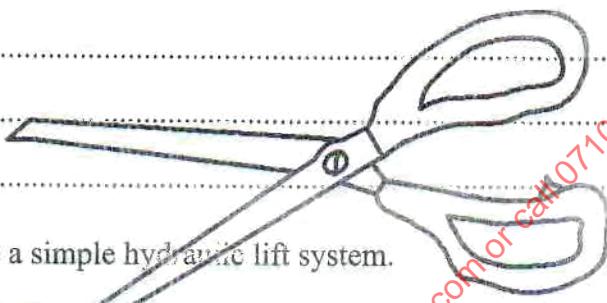


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- (ii) Explain the shape of the graph in (i). State two reasons why water is not a suitable liquid for use in this system. (2 marks)

- 18 (a) Explain why the walls of a dam are thicker at the bottom than at the top. (3 marks)

.....(c).....Figure 8 shows a pair of scissors.



- (b) Figure 7 shows a simple hydraulic lift system.

Figure 8

- (i) On the diagram, label the load, effort and fulcrum. (1 mark)
- (ii) Explain how the velocity ratio of the given pair of scissors may be reduced. (2 marks)



Figure 7

- (i) (iii) Given that the areas of pistons 1 and 2 are A_1 and A_2 respectively, determine the maximum load that can be lifted at piston 2, when a force of 200 N is applied at piston 1. (3 marks)

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