Name: …………………………………………………………………….…………….

Date………………Candidate’s Signature: ……….……. stream ....................Adm.no..................

**PHYSICS**

**THEORY**

Time: 2 hours

**April 2024**

**Kenya Certificate of Secondary Education**

**FORM 2 PHYSICS**

**END TERM 1 2024**

**Instructions to Candidates**

* *Write your name, admission number, class and signature in the spaces provided at the top of the page. This paper consists of two sections;* ***A*** *and* ***B.***
* *Answer* ***ALL*** *the questions in the spaces provided.*
* *Mathematical tables and electronic calculator may be used.*
* *All working MUST be clearly shown.*
* *This paper consists of* ***15*** *printed pages.*
* *Candidates should answer the questions in English and check to ensure that no question(s) is missing.*

**FOR EXAMINER’S USE ONLY**

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| --- | --- | --- | --- |
| **SECTION** | **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| **A** | 1 – 13 | 25 |  |
| **B** | 14 | 11 |  |
| 15 | 12 |  |
| 16 | 11 |  |
| 17 | 10 |  |
| 18 | 11 |  |
|  **TOTAL SCORE** | **80** |  |

***This paper consists of 15 printed pages. Candidates should check and ascertain that all questions are printed as indicated and that no questions are missing. TURN OVER***

**SECTION A (25 MARKS)**

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

1. Figure 1 shows a section of a Vernier calipers used to measure the external diameter of a tube. The Vernier calipers has a zero error of 0.3cm. Determine the actual diameter of the tube. (1 mark)



Figure 1

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1. A student used a container of mass x grams in an experiment to determine the density of a liquid. The following data was obtained:

Mass of empty container = xg

Mass of container when full of water = 80g

Mass of container when full of the liquid = 70g

The student obtained the density of the liquid to be$0.8{g}/{cm^{3}}$ . If the density of water is $1{g}/{cm^{3}}$, determine the value of x. (3 marks)

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1. Figures 2 shows two layers, A and B, of ice of equal thickness formed in a frozen pond



Figure 2

It is observed that layer B took longer to form even when the air above the pond remained at the same low temperature. Explain this observation. (2 marks.) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Figure 3 shows two containers filled with equal volume of hot water.



Figure 3

State, with a reason, in which container will water cool faster. (2 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Figure 4 shows a uniform horizontal beam of mass 5 kg pivoted at one end. The beam is supported by a spring and loaded with a mass of 2 kg.



Figure 4

Calculate the tension in the spring when the beam is horizontal. (2 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. The set up in figure 5 was used to compare the rates of diffusion of ammonia and hydrochloric acid. In the experiment, cotton wool soaked in ammonia solution placed in one end of a long tube and cotton wool soaked in hydrochloric acid in the other end. A white ring forms in the tube as shown in the diagram.



Figure 5

State with a reason which gas diffused faster. (2 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. When a person carries a load in one arm, the other arm swings away from the body and the torso bends away from the load as shown in figure 6.



Figure 6

Explain why this is necessary. (2 marks) ……………………………………………………………………………………………………… ……………………………………………………………………………………………………… ………………………………………………………………………………………………………

1. Oil accidentally spills in the sea and spread to form a monolayer film of area $2×10^{12}cm^{2}$. The oil molecule has a thickness of $5×10^{-19}m$.Determine the volume of the oil that spilt. (2 marks)

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1. A negatively charged rod is brought slowly towards the cap of a highly positively charged leaf electroscope. State and explain the observation made. (2 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
2. A person standing out in the garden at night is observed to have two shadows of different sharpness. Explain this observation. (1 mark) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
3. The magnetic field lines between the poles of two bar magnets, X and Y, are shown in Figure 7 below.



 Figure 7

State with a reason which magnet is stronger. (2 marks). ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Figure 8 shows some water trapped on a canvas tent.



Figure 8

(i) Give a reason why water is trapped on the canvas. (1 mark) ………………………………………………………………………………………………………………………………………………………………………………………………………………

 (ii) State and explain what is observed when soap is smeared at a point X on the lower side of the canvas. (2 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Explain why brakes fail in a hydraulic brake system when air gets in to the system.

 (1 mark)

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**SECTION B (55 MARKS)**

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

1. a) Other than being not visible give another reason why water is not a good barometric liquid. (1 mark) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

 b) State the principle of transmission of pressure in fluids. (1 mark)

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 c) Figure 9 shows a hydraulic lift in a car repair workshop.



Figure 9

 The hydraulic fluid transmits the pressure caused by piston A, equally to each of the four pistons holding up the car supports. The pressure throughout the fluid is the same. A force of 1000 N on piston A is just enough to raise the car.

 Determine;

1. The pressure caused by piston A on the hydraulic fluid. (2 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
2. The total upward force caused by the fluid. (3 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
3. The weight of each of the two car supports is 1000 N. Calculate the mass of the car. (2 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

c) State two properties to be considered when choosing the hydraulic fluid used in this system.

 (2 marks)

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1. a) A solar panel is mounted on the roof of a house. Figure 10 shows a section through part of the solar panel.



Figure 10

 A pump makes water circulate through the copper pipes. The water is heated by passing through the solar panel. (a) give a reason for the following;

1. the pipes are made of copper. (1 mark) …………………………………………………………………………………………………………………………………………………………………………………………
2. the pipes and the metal backing sheet are painted black. (1 mark) …………………………………………………………………………………………………………………………………………………………………………………………

(iii) an insulating material is attached to the metal backing sheet. (1 mark) …………………………………………………………………………………………………………………………………………………………………………………………………………

b) The water in the set up in figure 11 is heated until it starts boiling.



Figure 11

It is observed that the reading of thermometer A is higher than that of thermometer B. Explain this observation. (2 marks)

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c) Differentiate between heat and temperature. (2 marks)

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d) Figure 12 shows an inverted flask fitted with a capillary tube dipped into a water which is at room temperature.



Figure 12

Explain what is observed when the flask is held with warm hands. (3 marks) …………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….………………………………………………………………

e) Figure 13(a) shows a setup with identical glass bulbs P and Q, filled with air and connected by a U-tube containing



Figure 13

In figure 13(b) shows the same setup after an electric heater placed in the space between P and Q, is switched on for a few minutes. Explain **the possible cause of the** differences in oil levels in figure 13(b). (2 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. a.) Figure 14 below show a mirror with the lower end pivoted to a wall and the other end suspended using a flexible rubber band 20cm long such that it makes an angle of$ 35^{°}$ with the wall.



Figure 14

In a hot afternoon, the rubber band stretches by 22.12mm, a ray of light strikes the mirror horizontally. Calculate the angle between the horizontal and the new reflected ray.

 (3 marks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b.) State two differences between images formed by pinhole camera and a Plane mirror. (2marks)

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c.) Figure 15 shows an object O placed between plane mirrors inclined at right angles.



Figure 15

Determine the number of images formed. (2 marks)

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d) Describe the image formed by a plane mirror. (2 marks)

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Figure 16

1. State the aim of the experiment. (1 mark)

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(ii) If one of the cards was displaced slightly to the left, state what would be observed. (1 mark)

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1. a.) Figure 17 shows two insulated and uncharged metal spheres X and Y in contact. A positively charged rod is held near X and then the spheres are moved apart.



Figure 17

1. In the space provided on the right side of figure 2, draw diagrams to show the charge on X and Y. (2 marks)
2. Identify the method of charging used in figure 17 above. (1 mark)

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1. A car battery requires topping up with distilled water occasionally.
2. State why topping up is necessary. (1 mark) …………………………………………………………………………………………………………………………………………………………………………
3. State why distilled water is used. (1 mark) …………………………………………………………………………………………………………………………………………………………………………
4. Give one advantage of alkaline battery over lead acid accumulator. (1 mark). …………………………………………………………………………………………………………………………………………………………………………
5. Calculate the amount of charge passing through a point in a circuit if a current of **5A** flows for **1.5** minutes. (3 Marks)

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1. Give a reason why it is not advisable to smoke a cigarette near a charging battery.

 (1 mark)

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1. a.) State two properties of magnets. (2marks)

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1. Given a bar magnet, a steel bar and a string describe a simple experiment to distinguish between the magnet and the steel bar. (3 marks)

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1. Figure 18 shows a magnetic material being magnetized



Figure 18

Identify the polarities of X and Y. (2mks)

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d.) The figure below shows two pins hanging from a magnet. Explain why they do not hang vertically downwards. (2 marks)

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Figure 19

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e.) Figure 20 shows a graph of magnetization against magnetizing current for two materials A and B

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 Figure 20

1. State with a reason, the material which is more suitable for use in a transformer to concentrate the magnetic fields. (2marks)

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