



# MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

MOCK EXAMINATIONS 2021

**232/1**

**PHYSICS**

**Paper 1**

**December 2021 – 2 Hours**

Name: ..... Adm No: .....

Class: .....Candidate's Signature: .....Date: ...../12/2021.

## INSTRUCTIONS TO CANDIDATES

1. Write your **name**, **admission number** in the spaces provided above. This paper consists of **TWO** sections.
2. Answer **ALL** the questions in sections **A** and **B** in the spaces provided.
3. **ALL** working **MUST** be clearly shown.
4. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
5. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

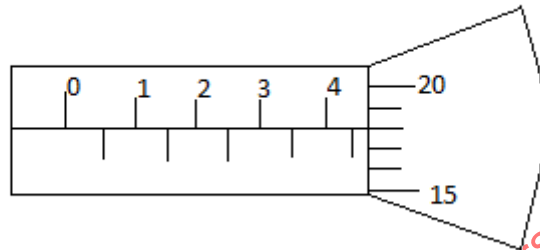
## For Examiner's Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 8	25	
	9	09	
B	10	12	
	11	10	
	12	10	
	13	07	
	14	07	
	Total Score	80	

### SECTION A (25 MARKS)

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

1. The diagram **below** shows a micrometer screw gauge used by a student to measure the thickness of a wire. If it has a zero error of 0.06mm, what is the actual thickness of the wire? (2mks)



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2. (a). State two differences between heat transfer by convection and radiation (2mks)

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- (b). Give a reason why a thick glass bottle cracks when boiling hot water is suddenly poured inside it (1mk)

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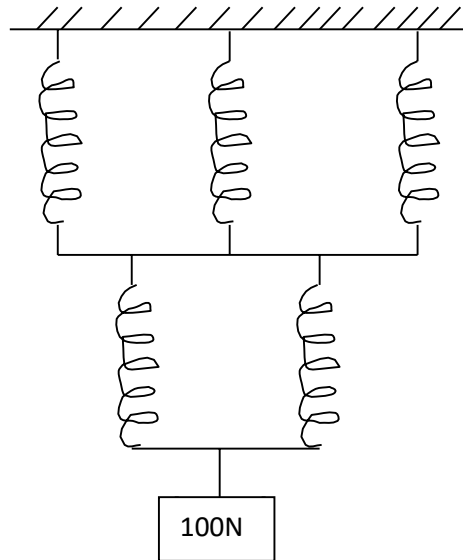
3. An aircraft 300m from the ground, travelling horizontally at 400 m/s releases a parcel. Calculate the horizontal distance covered by the parcel from the point of release. (Ignore air resistance) (2mks)

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4. A single spring stretches by 2.0 cm when supporting a load of 50N. If in the system below the springs are identical and have negligible weight;



Find:

- a) The total extension of the system. (2mks)

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- b) The total spring constant. (2mks)

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5. (a) The distance between the ice point and steam point on a liquid in glass thermometer is 30cm. what temperature is recorded when the mercury thread is 12cm above the ice point? (2mks)

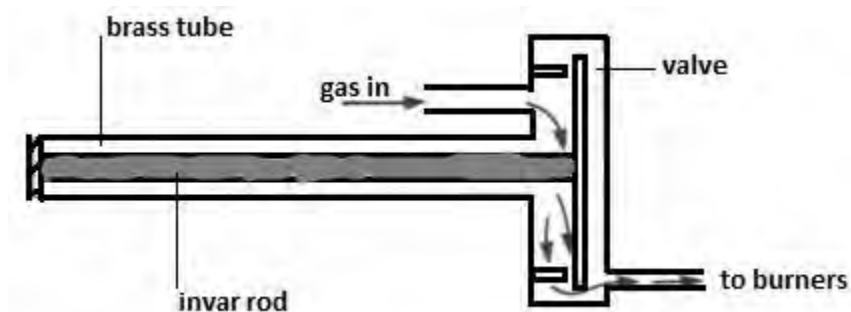
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b) The diagram below shows a gas cooker thermostat



Briefly explain how the thermostat works

(3mks)

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6. The figure below shows a uniform plank AB of length 10m weighing 500N. Two masses measuring 25kg and 60kg are loaded on its ends.



Determine the distance from point A where a support should be placed for the plank to balance horizontally.

(3mks)

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7. In an experiment to determine the thickness of an oil molecule, an oil drop of volume  $3.60 \times 10^{-6} \text{ m}^3$  was observed to form a circular patch of diameter 0.016m on the surface of water covered with lycopodium powder

i). Explain why the oil drop forms a circular patch.

(1mks)

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ii) Determine the thickness of the oil molecule

(2mks)

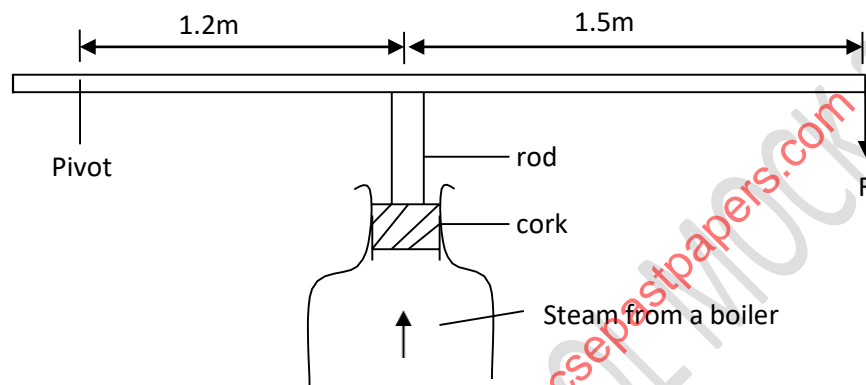
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8. A cork enclosing steam in a boiler is held down by the system shown.



If the area of the cork is  $15 \text{ cm}^2$  and a force ( $F$ ) of 500N is needed to keep the cork in place, determine the pressure of the steam in the boiler.

(3mks)

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## **SECTION B**

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

9. (a) An electric crane lifts a load of 2000kg through a vertical distance of 3.0m in 6s.

Determine:

- i) Work done (1mk)

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- ii) Power developed by the crane (2mks)

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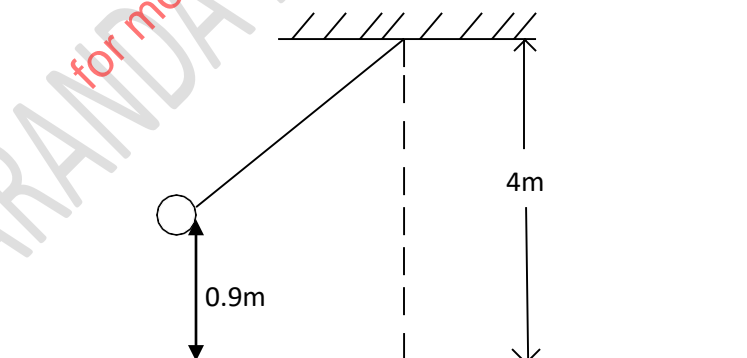
- iii) Efficiency of the crane if it is operated by an electric motor rated 12.5 Kw (2mks)

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- b) A bob of mass 20kg is suspended using a string of 4m from a support and swings through a vertical height of 0.9m as shown below:



Determine:

- i) The potential energy of the body at its position. (2mks)

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- ii) Speed of the body when passing through the lowest point. (2mks)

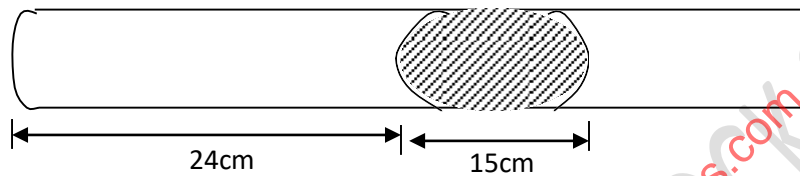
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10. (a) A glass capillary contains enclosed air by a thread of mercury 15cm long when the tube is horizontal, the length of the enclosed air column 24cm as shown.



- i) What is the length of the enclosed air column when the tube is vertical with the open end uppermost if the atmosphere pressure is 750mmHg? (2mks)

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- ii) Explain why the mercury does not run out when the tube is vertical with the closed end uppermost. (1mk)

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- b) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface. (1mk)

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- c) When an inflated balloon is placed in a refrigerator it is noted that its volume reduces, use the kinetic theory of gases to explain this observation. (2mks)

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d) A certain mass of hydrogen gas occupies a volume of  $1.6\text{m}^3$  at a pressure of  $1.5 \times 10^5\text{Pa}$  and a temperature of  $22^\circ\text{C}$ . Determine the volume when the temperature is  $0^\circ\text{C}$  at a pressure of  $0.8 \times 10^5\text{Pa}$ . (3mks)

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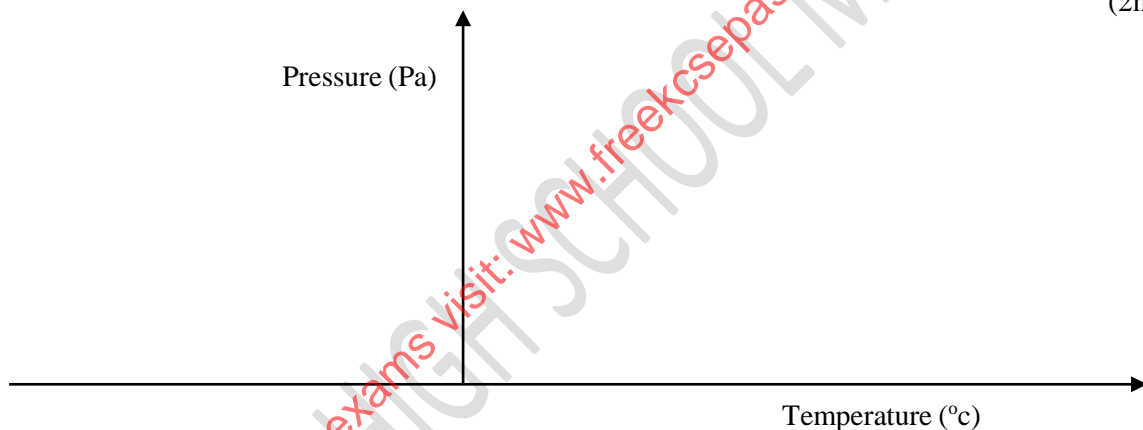
e) i) State the pressure law (1mk)

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ii) On the axis provided, sketch a graph of pressure against temperature on the celcius scale. On the same axis sketch another graph for a gas of a larger volume. (2mks)



11 (a) in a hydraulic press, a force of  $200\text{N}$  is applied to a master piston of area  $25\text{cm}^2$ . If the press is designed to produce a force of  $5000\text{N}$ , determine the area of the slave piston. (2mks)

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(b) The barometric height in a town is  $70\text{cmHg}$ . Given that the standard atmospheric pressure is  $76\text{cmHg}$  and the density of mercury is  $13600\text{kg/m}^3$ , determine the altitude of the town. (density of air is  $1.25\text{kg/m}^3$ ) (3mks)

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(c) In an experiment to determine atmospheric pressure, a plastic bottle is partially filled with hot water and the bottle is then tightly corked. After some time the bottle starts to get deformed.

(i) State the purpose of the hot water. (1mk)

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(ii) State the reason why the bottle gets deformed. (2mks)

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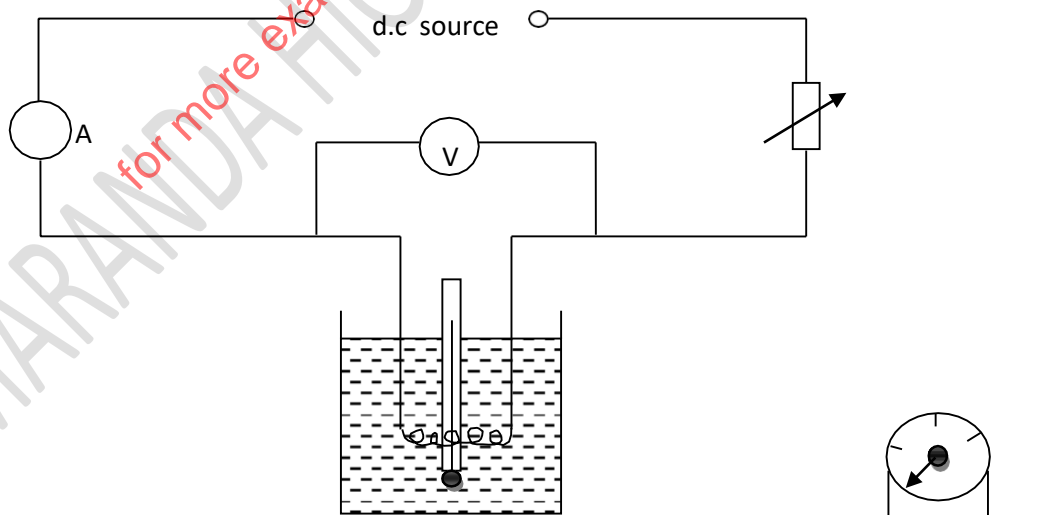
(d) A hole of area  $2.0\text{cm}^2$  at the bottom of a tank 5m deep is closed with a cork. Determine the force on the cork when the tank is filled with sea water of density  $1.2\text{g/cm}^3$ . (2mks)

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12. (a) Define specific latent heat of vaporization (1mk)

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b) The illustration below is used to produce a measured rise in temperature of a liquid using electrical energy.



Explain why;

- (i) The liquid will tend to be warmer at the top of the container than at the bottom. (1mk)

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- (ii) The temperature will eventually stop rising even though the current is still passing through the heating coil. (1mk)

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- iii) if the apparatus is used to determine the specific heat capacity of the liquid, the accuracy of the experiment will be increased if the liquid is first cooled to about  $5^{\circ}\text{C}$  below room temperature and the current passed until the temperature is about  $5^{\circ}\text{C}$  above room temperature. (2mk)

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(c). A 50W heating coil is totally immersed in 100g of water contained in an insulated flask of negligible heat capacity. The initial temperature of water in the flask is  $20^{\circ}\text{C}$ .

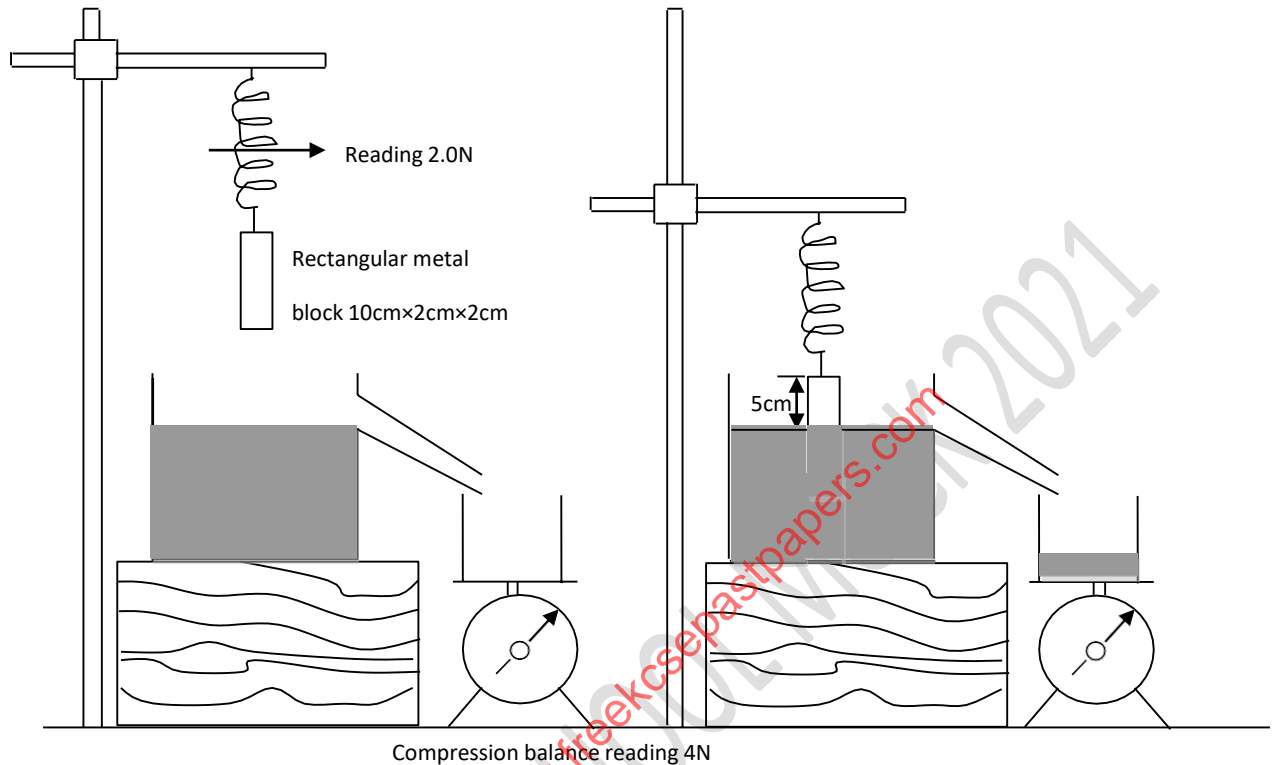
- (i) Determine how long it takes for the water to boil at  $100^{\circ}\text{C}$  when the heater is switched on (2mks)

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- (ii) After the water has been boiling for 15 minutes, it is found that the mass of water in the flask has decreased to 80g. Assuming no external heat losses, calculate a value for the specific latent heat of vaporization of water (3mks)

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13. (a) The figure below shows details of an experiment performed by a student and the results taken. (take the density of water as  $1.0\text{g/cm}^3$ )



- i) Calculate the volume of the metal block below the water (1mk)

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- ii) Calculate the new reading on the compression balance after the block is halfway immersed (2mks)

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- iii) Calculate the reading you would expect to obtain on the spring balance (2mks)

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- iv) Give a statement of the principle you have used in part (iii) above (1mk)

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b). Explain why the narrow stem of a hydrometer provides greater sensitivity than a wide one

(1mk)

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14 (a) (i) A car goes round a flat circular bend whose radius is 100m at a constant speed of 30m/s.

Calculate its acceleration

(2mks)

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(ii) if the mass of the car is 1500kg, calculate the frictional force required to provide this acceleration.

(2mks)

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(b) (i) Calculate the maximum speed at which the car can go round the bend without skidding if the coefficient of friction between the tyres and the ground is 0.5.

(2mks)

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(ii) Give a reason why the driver of the car has to move through the same bend at a lower speed during a rainy day.

(1mk)

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