

CANDIDATE NAME:.. _____



NENO DISTRICT MOCK EXAMINATION

2022 MALAWI SCHOOL CERTIFICATE OF EDUCATION

PHYSICS

Thursday, 22 May

Time allowed: 2 hours

PAPER I

(100 marks)

Instructions

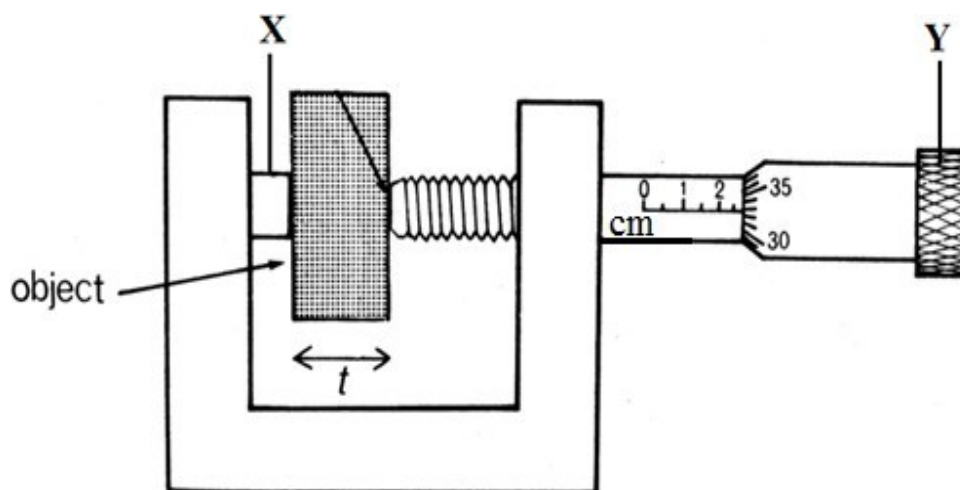
1. This paper contains 16 printed pages. Please check.
2. Before beginning, write your **name** at the top of each page.
3. Answer **all** questions in the spaces provided.
4. This paper contains **two** Sections. **A** and **B**. In section **A** there are **eleven** short answer questions while in **section B** there are **two** restricted essay questions.
5. Answer **all** the **thirteen** questions in the spaces provided.
6. Use of electronic calculators is allowed.
7. The maximum number of marks for each answer is indicated against each question.
8. In the table provided on this page, **tick** against the number of question you have answered.

Question number	Tick if answered	Do not write in these columns
1		
2		
3		
4		
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9		
10		
11		
12		
13		

SECTION A (70 marks)

Answer **all** questions

1. a. **Figure 1** shows an instrument of measurement in use. Use it to answer questions that follow.

**Figure 1**

- i. Identify the instrument.

_____ (1 mark)

- ii. Name the parts marked **X** and **Y**.

X _____

Y _____

(2 marks)

- iii. Determine the thickness t of the object shown.

(2 marks)

- b. Explain how photocopier machine works using static electricity.

(3 marks)

2. a. Define semiconductor

(1 mark)

- b. Differentiate intrinsic semiconductor from extrinsic semiconductor.

(2 marks)

- c. **Figure 2** shows graphs of signals X and Y. Use it to answer questions that follow.

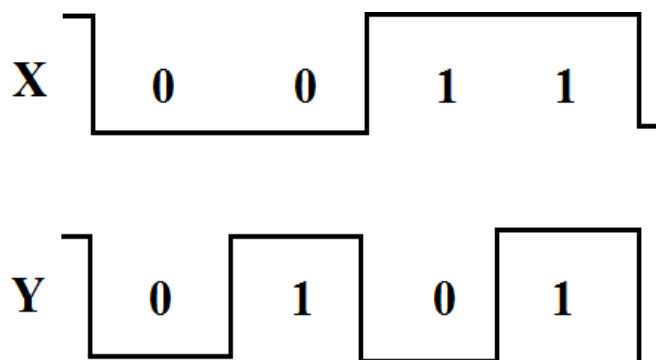


Figure 2

- i. Name the type of signal

(1 mark)

- ii. Given that the two signals above were used as input signals for a NAND gate.
Draw the symbol and truth table for a NAND gate.

(3 marks)

- iii. Use the truth table above to draw an output signal produced by the
NAND gate.

(2 marks)

3. a. State Newton's third law of motion.

(1 mark)

- b. Mention any **two** applications of Newton's third law of motion.

(2 marks)

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- c. **Figure 3** shows a mass M kg and 2.5kg connected by a light inextensible string that runs over a light frictionless pulley as shown below.

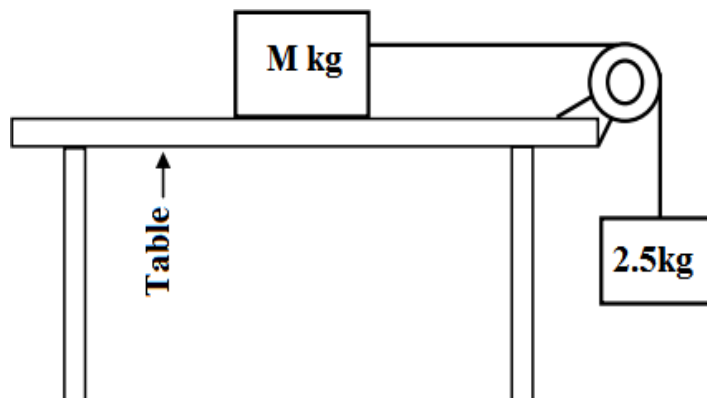


Figure 3

Calculate minimum value of M that will prevent the blocks from moving taking coefficient of static friction (μ_s) between the unknown mass and the surface of the table to be 0.2.

(3 marks)

4. a. Explain the significance of the limit of proportionality for an elastic material.

(2 marks)

- b. **Figure 4** shows a spring with a pointer attached hanging next to a scale marked in millimeters. Three different packages are hung from the spring, in turn.

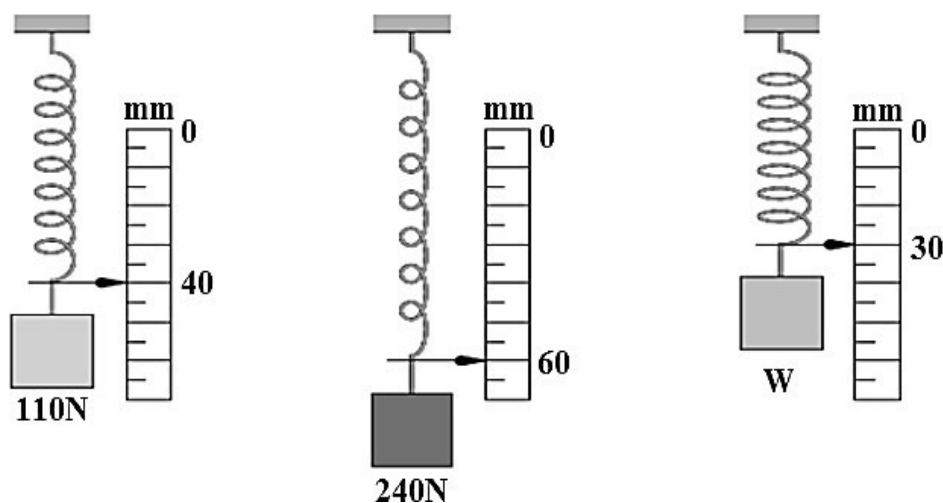


Figure 4

- i. Calculate mark on the scale the pointer will indicate when no package is hung.

(4 marks)

- ii. Calculate weight of the third package marked **W**.

(2 marks)

5. a. Differentiate angular displacement from angular velocity.

(2 marks)

- b. State any **two** factors that determine magnitude of centripetal force.

(2 marks)

- c. **Figure 5** shows a person of mass 20kg on a swing which has a speed of 10ms^{-1} at the lowest point of its motion. The rope of the swing is 2.5m long. [take $g=10\text{ms}^{-2}$]

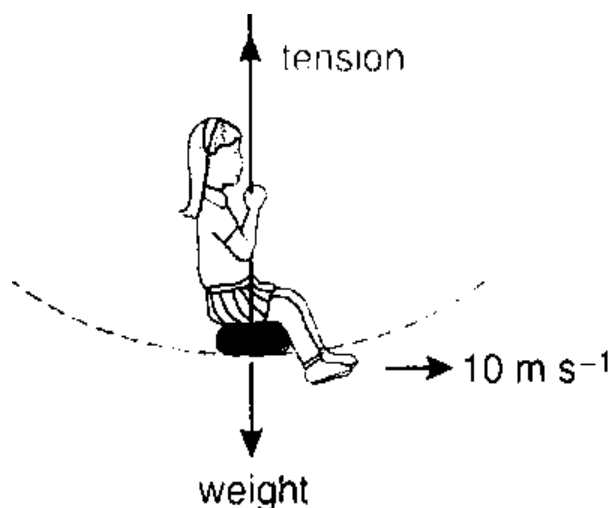


Figure 5

Find the tension developed in the rope.

(3 marks)

d. Explain how banked road tracks help to prevent road accidents.

(2 marks)

6. a. Mention any **one** difference between heat and temperature.

(1 mark)

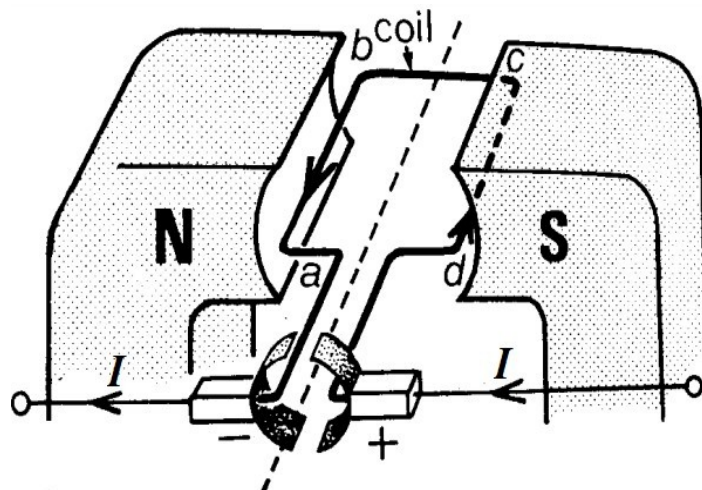
b. Describe the anomalous expansion of water.

(2 marks)

c. Explain how thermal expansion is applied in installation of electricity cables.

(2 marks)

7. **Figure 6** shows an electrical device. Use it to answer questions that follow.



- a. Identify the device

(1 mark)

- b. Using Fleming's left hand rule indicate (on the diagram) direction of motion of the coil in the figure above.

(1 mark)

- c. Describe how the device works.

(4 marks)

8. a. Define half-life.

(1 mark)

- b. Explain how beta particles are emitted by a radioactive source.

(3 marks)



- c. **Figure 7** shows a decay curve for a radioactive material. Use it to answer questions that follow.

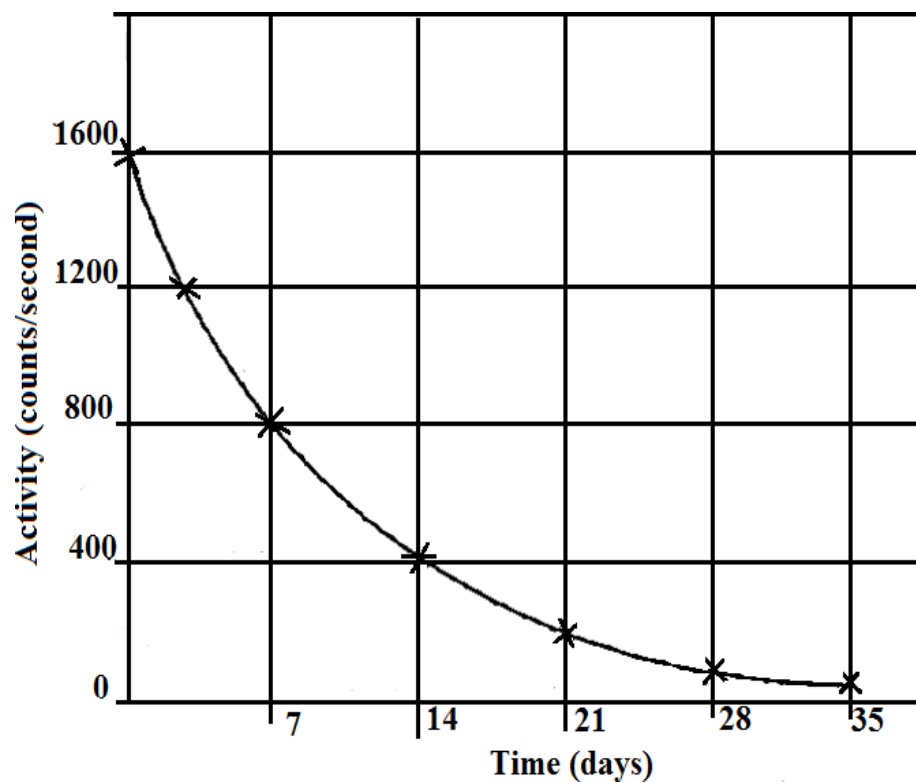


Figure 7

- i. What is the half-life of the substance?
- _____
- (1 mark)
- ii. What was the initial activity of the sample?
- _____
- (1 mark)
- iii. Explain why it is important to use radioactive elements with short half-life when studying nutrient uptake by plants.
- _____
- _____
- _____
- (2 marks)

9. a. Mention any **two** factors that affect speed of sound.

(2 marks)

- b. **Figure 8** shows two waves travelling in opposite directions.



Figure 8

Draw a diagram to show

- i. What happens when the two waves meet.

(1 mark)

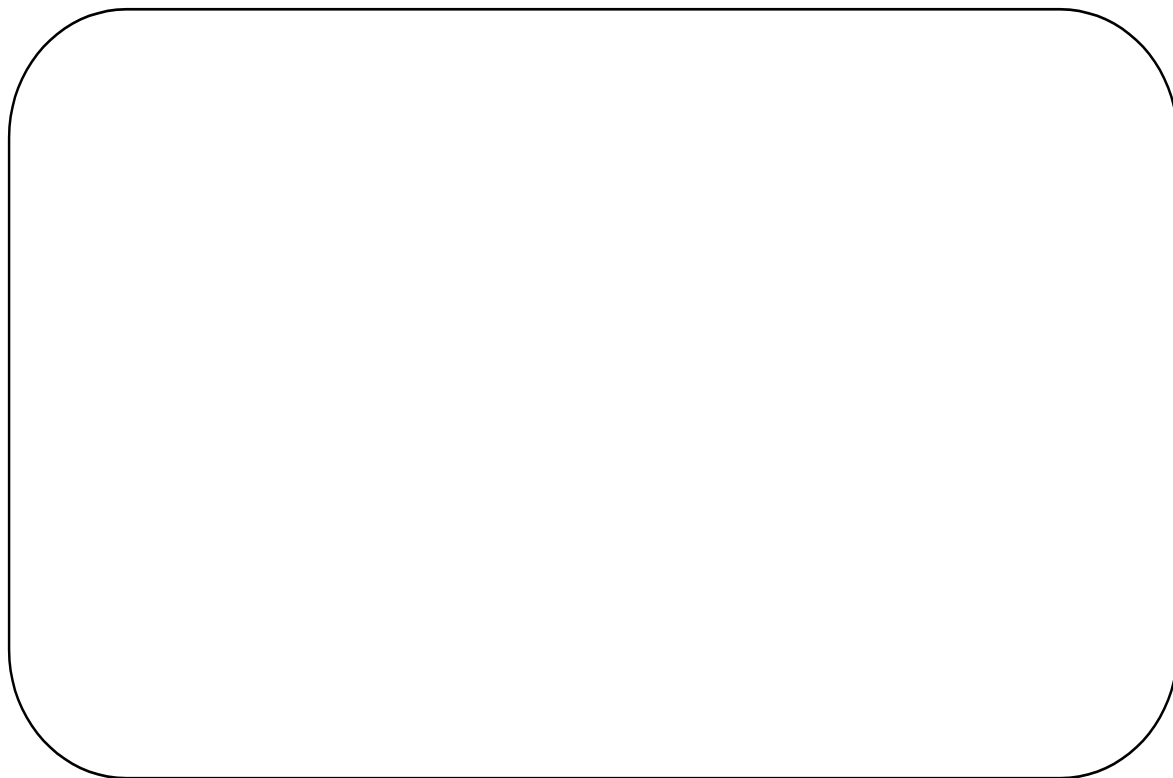
- ii. What happens when the waves pass each other.

(2 marks)

- iii. What property of waves is demonstrated in 8c (i) above?

(1 mark)

- c. Two forces **60 N** and **80 N** act at a point on an object, by scale drawing, use triangle law find the resultant force if the two forces act at an angle of 60° . [*scale 1cm=10N*].



(3 marks)

10. a. State the principle of moments for a body in equilibrium.

(1 mark)

- b. Explain the relationship between force and torque.

(2 marks)

- c. **Figure 10** shows a non-uniform plank **AB**. The plank is balanced when a force of 200N is applied at the end **B**. **G** is the centre of gravity.

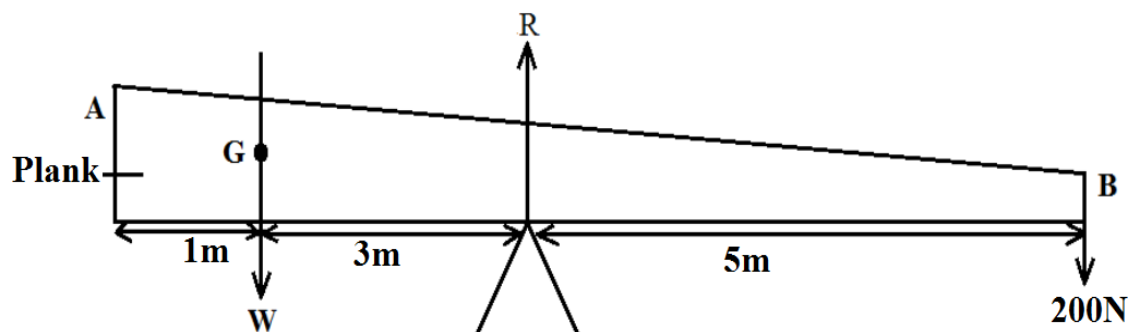


Figure 10

Calculate mass of the plank

(3 marks)

11. a. State the **law of floatation**

(1 mark)

- b. Calculate the volume of displaced water if a boat weighs 2000N in air and 1500 N when partly submerged in water of density 1.03g/cm^3 . [take $g=10\text{ms}^{-1}$]

(3 marks)

SECTION B (20 marks)

Answer **all** questions

12. a. With the aid of a ray diagram derive the lens formula.



(5 marks)

- b. Describe how density of a gas can be determined.

(5 marks)

c. Design an experiment you would carry out to show the effect of temperature on electrical resistance.

(5 marks)

13. a. Describe how constant volume gas thermometer works.

(4 marks)



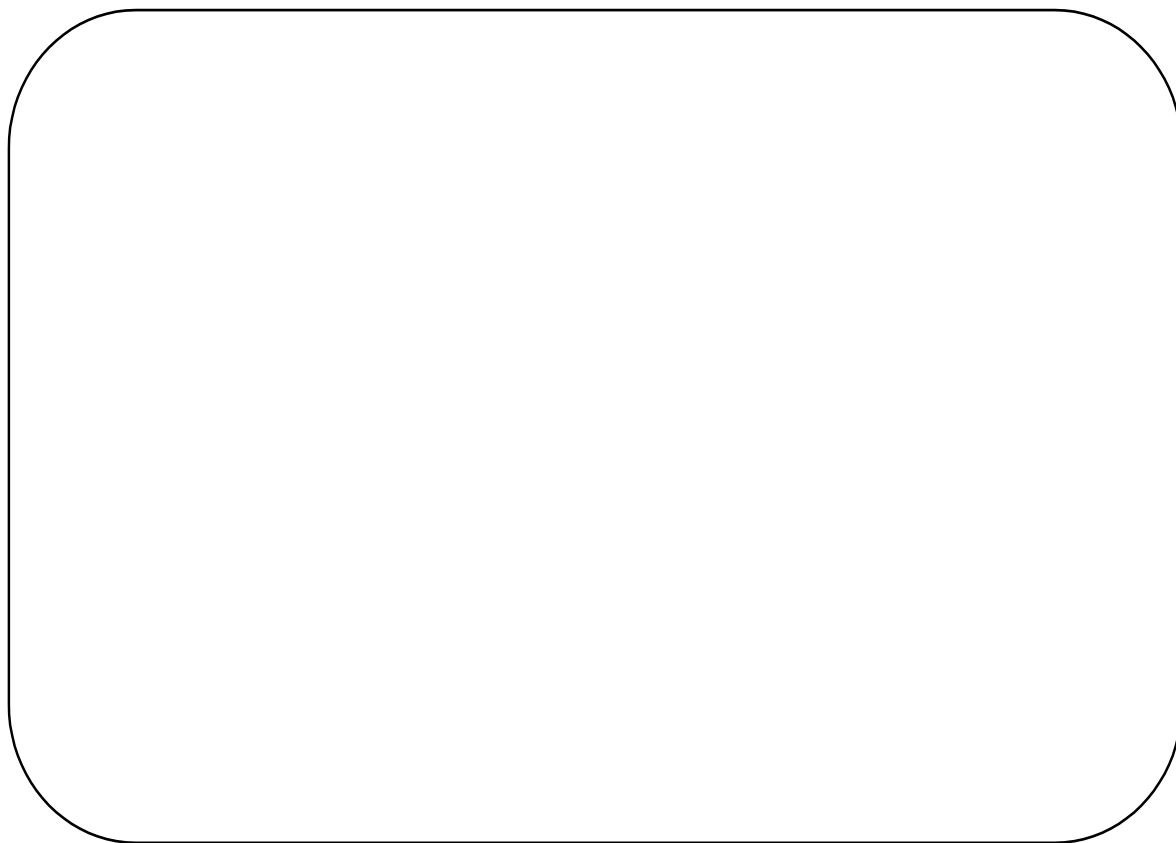
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- b. The pressure of a certain constant volume gas thermometer is 300mmHg at 0°C and 560mmHg at 100°C . Calculate the pressure when temperature is 120°C .



(3 marks)

END OF QUESTION PAPER

NB: This paper contains 16 printed pages

