**Name…………………………………………………… Class Register…………..………**

**Candidate’s Signature…………**

**PHYSICS Date………………………..……**

**Theory**

**Paper 1**

*Time: 2 hours*

**PAVEMENT FORM 4 TRIAL 2 EXAMINATION 2021/2022**

**Kenya certificate of secondary education (K.C.S.E)**

**Instructions to Candidates**

1. *Write your name and class register number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consists of* ***TWO*** *sections:* ***A*** *and* ***B****.*
4. *Answer* ***ALL*** *the questions in sections* ***A*** *and* ***B*** *in the spaces provided.*
5. *ALL working* ***MUST*** *be clearly shown.*
6. *Mathematical tables and non-programmable silent electronic calculators may be used.*
7. ***This paper consists of 11 printed pages****.*

**FOR EXAMINER’S USE ONLY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section** | **Question** | **Maximum**  **Score** | **Candidate’s**  **Score** |
| **A** | 1 – 10 | 25 |  |
| **B** | 11 | 7 |  |
| 12 | 6 |  |
| 13 | 11 |  |
| 14 | 10 |  |
| 15 | 11 |  |
| 16 | 11 |  |
|  | **Total Score** | **80** |  |

*Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing*

**SECTION A (25 Marks)**

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

1. The level of water in a burette is at 30 cm3. 400 drops of water each of volume 0.015 cm3 was removed from the burette. Determine the new level of water in the burette **(3 marks)**

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1. Calculate the temperature change of water as it falls through a height of 20 m. (Take g = 10 N/kg and s.h.c of water = 4200 J/kg/K) **(3 marks)**

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1. State the SI unit of density **(1 mark)**

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1. Give a reason why heat transfer by radiation is faster than heat transfer by conduction **(1 mark)**

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1. A railway truck of mass 4000 kg moving at 3 m/s collides with a stationary truck of mass 2000 kg. The couplings join and the trucks move off together. Calculate their common velocity after collision. **(3 marks)**

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1. State the principle of moments (1 mark)

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1. An air bubble with a volume of 1 cm3 escapes from the helmet of a diver at a depth of 200 m below the water surface. What will be the volume of the bubble immediately it breaks the surface of water? *(Take atmospheric pressure = 10 m of water)* **(4 marks)**

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1. Calculate the acceleration due to gravity on a planet where an object released from rest falls through a height of 54.2 m in 1.08 s. **(3 marks)**

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1. State the three factors on which the rate of heat flow depends on. **(3 marks)**

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1. Under a driving force of 3000 N, a car of mass 1200 kg has an acceleration of 1.3 m/s2. Find the frictional resistance acting in the car. **(3 marks)**

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**SECTION B (55 marks)**

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

1. **(a)** The diagram below shows a set up used by a student to show variation of pressure in a liquid. The thistle funnel is wrapped with an elastic membrane. Use it to answer the question that follow.

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  State and explain the effect on the height, h, when the thistle funnel is moved upwards towards the surface of the liquids. **(2 marks)**

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**(b)**  Figure below shows a simple barometer.



1. What name is given to region A? **(1 mark)**

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1. What keeps the mercury in the tube? **(1 mark)**

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1. What is the value of the atmospheric pressure being shown by the barometer? **(1 mark)**

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1. What would happen to the reading if the barometer was taken up a high mountain. **(1 mark)**

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1. Give a reason for (d) above. **(1 mark)**

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1. a) In opening a door, the moment exerted about the hinges was 15Nm. If the pushing force was 25N and perpendicular to the door, what is the distance of the force from the hinges?  **(2 marks)**

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b) A uniform plank of wood is balanced 30cm from one end when a lead of 0.08kg is hung at one end as shown below.



Calculate the weight of the plank. **(2marks)** ……………………………………………………………………………………………….…………………………………………………………………………………………………………………………………………………………………………………………………………………….………………………………………………………………………………………………………………………………………………………………

c) State two factors that affect centre of gravity. **(2 marks)**

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1. a) Sketch a velocity-time graph of a ball dropped to the ground and caught when it bounces up again. **(2 marks)**

   b) In areas of the world where a plane is unable to land free fall airdrops can be used to deliver supplies. A plane travelling at a speed of 90m/s and a height of 100m releases a load of supplies. *(g=10N/kg)*

1. Sketch the path followed by the falling load. **(1 mark)**
2. Find the horizontal distance of the load from the drop zone to where it landed. **(3 marks)**

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c) Define the Newton. (1 mark)

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d) The reading on a speedometer of a car of mass 1000kg is 60km/hr when the brakes are applied. The car is brought to rest in 10m. Find;

1. The retardation. **(2 marks)**

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1. Find the average breaking force.  **(2 marks)**

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1. a) The figure below shows the motion of a ticker tape through a ticker-timer whose frequency is 100Hz.





  Determine:

1. Velocity at AB and PQ **(2 marks)**

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1. Acceleration of the tape. **(2 marks)**

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**b)** Sate two factors that affect centripetal force of a body moving a circular path.  **(2 marks)**

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**c)** A stone of mass 1.2 kg is tied to a rope and whirled in a vertical circle of radius 3.2m with a speed of 6.32m/s. Calculate

1. The centripetal acceleration of the stone. **(2 marks)**

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1. The tension in the rope when the stone is at the highest point. **(2 marks)**

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1. a) State the law of floatation. **(1 mark)**

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b) You are provided with the following

* A block of wood.
* A spring balance.
* A thin thread.
* Overflow can
* A small measuring cylinder.
* Some liquid.

With the aid of a labelled diagrams describe an experiment to verify the law of floatation. **(4 marks)**

c) A block of length 80cm, cross sectional area 3.0cm² and density 1300kg/m³ is completely immersed in a liquid of density 1030kg/m³. Determine

1. The mass of the block. **(1 mark)**

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1. The weight of the block in the liquid.  **(3 marks)**

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d) The diagram below shows a car acid hydrometer.



1. Indicate on the diagram the maximum and minimum measurements to be taken. **(1 mark)**
2. State the reason why the bulb is wide. **(1 mark)**

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1. **a)** (i) State Charles law. **(1 mark)**

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(ii) A gas of volume 2m³ at 27°C is cooled to -123°C, at constant pressure. What is its new volume? **(2 marks)**

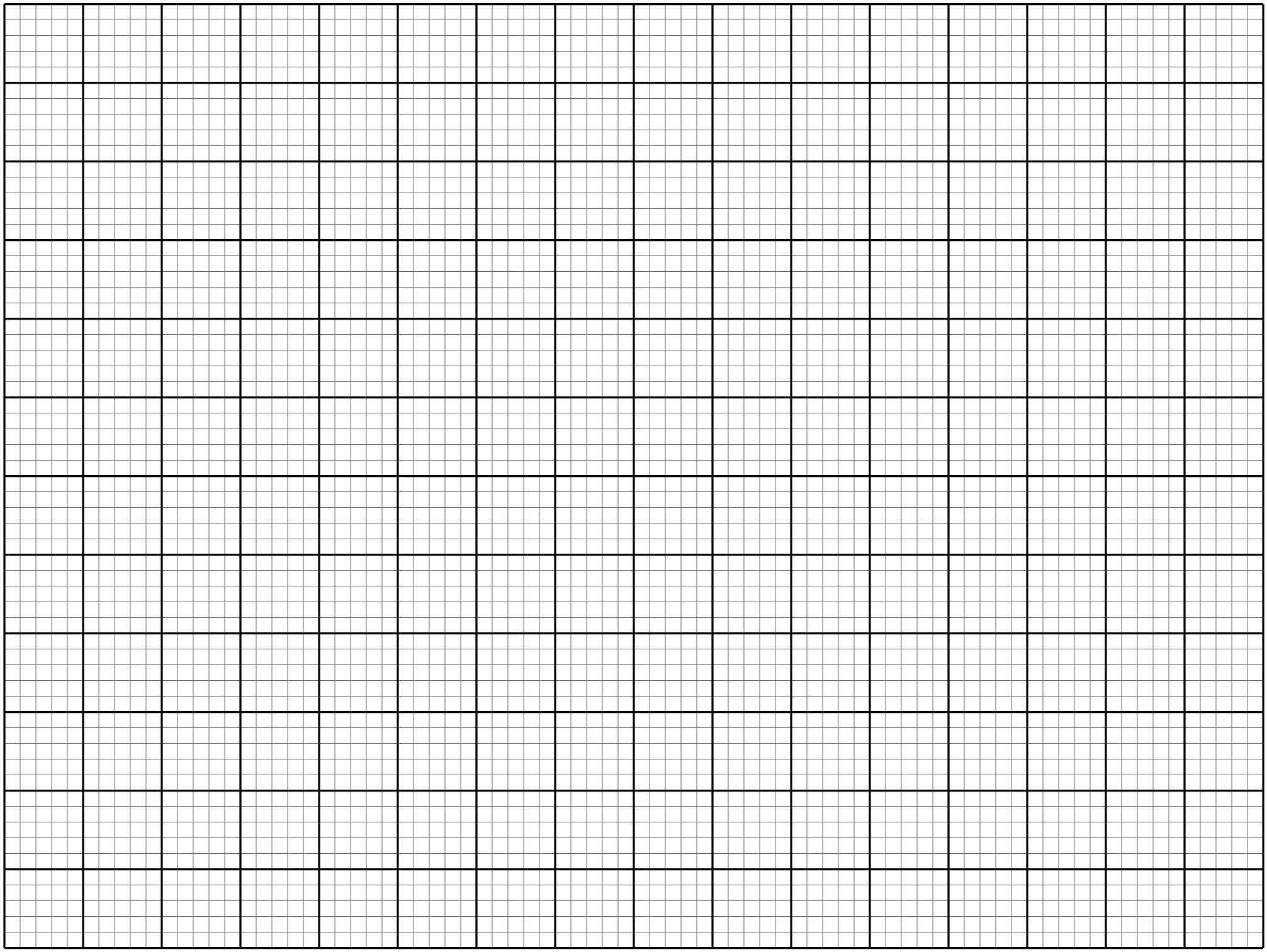
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**b)**

    The figure shown illustrates an apparatus in which a fixed mass of air was compressed in a calibrated syringe, which was approximately half full of air at atmospheric pressure and a temperature of 17°C corresponding values of volume and pressure of the trapped air as shown in the table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pressure (Kpa) | 50 | 60 | 75 | 90 | 105 | 120 |
| Volume (cm³) | 0.00048 | 0.00040 | 0.00032 | 0.00027 | 0.00023 | 0.00020 |
|  |  | 2500 |  | 3704 |  |  |

1. Complete the table by calculating values for some of the values have been entered for you. **(1 mark)**
2. On grid paper plot a graph of pressure on the y-axis against on the axis. **(5 marks)**



1. What relationship between pressure and volume of the trapped air can be deducted from your graph? Explain your answer. **(1 mark)**

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1. If the temperature of air was increased to 27°C, what would happen to the volume occupied by the air at a pressure of 100Kpa? **(1 mark)**

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