



EXAMINATION NO.: \_\_\_\_\_  
**THE MALAWI NATIONAL EXAMINATIONS BOARD**

2022 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

# PHYSICS

Subject Number: M164/I

Thursday, 8 September

Time Allowed: 2 hours

8:00 – 10:00 am

## PAPER I

(100 marks)

### Theory

#### Instructions

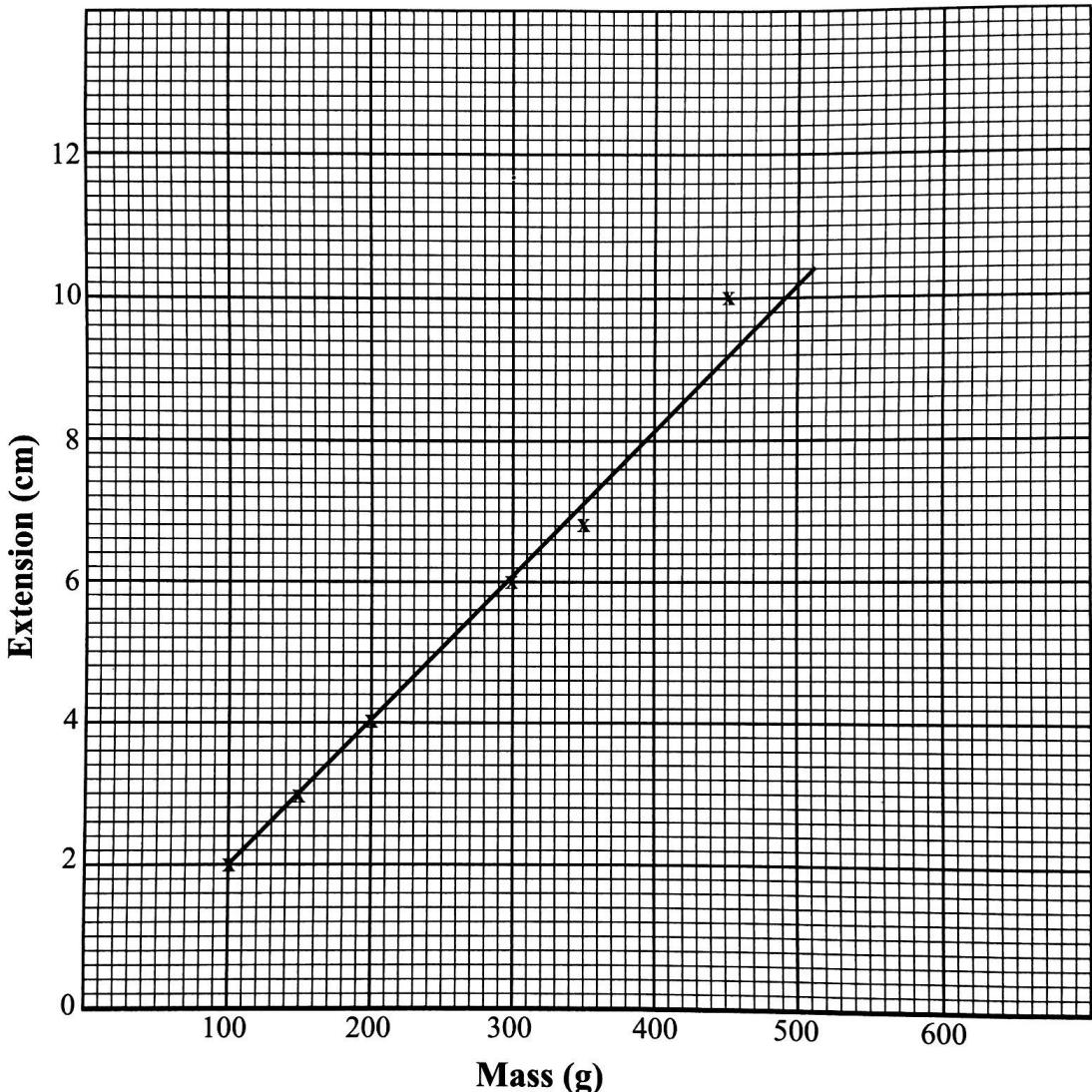
1. This paper contains 14 printed pages. Please check.
2. Write your Examination Number at the top of each page od this question paper.
3. This paper has two sections, A and B. In Section A there are ten short answer questions while in Section B there are three essay questions.
4. Answer all the thirteen questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, tick against the number of the question you have answered.
8. Hand in your question paper to the invigilator when time is called to stop writing.

Question Number	Tick if answered	Do not write in these columns	
1			
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13			
Total			

**Section A (70 marks)**

Answer all the questions in this section.

1. a. **Figure 1** is a graph which was plotted after conducting an experiment in which different masses were hung from the end of a spring held on a stand to find extension of the spring.



**Figure 1**

- (i) State the relationship between extension and mass shown by the graph.

\_\_\_\_\_ (1 mark)

- (ii) Find the extension on the spring when a 400g mass is hung on the spring.

\_\_\_\_\_ (1 mark)

Continued/...

**1. a. (Continued)**

(iii) Derive the unit of the slope of the graph.

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**(1 mark)**

(iv) Give a reason for the points lying outside the graph line.

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**(1 mark)**

b. Give the reason for repeating an experiment and taking an average of the results.

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**(1 mark)**

c. Give any **two** factors that can affect the speed of sound in air.

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**(2 marks)**

2. a. Give any **two** effects of the unusual expansion of water.

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**(2 marks)**

b. (i) State the Archimedes principle.

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**(1 mark)**

(ii) Calculate the upthrust force on the stone that has a mass of **60kg** and weighs **40N** in water.

**(4 marks)**

Continued/...

3. a. Give any **two** dangers of radioactive substances.

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(2 marks)

- b. **Table 1** shows radioactive isotopes and their half-lives.

**Table 1**

Isotope	Half-life
Carbon	5,600 years
Calcium	30 years
Iodine	8 days
Sodium	15 hours

- (i) Which isotope is ideal to be used as a tracer in medicine?

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(1 mark)

- (ii) Give a reason for the answer in 3c (i).

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(1 mark)

- c. Calculate the amount of current introduced in the primary coil of a **100%** efficient transformer if it converts **400V** to **200V** in order to operate a **5A** hair drier.

(3 marks)

4. a. Give any **one** factor that can affect the frequency of a cantilever.

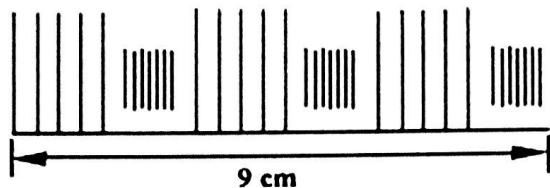
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(1 mark)

**4. (Continued)**

- b. **Figure 2** is a diagram of a wave.

**Figure 2**

- (i) Name the type of wave drawn in **Figure 2**.

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**(1 mark)**

- (ii) Calculate the wave length.

**(2 marks)**

- (iii) Calculate the wave speed given that the wave has a frequency of 0.5Hz

**(3 marks)**

Continued/...

5. a. Explain how the length of an inclined plane affects its mechanical advantage.

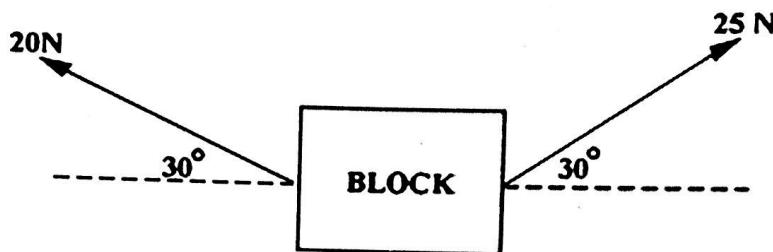
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(3 marks)

**Figure 3** is a diagram showing a block with **two** forces acting on either directions at  $30^\circ$ . Use it to answer the question that follow.



**Figure 3**

- b. Assuming the surface is frictionless, calculate the resultant force if the block is moving horizontally on surface.

(4 marks)

6. a. List any **three** examples of levers.

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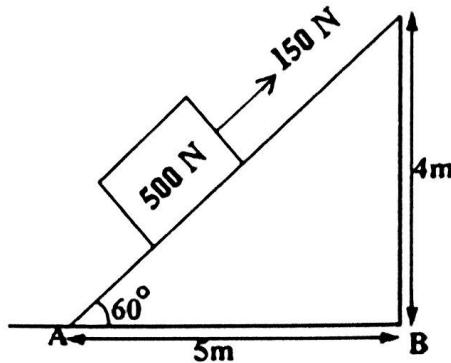
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(3 marks)

**6. (Continued)**

- b. **Figure 4** is a diagram showing an inclined plane being used to raise a load of **500N** to a height of **4m** using a force of **150N**.

**Figure 4**

- (i) Calculate the work done in the horizontal direction.

**(3 marks)**

- (ii) How will energy used up in doing this work be determined?

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**(1 mark)**

7. a. State the principle of transmission of pressure in fluids.

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**(1 mark)**

## 7. (Continued)

Figure 5 is a diagram of a hydraulic machine with pistons 1 and 2 acting in different directions.

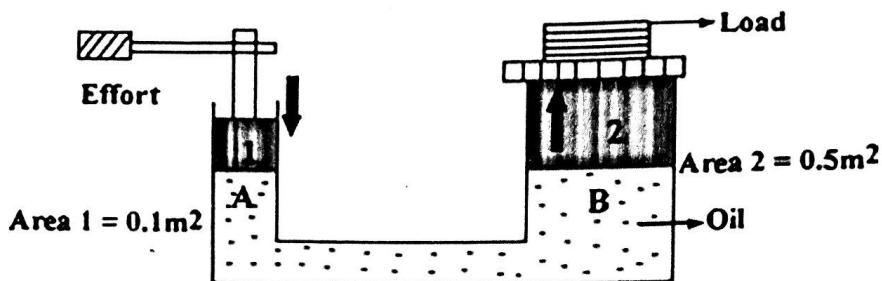


Figure 5

b. Determine:

- (i) pressure exerted on the oil by piston 1 at Point A if a force of 200N is applied on the handle.

(2marks)

Continued/...

7. b. (Continued)

- (ii) force exerted on piston 2 by oil.

(4 marks)

8. a. (i) State **one** property that is common for both liquids and gases.

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(1 mark)

- (ii) Give **two** effects of anomalous expansion of water.

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(2 marks)

b. Mention any **two** ways in which electromagnetic spectrum is emitted.

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(2 marks)

c. A spiral spring vibrates at the rate of 20 cycles for every 5 seconds, calculate the frequency of the waves produced.

(2 marks)

Continued/...

9. a. Give any **two** factors which affect the electrical resistance of a conductor.

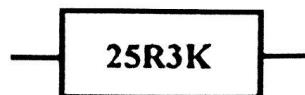
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(2 marks)

- b. Calculate the resistance of the resistor that has been given in a standard notation in **Figure 6**.

**Figure 6**

(1 mark)

- c. **Table 2** shows standard notation used on carbon resistors.

**Table 2**

Notation	Meaning
R27	$0.27\ \Omega$
2R7	$2.7\ \Omega$
3K0	$3,000\ \Omega$
5K6	$5,600\ \Omega$
47K	$47,000\ \Omega$
2M2	$2,200,000\ \Omega$

Extra letter

 $F \pm 1\%$ ,  $G \pm 2\%$ ,  $J \pm 5\%$ ,  $K \pm 10\%$ ,  $M \pm 20\%$ 

- (i) Calculate the value of the resistor marked 8K2J.

(2 marks)

- (ii) Write down the standard notation of resistor of value  $3,300,000 \pm 20\%$ .

(2 marks)

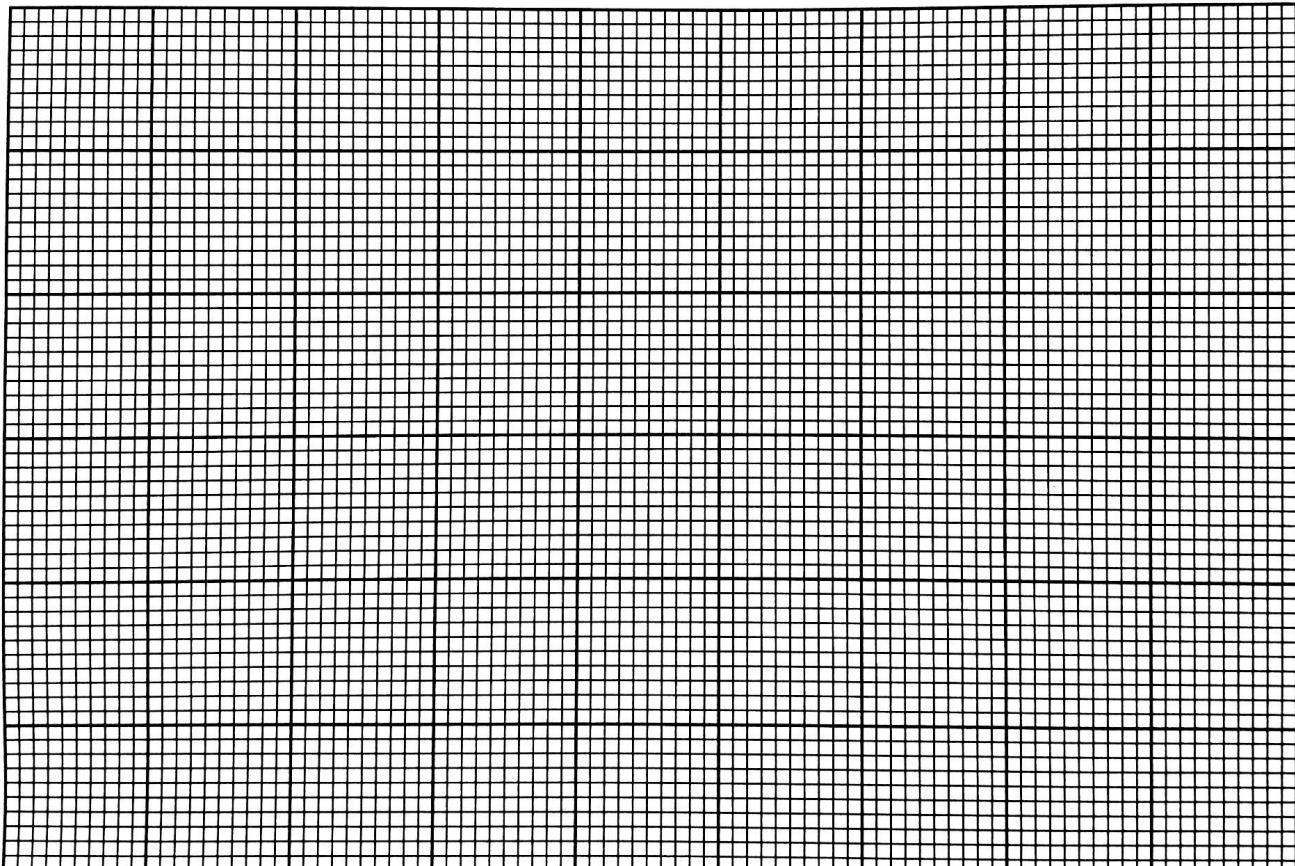
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10. **Table 3** shows the results obtained from an experiment to find the relationship between length of a nichrome wire and resistance.

**Table 3**

<b>Length of wire (cm)</b>	<b>Current (A)</b>	<b>Voltage (V)</b>	<b>Resistance</b>
100	0.2	1.2	
80	0.4	1.0	
60	0.6	0.8	

- a. Calculate the resistance of each length of the wire and record under resistance in the table. **(3 marks)**
- b. (i) Plot a graph of resistance against length on the graph paper below.



**(3 marks)**

- (ii) State the relationship between length of nichrome wire and resistance.

**(1 mark)**

Continued/...

**Section A (30 marks)**

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

11. a. Explain in terms of the kinetic theory of matter why a piece of sweet melts when it is put in a mouth of a person.

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**(5 marks)**

- b. With the aid of a diagram, describe how destructive interference occurs.

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**(5 marks)**

Continued/...

12. a. Explain how sinking and floating of submarines are made possible.

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**(5 marks)**

- b. Briefly, explain how a concave type of lens assists a short sighted-person.

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**(5 marks)**

13. a. With the aid of a well labelled diagram, describe how a thermocouple thermometer works.

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(5 marks)

- b. Explain how the decrease in temperature affects the molecular motion.

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# THE MALAWI NATIONAL EXAMINATIONS BOARD

2022 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## PHYSICS

**Subject Number: M164/II**

**Friday, 2 September**

**Time Allowed: 2 hour sessions**  
**10:00 am onwards**

### **PAPER II** (40 marks)

#### **Practical**

#### **Instructions**

1. This paper contains 8 printed pages. Please check.
2. Write your **Examination Number** at the top of each page of this question paper.
3. Answer all the 4 questions in the spaces provided.
4. Use of electronic calculators is allowed.
5. The maximum number of marks for each answer is indicated against each question.
6. In the table provided on this page, tick against the question number you have answered.
7. Hand in your question paper to the invigilator when time is called to stop writing.

<b>Question Number</b>	<b>Tick if answered</b>	<b>Do not write in these columns</b>	
1			
2			
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<b>Total</b>			

**Section A (20 marks)**

1. Describe an experiment to show the effect of an amount of electric current on the strength of an electromagnet.

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**(10 marks)**

Continued/...

2. Describe an experiment that could be done to investigate how the length of a cantilever affects its frequency.

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**Section B (20 marks)**

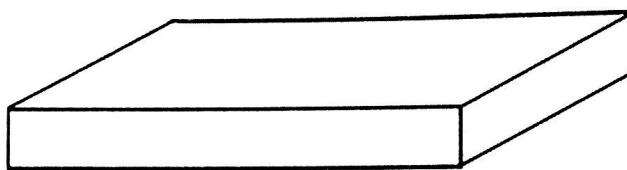
3. You are provided with a rectangular wooden block, a beam balance and a 30 cm ruler.

- a. Measure the mass of rectangular block on the beam balance.

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(1 mark)

- b. Place the rectangular block on the bench horizontally as shown in **Figure 1**.



**Figure 1**

- c. Measure the length and width of the rectangular block at its base using the 30 cm ruler.

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(1 mark)

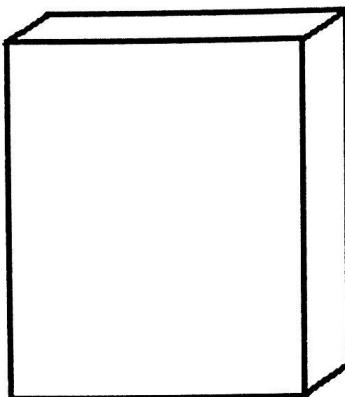
- d. Calculate the pressure exerted by wood block on the bench.

(2 marks)

Continued/...

**3. (Continued)**

- e. Place the same rectangular block vertically as shown in **Figure 2**.

**Figure 2**

- f. Measure the length and width of the block of wood at its base.

(i) length \_\_\_\_\_ **(1 mark)**

(ii) width \_\_\_\_\_ **(1 mark)**

- g. Calculate the pressure exerted by the block on the table.

**(2 marks)**

- h. Compare the pressure exerted by of the rectangular wood block in a horizontal and vertical position.

\_\_\_\_\_ **(1 mark)**

- i. Which factor of pressure is being investigated in the experiment.

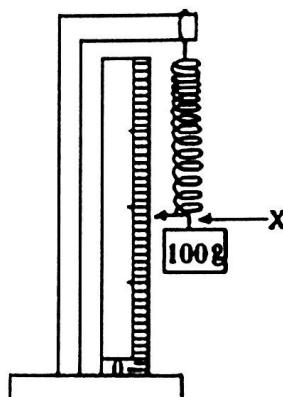
\_\_\_\_\_ **(1 mark)**

4. You are provided with a 1 metre ruler, a spiral spring, a clamp and clamp stand and masses of 100 g, 150 g, 200 g and 250 g.

- a. Set the apparatus as shown in **Figure 3**.

- Record and record the initial position “X” of the pointer before the mass is loaded to get the initial length of spring.

X: \_\_\_\_\_ (1 mark)



**Figure 3**

- b. Load the spring with a 100 g mass and record the new pointer reading in the **table** below.
- c. Repeat step “b” with 150 g, 200 g and 250 g masses and record.

**Table of results**

Mass (g)	Force (N)	Final reading Y/cm	Extension Y-X (cm)
100			
150			
200			
250			

**(2 marks)**

**4. (Continued)**

- d. Calculate and record extension of the spring in the **Table of Results** on page 6.

**(2 marks)**

- e. Plot the graph of extension against applied force on **page 8**.

**(3 marks)**

- f. Calculate force constant of the spring.

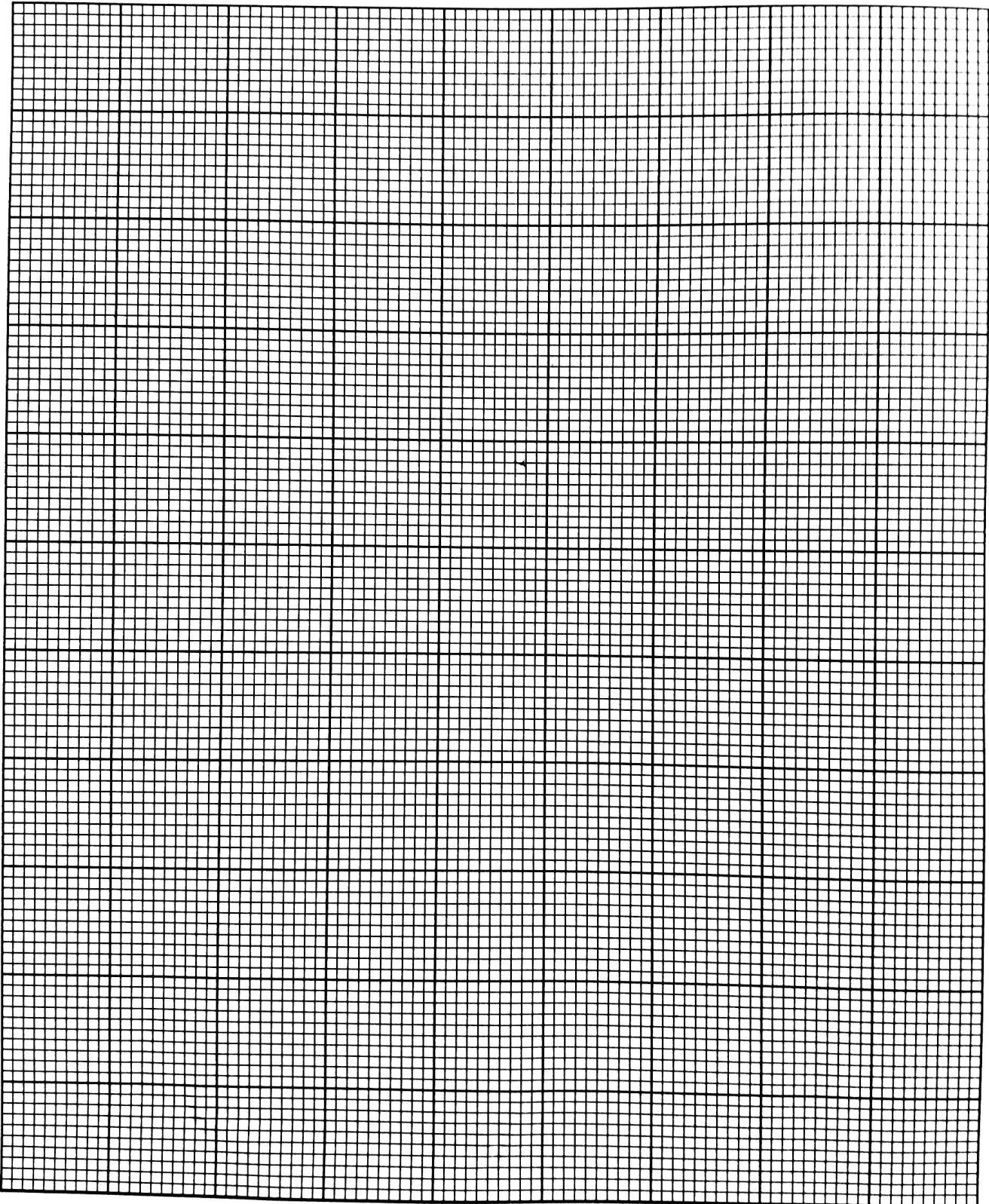
- g. Deduce the relationship between extension produced in spring and force applied.

**(1 mark)**

**2022**

**EXAMINATION NO.: \_\_\_\_\_**  
**Page 8 of 8**

**M164/II**



**END OF QUESTION PAPER**

**This paper contains 8 printed pages.**



# THE MALAWI NATIONAL EXAMINATIONS BOARD

2021 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## PHYSICS

**Subject Number: M164/I**

**Time Allowed: 2 hours**

**8:00 – 10:00 am**

Thursday, 4 November

### PAPER I (100 marks)

#### Theory

#### Instructions

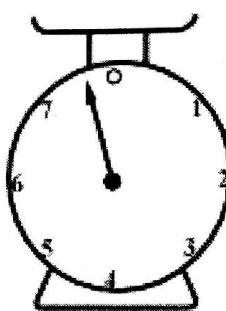
1. This paper contains 12 printed pages. Please check.
2. Fill in your Examination Number at the top of each page.
3. This paper has **two** sections, **A** and **B**. In Section **A** there are **ten** short questions while in Section **B** there are **three** restricted essay questions.
4. Answer **all** the **thirteen** questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, **tick** against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns	
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<b>Total</b>			

**Section A (70 marks)**

Answer all the questions in this section

1. a. **Figure 1** is a diagram of a measuring instrument with an error and has a scale ranging from **0kg** to **7kg**



**Figure 1**

- (i) Name the instrument.

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(1 mark)

- (ii) Identify the type of error demonstrated in **Figure 1**.

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(1 mark)

- (iii) Explain how the error in question **1a (ii)** could be minimized.

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(2 marks)

- b. Convert **2,500 $\mu\text{m}$**  to **m**.

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(3 marks)

2. a. Define 'absolute temperature'.

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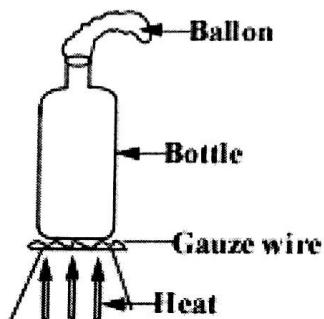
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(1 mark)

Continued/...

**2 (Continued)**

- b. Figure 2 is a diagram showing a balloon fitted to a bottle before heating.

**Figure 2**

- (i) What would happen to the volume of the balloon after heating?

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**(1 mark)**

- (ii) Explain your answer in 2b (i).

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**(5 marks)**

3. a. State the difference between angular velocity and linear velocity.

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**(2 marks)**

- b. Calculate the linear velocity of a ball whose radius is 15cm and is rotating at a frequency of 20Hz.

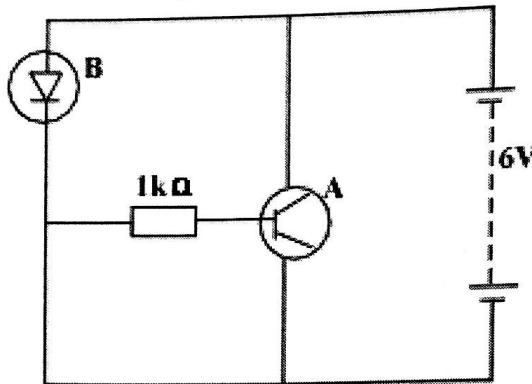
**(5 marks)**

Continued/...

4. a. Explain why **two** identical bulbs in series circuit would have higher electrical resistance than in a parallel circuit.
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(4 marks)

- b. **Figure 3** shows a circuit diagram of a light operated switch.

**Figure 3**

- (i) Name the device labelled A.
- 

(1mark)

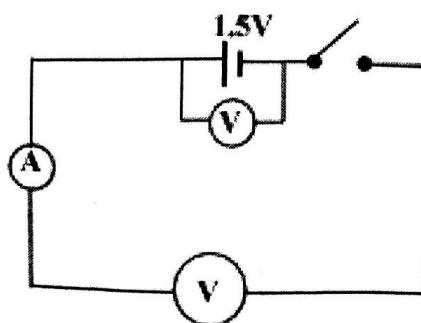
- (ii) Give any **two** uses of the device labelled B.
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(2 marks)

5. a. Define internal resistance of the cell.
- 
- 

(1 mark)

**Figure 4** is a diagram of a circuit with an ideal ammeter which reads **0.20A** when the switch is closed.

**Figure 4**

## 5. (Continued)

- b. Determine the internal resistance.

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(4 marks)

- c. State any **two** factors that affect the magnitude and direction of induced electromagnetic force.

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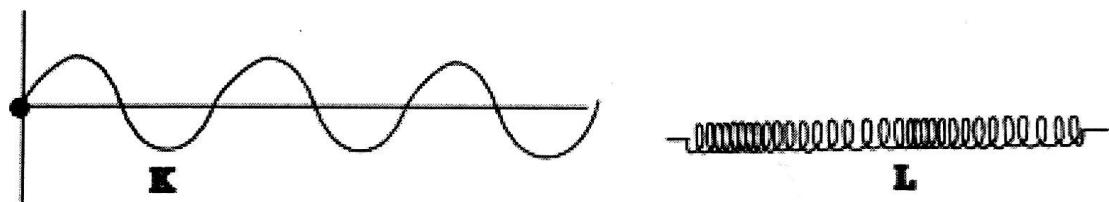
(2 marks)

6. a. Define the term 'oscillation'.

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(1 mark)

- b. **Figure 5** is a diagram showing some waves.



**Figure 5**

- (i) Identify the waves.

K \_\_\_\_\_ (1 mark)

L \_\_\_\_\_ (1 mark)

- (ii) Explain any **two** differences between wave K and wave L.

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(4 marks)

7. a. Mention any **two** characteristics of waves.

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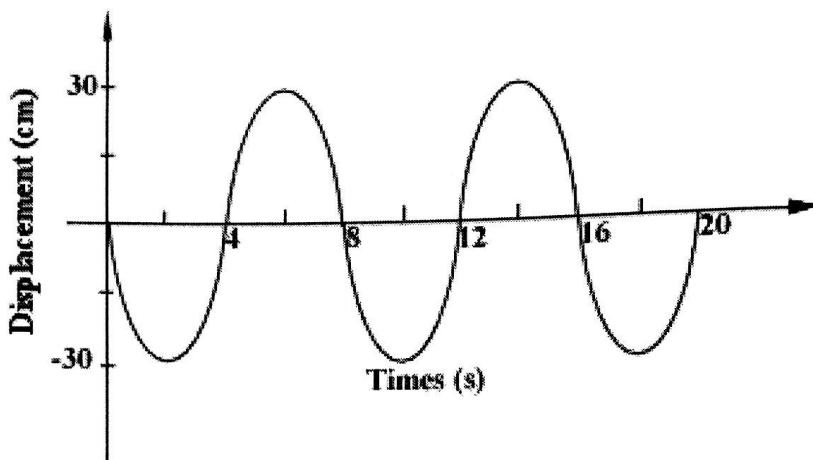
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(2 marks)

Continued/...

## 7. (Continued)

- b. Figure 6 is a displacement-time graph drawn after the oscillation of a pendulum.



**Figure 6**

(i) Identify:

1. the amplitude of the oscillation

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**(1 mark)**

2. the period of the oscillation.

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**(1 mark)**

- (ii) Calculate the frequency of the oscillation as shown in the graph.

**(3 marks)**

Continued/...

8. a. List any **three** uses of radioactivity.

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(3 marks)

- b. The **Table** below shows the coefficients of sliding friction of surfaces **A**, **B** and **C** with an equal pressing force of **50N**.

	<b>Reaction (N)</b>	<b>Coefficient friction (<math>\mu</math>)</b>
Surfaces A and B	50	0.74
Surfaces B and C	50	0.94

- (i) Identify the pair of surfaces on which the friction is high.

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(1 mark)

- (ii) Calculate the sliding friction for surfaces **A** and **B**.

(3 marks)

9. a. Define 'acceleration'.

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(1 mark)

- b. Figure 7 is a velocity-time graph showing the motion of a car in 6 seconds through points A, B, C and D.

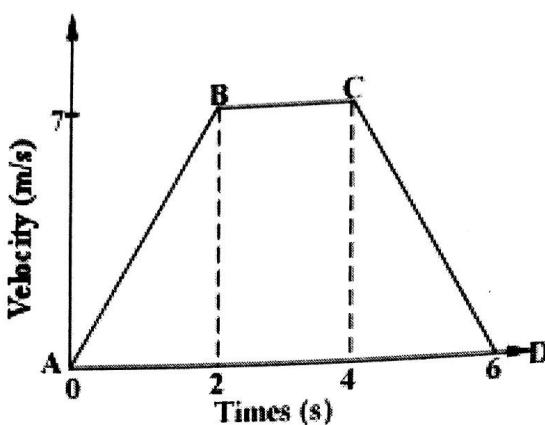


Figure 7

- (i) Identify any **two** points during which the car was at rest.

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(2 marks)

- (ii) On which part of the graph was the car moving with uniform velocity?

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(1 mark)

- (iii) Calculate the distance travelled by the car in the first 2 seconds.

(3 marks)

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

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(1 mark)

Continued/...



**10. (Continued)**

- b. A crane lifts **9,940N** when an effort of **116N** is applied. If the efficiency of the crane is **75%**, find

(i) mechanical advantage

**(2 marks)**

(ii) velocity ratio

**(4 marks)**

**SECTION B (30 marks)**

11. a. Explain how photographic plates are used to detect the radioactive emissions.

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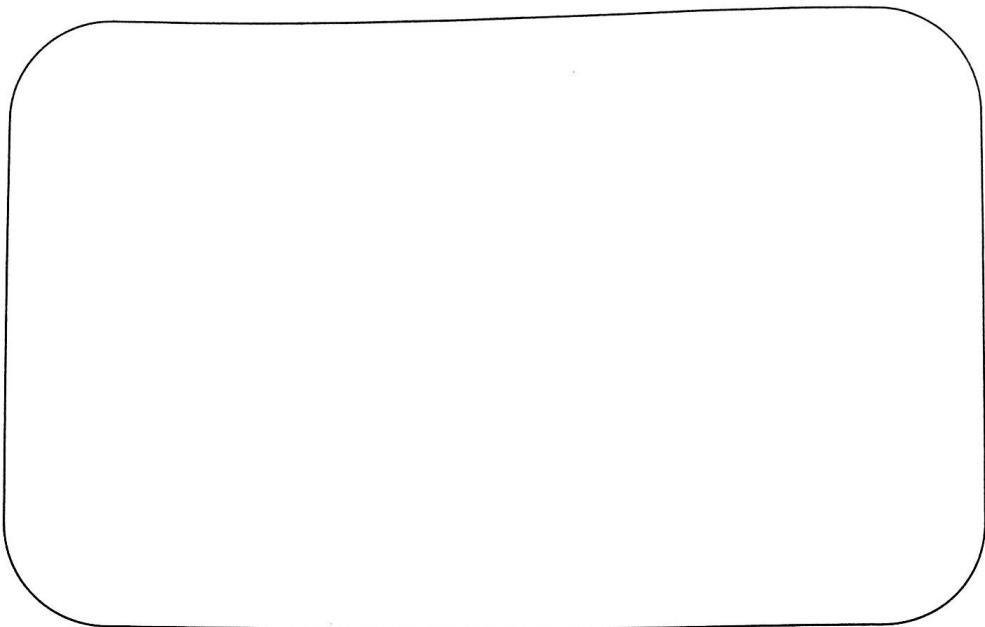
**(3 marks)**

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**11. (Continued)**

- b. With the aid of a diagram, describe how a clinical thermometer works.



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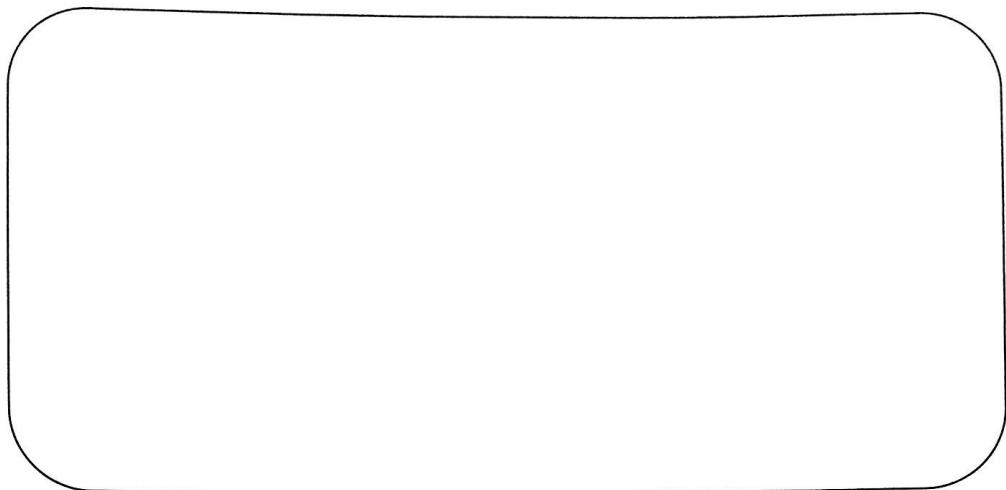
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**(7 marks)**

12. a. With the aid of a labelled diagram, describe the problem of long sight in the human eye.



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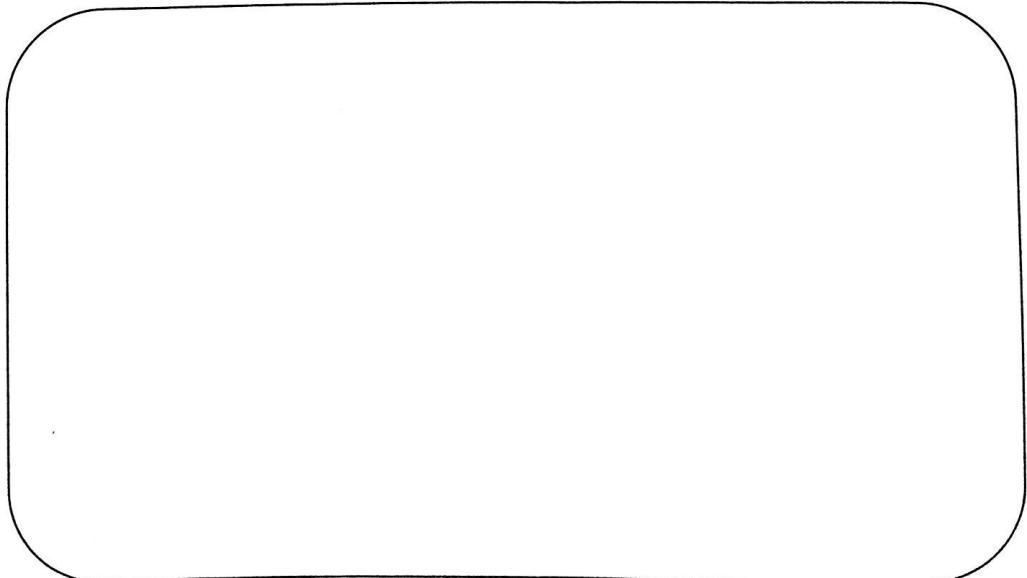
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(5 marks)

- b. With the aid of a ray diagram, describe the nature of an image formed by a convex lens of focal length 10cm, with the object 10cm high placed at 6cm from the lens. (Use a scale of 1cm : 5 units)



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12. b. (Continued)

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\_\_\_\_\_ (5 marks) \_\_\_\_\_

13. a. Explain how the principle of circular motion is applied in drying wet clothes in a drying machine.

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(5 marks)

- b. Explain in terms of the band theory why insulators are bad conductors of electricity even if their temperature is increased.

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(5 marks)

**END OF QUESTION PAPER**

This paper contains 12 printed pages.





EXAMINATION NO.: \_\_\_\_\_

# THE MALAWI NATIONAL EXAMINATIONS BOARD

2021 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## PHYSICS

Subject Number: M164/II

Time Allowed: 2 hour sessions

10:00 am onwards

Friday, 29 October

### PAPER II (40 marks)

### Practical

#### Instructions

1. This paper contains 7 printed pages. Please check.
2. Fill in your **Examination Number** at the top of each page.
3. Answer **all** the 4 questions in the spaces provided.
4. Use of electronic calculators is allowed.
5. The maximum number of marks for each answer is indicated against each question.
6. In the table provided on this page, **tick** against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns	
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<b>Total</b>			



1. With the aid of a well labelled diagram, describe an experiment to show why a pencil partially immersed in water appears to be bent.

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(10 marks)  
Continued/...

2. Describe an experiment that can be conducted to investigate the effect of mass on the frequency of an oscillating mass-spring system.

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(10 marks)

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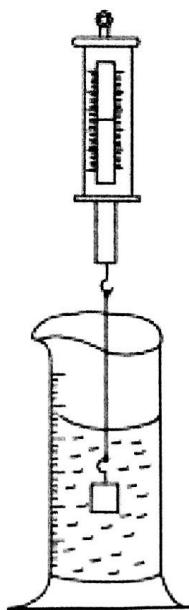
3. You are provided with a **0-5N** spring balance, a measuring cylinder, water, an object labelled **X** and a string.
- Tie the mass to the string and fix it to spring balance.
  - Measure the weight of the object X in air on the spring balance.
  - Record its weight in the table of results.

**Table of Results**

Description	Reading
Weight of object in air (N)	
Weight of object in water (N)	
Initial volume of water ( $\text{cm}^3$ )	
Final volume of water ( $\text{cm}^3$ )	

**(4 marks)**

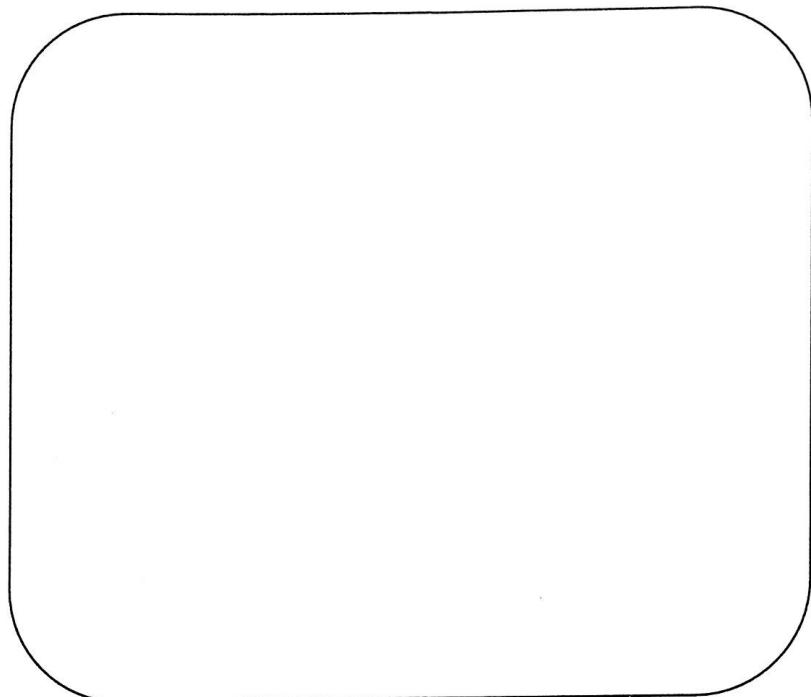
- Put  $25\text{cm}^3$  of water in the measuring cylinder.
- Slowly place the mass in the measuring cylinder until it is completely immersed in the water as shown in **Figure 1**.

**Figure 1**

- Record the final volume of water.
- Record the weight of the object X in water.

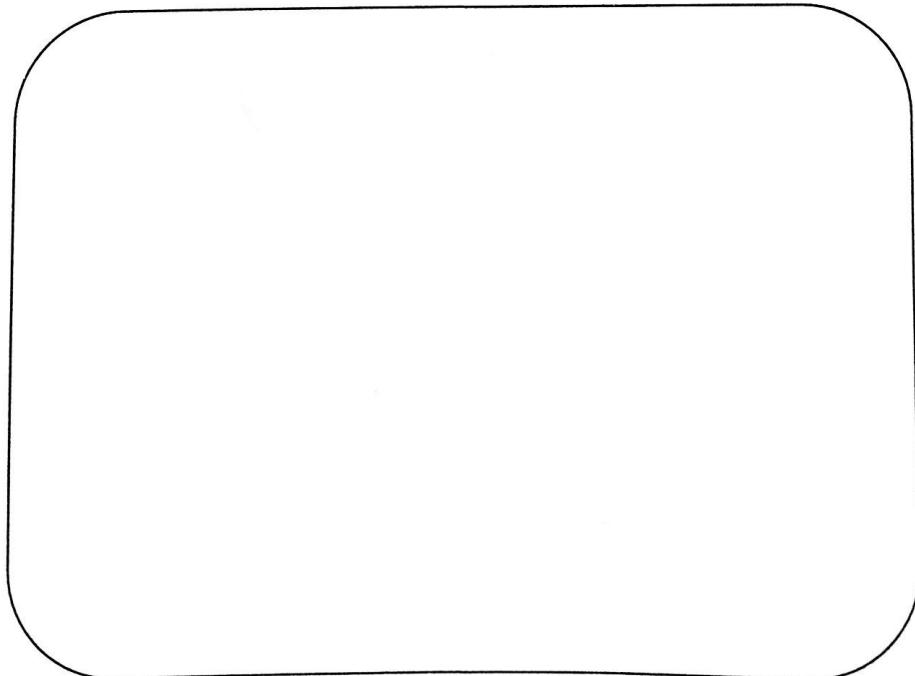
**3. (Continued)**

- h. Calculate the upthrust exerted by the water on the mass.



(3 marks)

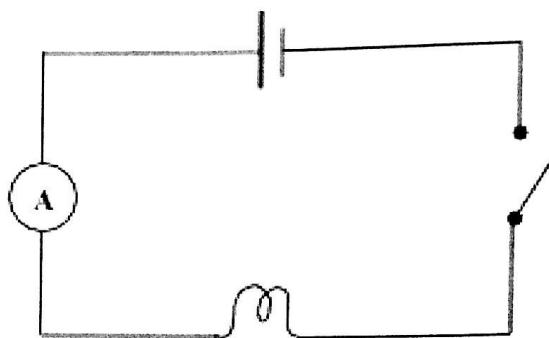
- i. Calculate the volume of the object.



(3 marks)

4. You are provided with 4 cells, a switch, an ammeter, 4 connecting wires, a bulb and a cell holder.

- a. Arrange the apparatus as shown in **Figure 2** using one cell.



**Figure 2**

- b. Close the switch.  
c. Read and record the ammeter reading in the table provided.  
d. Repeat steps **b** and **c** with 2, 3 and 4 cells connected in series.

**Table of Results**

Number of cells	Current (A)	Voltage (V)
1.		
2.		
3.		
4.		

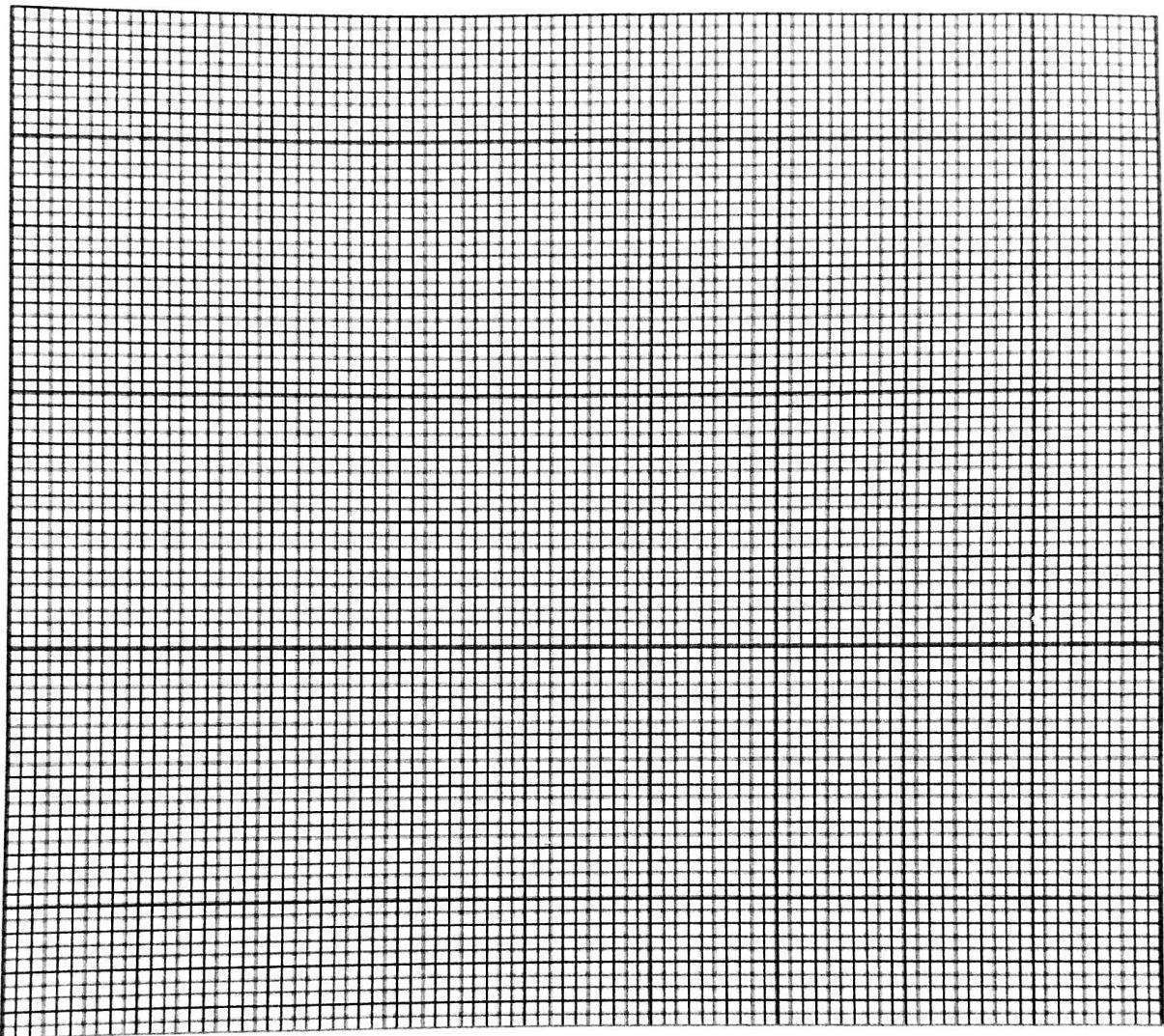
(4 marks)

- e. Assuming that each cell is 1.5V, complete table by filling in the voltage values.

(2 marks)

## 4. (Continued)

- f. Plot a graph of voltage against current.



(3 marks)

- g. Using your graph, find resistance of the bulb.

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(1 mark)

**END OF QUESTION PAPER**

This paper contains 7 printed pages.



EXAMINATION NO.: \_\_\_\_\_

**THE MALAWI NATIONAL EXAMINATIONS BOARD**  
2020 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## **PHYSICS**

Monday, 25 January 2021

Subject Number: M164/I

Time Allowed: 2 hours  
8:00 – 10:00 am

### **PAPER I** (100 marks)

#### **Instructions**

1. This paper contains 15 printed pages. Please check.
2. Fill in your Examination Number at the top of each page.
3. This paper contains two sections A and B. In Section A there are ten short answer questions while in Section B there are three restricted essay questions.
4. Answer all the thirteen questions in the spaces provided.
5. Use of electronic calculators is allowed .
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, tick against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns
1		
2		
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**SECTION A (70 marks)****Answer all questions**

1. a. (i) Define 'absolute zero'

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**(1 mark)**

- (ii) Convert 45 Kelvins to degrees Celsius.

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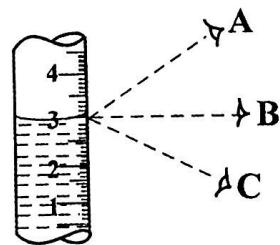
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**(2 marks)**

- b. **Figure 1** is a diagram illustrating three students A, B and C taking a reading from a measuring cylinder.

**Figure 1**

- (i) Which student is likely to get a correct reading from the cylinder?

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**(1 mark)**

- (ii) Name the type of error which students that get wrong readings are likely to make.

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**(1 mark)**

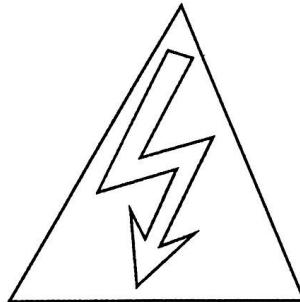
Continued/...

1. b. (Continued)

(iii) Calculate the relative error if student C gets a reading of  $3.1 \text{ cm}^3$ .

(2 marks)

2. a. Figure 2 shows a hazard symbol indicated on some materials found in a Physics laboratory.



**Figure 2**

(i) Give the meaning of the symbol.

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(1 mark)

Continued/...

2. a. (Continued)

- (ii) State any **two** ways of correctly handling a material with the symbol in **Figure 2**.

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(2 marks)

- b. Describe how atmospheric pressure is applied when using a drinking straw.

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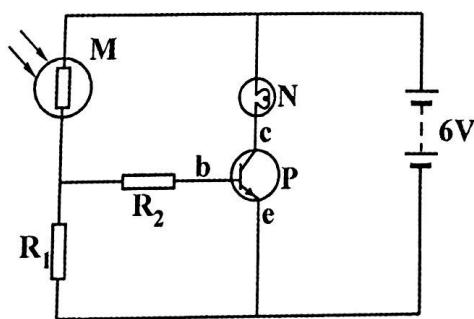
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(4 marks)

3. **Figure 3** shows a circuit with some electronic devices in use.



**Figure 3**

- a. Name the devices labelled **M** and **N**.

**M** \_\_\_\_\_ (1 mark)

**N** \_\_\_\_\_ (1 mark)

Continued/...

## 3. (Continued)

- b. Explain how part P operates as a light operated switch in the circuit during bright light.

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(4 marks)

- c. Name the logic gate which is also called the inverter.

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(1 mark)

4. a. Give any two types of nuclear radiations.

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(2 marks)

- b. Explain how radioactivity is used in archaeology.

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(2 marks)

## 4. (Continued)

- c. Calculate the velocity with which a ball hits the ground when released from a roof 9m high from the ground. Hint: Use  $g = 10\text{m/s}^2$

(3 marks)

5. a. **Table 1** shows atomic numbers and numbers of neutrons of different atoms W, X, Y and Z which are not their real chemical symbols.

**Table 1**

Atom	W	X	Y	Z
Atomic number	6	7	6	8
Number of neutrons	6	7	8	8

- (i) Identify **two** atoms that are isotopes.

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(2 marks)

- (ii) Explain the answer to 5 a (i).

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(2 marks)

**5. a. (Continued)**

(iii) Express atom Y in its nuclear notation.

(1 mark)

b. Give any two factors which affect the melting point of a substance.

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(2 marks)

**6. a. Define 'density'**

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(1 mark)

b. Explain how an increase in temperature affects the density of a substance.

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(3 marks)

Continued/...

## 6. (Continued)

- c. Calculate the altitude at which pure water will boil at  $94^{\circ}\text{C}$ .

7. a. Give one difference between scalar and vector quantities.

(3 marks)

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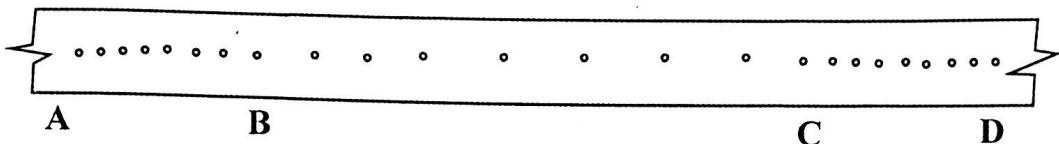
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(1 mark)

Continued/...

## 7. (Continued)

- b. **Figure 4** is a record of a complete motion of a trolley joined to a ticker-tape with dots showing the position of the trolley at regular intervals of time.



**Figure 4**

Describe the motion of the trolley from start to finish (A to D).

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(3 marks)

- c. Explain how a seat belt in a vehicle reduces injury to the driver.

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(3 marks)

8. a. State the energy-work theory.

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(1 mark)

Continued/...

## 8. (Continued)

- b. Give any **three** properties of electromagnetic waves.

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(3 marks)

- c. Describe how the shrink fitting method could be applied to make tight fits.

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(3 marks)

9. a. Give **two** effects of balanced forces on objects.

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(2 marks)

## 9. (Continued)

- b. Give any two differences between mass and weight.

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(2 marks)

- c. Outline the energy changes that take place in a burning stick of matches.

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(3 marks)

10. Figure 5 is a graph of displacement against time of an object.

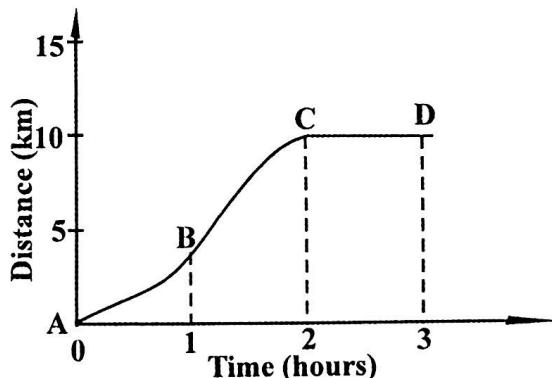


Figure 5

- a. Describe the motion of the object from:

- (i) A to B

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(1 mark)

- (ii) B to C

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(1 mark)

Continued/...

10. a. (Continued)

(iii) C to D

b. Calculate the average speed of the object from A to C.

(1 mark)

c. Explain how Newton's third law of motion is used when one is walking.

(2 marks)

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(2 marks)

**SECTION B****Answer all questions**

11. a. Describe how a falling object in air reaches terminal speed.

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**(5 marks)**

- b. Using a truth table, describe how an OR gate works.

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**(5 marks)**

12. a. With the aid of a well labelled diagram, explain why a diode does not conduct electricity when reverse biased.

(6 marks)

- b. Describe how a thermometer can be graduated into a degrees celsius ( $^{\circ}\text{C}$ ) scale.

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(4 marks)

13. a. With the aid of a well labelled diagram, describe the refraction of water waves as they travel from shallow to a deep region.

(5 marks)

- b. With the aid of a diagram, describe an experiment that could be done to show that sound requires a medium to travel through.

(5 marks)

**END OF QUESTION PAPER**

**NB:** This paper contains 15 printed pages.



EXAMINATION NO.: \_\_\_\_\_  
**THE MALAWI NATIONAL EXAMINATIONS BOARD**  
2019 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## PHYSICS

Subject Number: M164/I

Wednesday, 26 June

Time Allowed: 2 hours

8:00 – 10:00 am

### PAPER I (100 marks)

#### Instructions

1. This paper contains 11 printed pages.  
Please check.
2. Fill in your Examination Number at the top of each page.
3. This paper contains two sections A and B. In Section A there are ten short answer questions while in Section B there are three restricted essay questions.
4. Answer all the thirteen questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, tick against the number of the question you have answered.

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1. a. State any two methods of studying physics.

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(2marks)

- b. Explain any one application of physics in medicine.

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(2 marks)

- c. Describe how the speed of a moving object can be measured using a tape measure and a stop watch.

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(3 marks)

2. a. Figure 1 is a graph of voltage against current for two conductors A and B. Use it to answer the questions that follow.

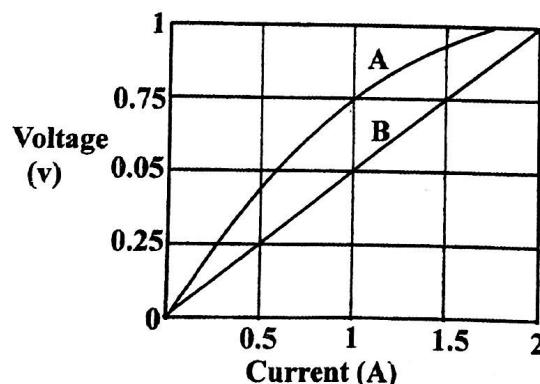


Figure 1

- (i) Which conductor obeys Ohm's law?

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(1 mark)

- (ii) Calculate the resistance of conductor A.

(2 marks)

## 2. (Continued)

- b. Explain any two factors that determine the amount of heat produced when current flows through a conductor.

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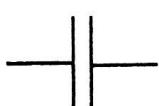
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(4 marks)

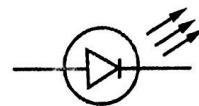
3. a. Figure 2 is a diagram showing symbols for electric components. Use it to answer the questions that follow.



W



X



Y

Figure 2

- (i) Identify the components labelled W and X.

W: \_\_\_\_\_

X: \_\_\_\_\_

(2 marks)

- (ii) What is the function of the component labelled Y?

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(1 mark)

- b. Give any one characteristic of a digital signal.

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(1 mark)

- c. Explain how temperature affects resistance of a wire.

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(3 marks)

4. a. State any two effects of force.
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(2 marks)

- b. A machine with a velocity ratio of 5 requires 5000J of energy to lift a load of 800N through a vertical distance of 5m. Calculate:-

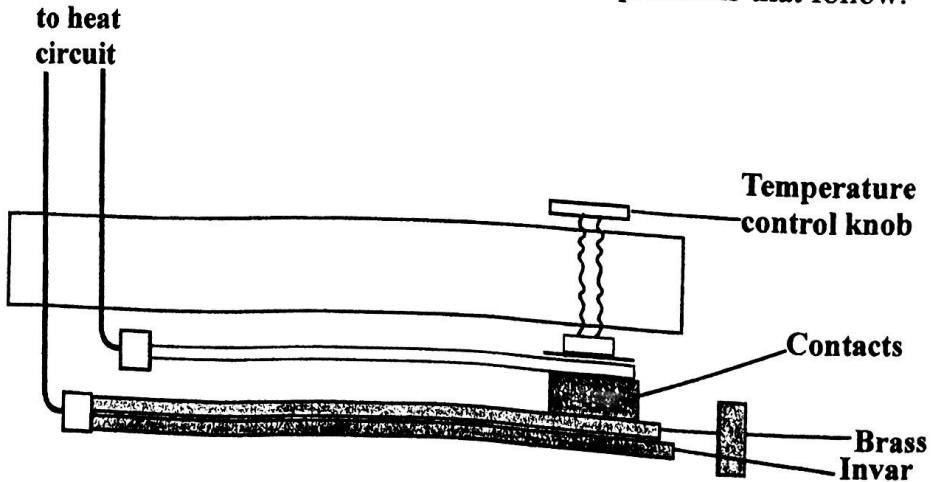
- (i) the efficiency of the machine.

(2 marks)

- (ii) the mechanical advantage of the machine.

(3 marks)

5. Figure 3 is a diagram showing a device which switches on and off electricity automatically in an electric appliance. Use it to answer the questions that follow.

**Figure 3**

- a. Name the device.
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(1 mark)

Continued/...

**5. (Continued)**

- b. Explain how the device works.

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(4 marks)

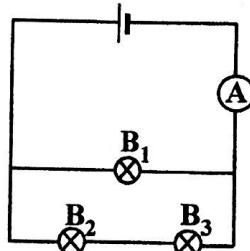
- c. Mention any two electrical appliances which use the device.

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(2 marks)

6. a. Figure 4 is a circuit diagram with three identical bulbs of resistance of  $1\Omega$  each.

**Figure 4****Calculate:-**

- (i) the electric current passing through  $B_1$ .

(2 marks)

- (ii) the total resistance in the circuit.

(3 marks)

Continued/...

**6. (Continued)**

- b. With the aid of a diagram, describe the arrangement of dipoles in a fully magnetized steel bar.

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(2 marks)

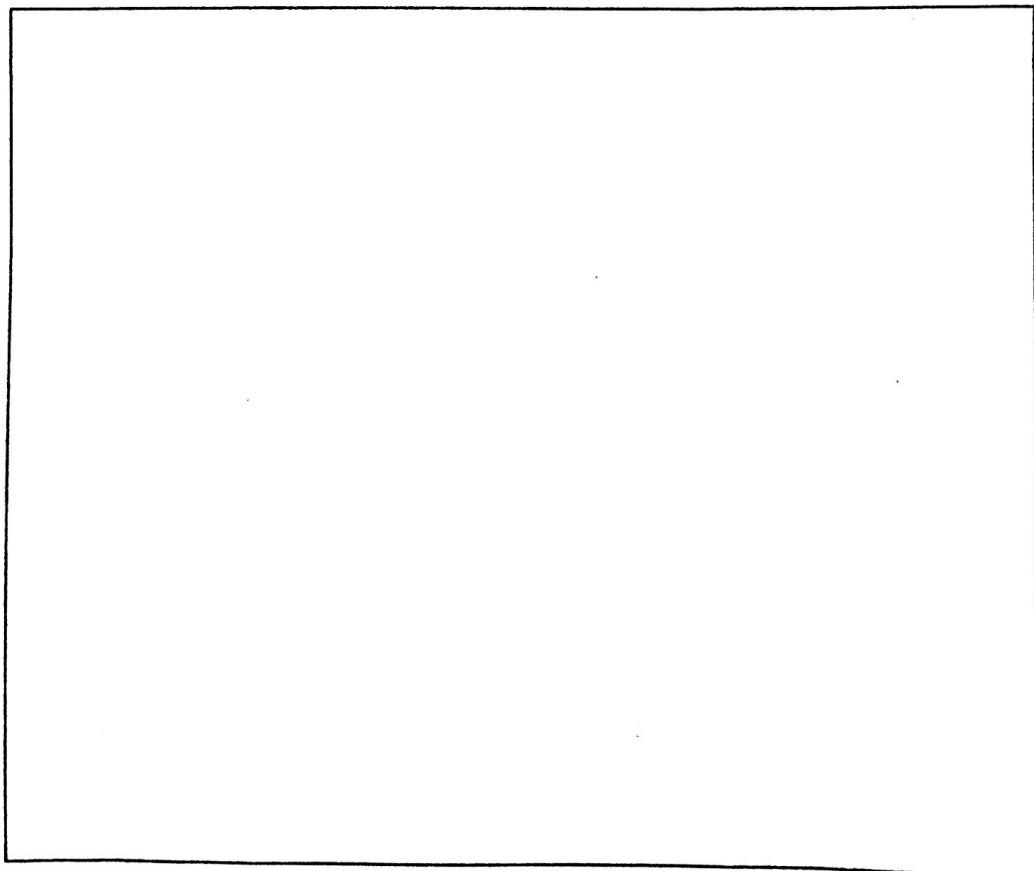
7. a. Give two properties of lenses.

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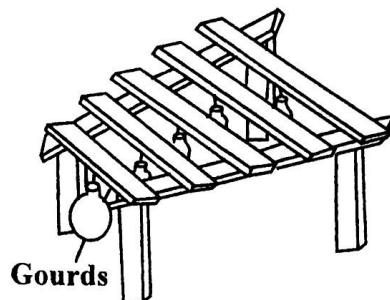
(2 marks)

- b. An object **1cm** high is placed **20cm** in front of a convex lens with a focal length of **10cm**. Using a ray diagram, find the image distance.



(5 marks)

8. a. **Figure 5** is a diagram showing a traditional musical instrument which consists of wooden bars of different lengths. Use it to answer the questions that follow.

**Figure 5**

- (i) Name the instrument.

(1 mark)

- (ii) How does the instrument produce sound?

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(1 mark)

- (iii) Why are wooden bars made of different lengths?

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(1 mark)

- (iv) What is the purpose of putting gourds under each wooden bar?

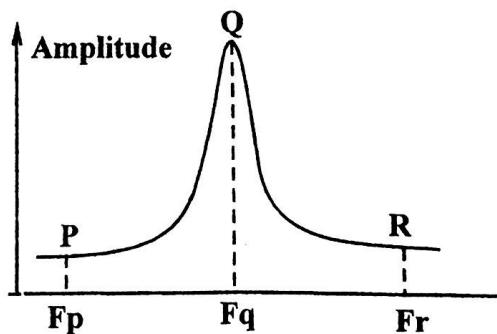
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(1 mark)

- b. **Figure 6** is a graph of amplitude against frequency for an oscillating system.

**Figure 6**

- (i) At what point is the system in resonance?

(1 mark)

- (ii) Give a reason for the answer in 8b (i).

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(1 mark)

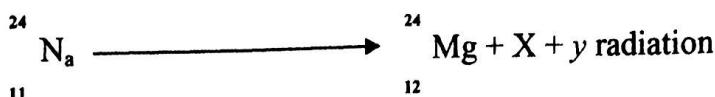
Continued/...

## 8. (Continued)

- c. Why is resonance dangerous to a vibrating system?
- 

(1 mark)

9. a. The following equation shows decay of sodium ( $\text{Na}$ ) into magnesium and other nuclear radiations;



- (i) Name the particle  $\text{X}$ .

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(1 mark)

- (ii) State any **one** property of  $\text{X}$  radiation.
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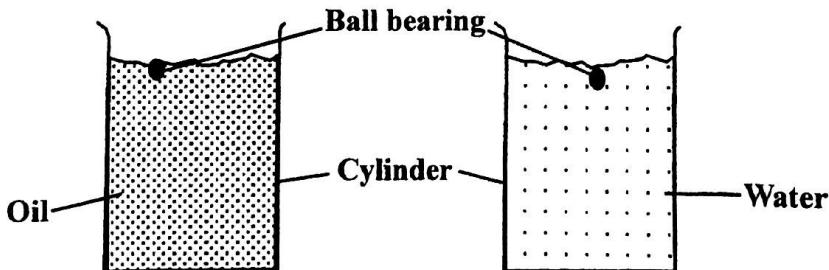
(1 mark)

- b. Explain how nuclear radiations can be used to trace brain tumors.
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(2 marks)

- c. **Figure 7** is a diagram showing a set up of an experiment investigating the fluid resistance to motion of objects. The ball bearings were released into the liquids at the same time. Use it to answer the questions that follow.



**Figure 7**

- (i) Which ball bearing reached the bottom of the cylinder first?
- 

(1 mark)

- (ii) Mention any **two** variables that were kept constant in the experiment.
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(2 marks)

10. a. Define "centre of gravity"

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(1 mark)

- b. State any two ways of increasing mechanical advantage of an inclined plane.

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(2 mark)

- b. Figure 8 is a diagram showing two spheres connected by a straight rod of length 10cm and suspended in the air at the centre of gravity G.

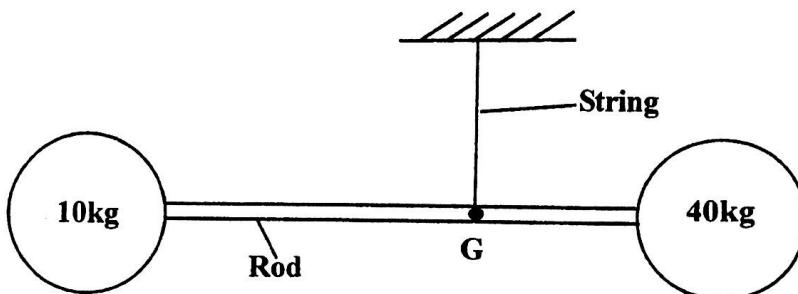


Figure 8

Calculate the position of the centre of gravity G from the 40kg mass.

(4 marks)

**SECTION B (30marks)**

11. a. Explain how a terminal speed is reached by an object falling through a liquid.

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(4 marks)

- b. Explain how the action of flotation and sinking is achieved in submarine ships.

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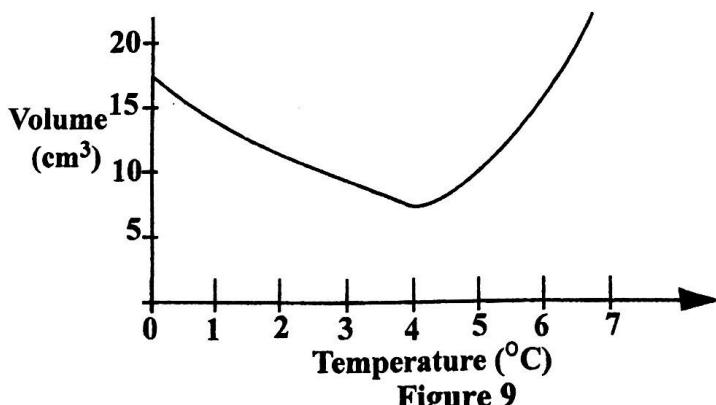
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(6 marks)

12. a. Figure 9 is a graph showing the behavior of water when heated.

**Figure 9**

Describe the behavior of water according to the graph.

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(5 marks)

Continued/...

**12. (Continued)**

- b. Explain the effect on magnetism when a magnet is heated to red hot and suddenly cooled down.

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(5 marks)

13. a. Explain how a liquid in a glass thermometer works to determine temperature of a substance.

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(4 marks)

- b. Describe an experiment that could be carried out in order to show that liquid pressure increases with depth.

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(6 marks)

**END OF QUESTION PAPER****NB:** This paper contains 11 printed pages



EXAMINATION NO.: \_\_\_\_\_

# THE MALAWI NATIONAL EXAMINATIONS BOARD

2018 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## PHYSICAL SCIENCE

Subject Number: M162/I

Wednesday, 27 June

Time Allowed: 2 hours  
8:00 – 10:00 am

### PAPER I

(100 marks)

#### Instructions

1. This paper contains 12 printed pages. Please check.
2. Fill in your Examination Number at the top of each page.
3. Answer all the eight questions in the spaces provided.
4. Use of electronic calculators is allowed.
5. The maximum number of marks for each answer is indicated against each question.
6. In the table provided on this page, tick against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns	
1			
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1. Figure 1 is a diagram showing the set up of an experiment to investigate the relationship between temperature and volume of a gas.

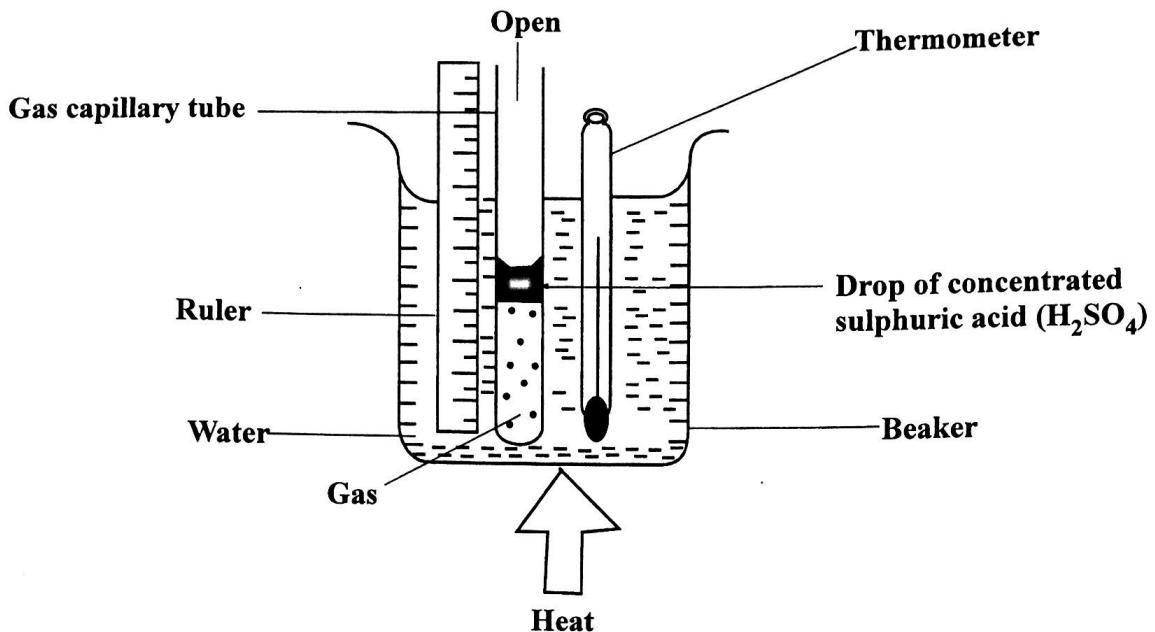


Figure 1

- a. What happens to the drop of concentrated sulphuric acid when water in the beaker is heated?

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(1 mark)

- b. Give a reason for the answer in 1a.

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(2 marks)

- c. Why is the glass capillary tube open?

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(1 mark)

- d. What is the value of the gas pressure in the tube?

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(1 mark)

Continued/...

2. a. State any **two** physical properties of halogens.

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**(2 marks)**

- b. Explain why bromine ( $\text{Br}_2$ ) has a higher boiling point than chlorine ( $\text{Cl}_2$ ).

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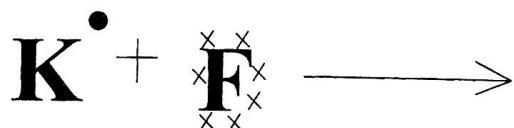
**(3 marks)**

- c. Write a balanced chemical equation to show the reaction between sodium ( $\text{Na}$ ) and water ( $\text{H}_2\text{O}$ ).

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**(3 marks)**

- d. Complete the following equation to show the bonding between potassium ( $\text{K}$ ) and Fluorine ( $\text{F}$ ).



**(3 marks)**

- e. Explain why ionic compounds conduct electricity in molten state and **not** when in solid state.

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**(2 marks)**

Continued/...

3. a. Define "standard solution".

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(1 mark)

- b. State **two** ways of expressing the concentration of a solution.

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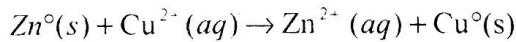
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(2 marks)

- c. Calculate the molarity of a sodium chloride (NaCl) solution made by dissolving 11.7 g of NaCl in water and making up the volume to 4 dm<sup>3</sup>. (RAM: Na = 23, Cl = 35.5)

(6 marks)

- d. Zinc (Zn<sup>0</sup>) reacts with copper ions (Cu<sup>2+</sup>) according to the following equation:



- (i) Which element is oxidized?

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(1 mark)

- (ii) Give a reason for the answer in 3.d.(i).

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(1 mark)

Continued/...

3. d. (Continued)

- (iii) What does "s" and "aq" mean in the equation?

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(2 marks)

- (iv) Write **two** half equations for the reaction between zinc and copper ions.

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(4 marks)

4. a. Classify the following quantities as vector or scalar: distance, acceleration, displacement and temperature.

Vector: \_\_\_\_\_ (2 marks)

Scalar: \_\_\_\_\_ (2 marks)

- b. A force of 20 N is applied to a moving object of mass 4 kg. Calculate its acceleration.

(3 marks)

- c. (i) Define "half-life" of a radioisotope.

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(1 mark)

Continued/...

## 4. c. (Continued)

- (ii) What is the difference between “natural” and “induced” radioactivity?

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(2 marks)

- d. (i) Explain why gamma rays are **not** deflected in an electric field.

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(3 marks)

- (ii) Explain why gamma rays are used in sterilization of food.

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(2 marks)

- (iii) Give any **two** safety measures that could be followed when handling radioactive sources at school.

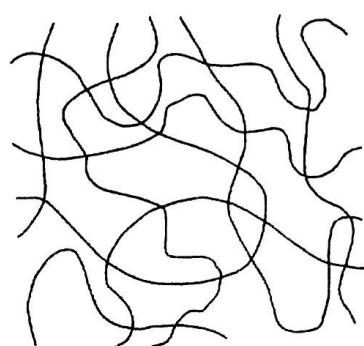
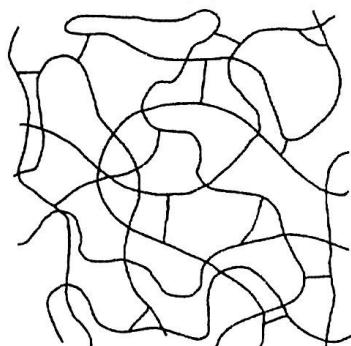
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(2 marks)

Continued/...

5. a. **Figure 2** is a diagram showing the arrangement of polymer chains after heating plastics **K** and **L**.



**Figure 2**

- (i) Identify the type of plastics **K** and **L**.

**K:** \_\_\_\_\_ (1 mark)

**L:** \_\_\_\_\_ (1 mark)

- (ii) State any **two** properties of plastics with polymer chains represented by **L**.

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(2 marks)

- (iii) Explain why structure **K does not** easily melt when heated.

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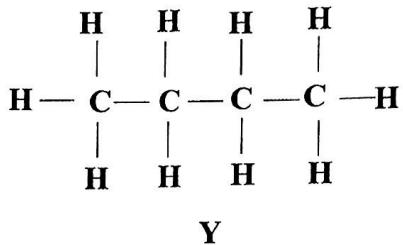
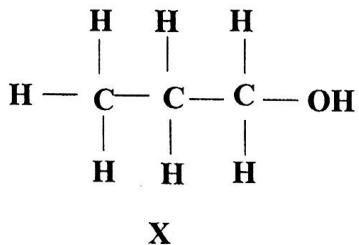
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(3 marks)

Continued/...

## 5. (Continued)

- b. Figure 3 is a diagram showing structures of organic compounds X and Y.



**Figure 3**

- (i) To which families of organic compounds do X and Y belong?

X: \_\_\_\_\_ (1 mark)

Y: \_\_\_\_\_ (1 mark)

- (ii) Write down the structure of an isomer of compound Y.

(2 marks)

Continued/...

5. b. (Continued)

- (iii) Describe a test that could be done to distinguish compound X from Y.

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(6 marks)

6. a. State **one** use of a transformer in an electrical appliance.

(1 mark)

b. State **two** ways of reducing energy loss in a transformer.

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(2 marks)

c. The primary circuit of a transformer is connected to 240 V mains supply and the output voltage is 15V. Calculate the efficiency of the transformer if the primary current is 0.5A and the secondary current is 6A.

(5 marks)

Continued/...

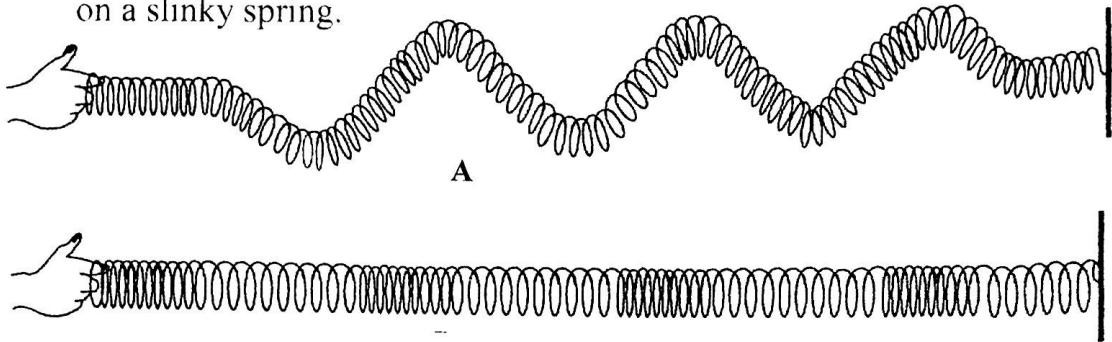
7. a. Define a “wave”.

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(1 mark)

- b. **Figure 4** shows diagrams A and B representing two kinds of waves on a slinky spring.



**Figure 4**

- (i) Label the positions of crest and rarefaction in the figure.

(2 marks)

- (ii) State how wave A is produced on the spring.

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(1 mark)

- c. A water wave has a frequency of 200 Hz. Calculate the period of the wave.

(3 marks)

Continued/...

## 7. (Continued)

d. Explain how each of the following components of a camera works.

(i) Diaphragm:

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(3 marks)

(ii) Shutter:

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(3 marks)

8. a. Explain why a balloon that is inflated with air bursts when it is rising in the atmosphere.

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(4 marks)

Continued/...

**8. (Continued)**

- b. Explain how “p-type” and “n-type” semiconductors are produced.

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(6 marks)

**END OF QUESTION PAPER****NB:** This paper contains 12 printed pages.



EXAMINATION NO.: \_\_\_\_\_

# THE MALAWI NATIONAL EXAMINATIONS BOARD

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## SAMPLE PAPER

# PHYSICS

Subject Number:

Time Allowed: 2 hours

## PAPER I (100 marks)

### Instructions

1. This paper contains 12 printed pages. Please check.
2. Fill in your **Examination Number** at the top of each page.
3. This paper contains **two** sections **A** and **B**. In **Section A** there are **ten** short answer questions while in **Section B** there are **three** restricted essay questions.
4. Answer **all** the **thirteen** questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, **tick** against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns
1		
2		
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12		
13		

## SECTION A (70 marks)

1. a. State any **two** safety measures to be followed when heating water in a boiling tube in a Laboratory.

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(2 marks)

- b. Mention any **one** way of presenting data in a scientific investigation.

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(1 mark)

- c. Explain any **two** ways of reducing errors in a scientific investigation.

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(4 marks)

2. a. State any **one** law of reflection.

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(1 mark)

- b. **Figure 1** is a diagram showing an **object** and its **image** as seen through a pinhole camera.

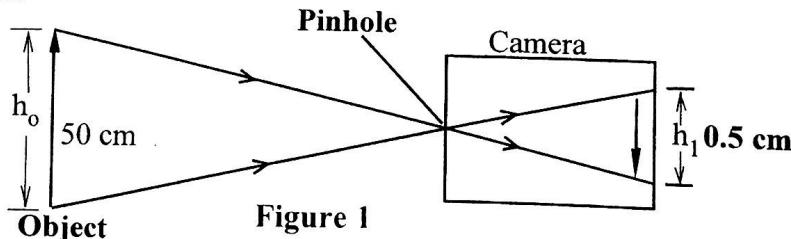


Figure 1

- (i) Why is the image upside down?

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(3 marks)

Continued/...

2. (Continued)

- (ii) Calculate the magnification of the image.

(3 marks)

- c. State any **two** characteristics of a wave.

(2 marks)

- d. **Figure 2** is a diagram showing waves on a string PQ.

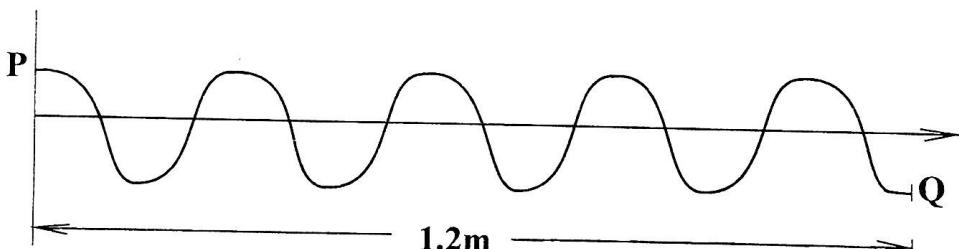


Figure 2

Calculate the average speed of the wave if the frequency of vibrations is 10Hz.

(4 marks)

Continued/...

2. (Continued)

e. Explain each of the following observations:

- (i) Speed of sound depends on the material through which it is passing.

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(2 marks)

- (ii) In air the speed of sound increases with temperature.

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(2 marks)

3. Figure 3 is a circuit diagram. Each of the three bulbs  $B_1$ ,  $B_2$  and  $B_3$  has a resistance of  $2\Omega$ .

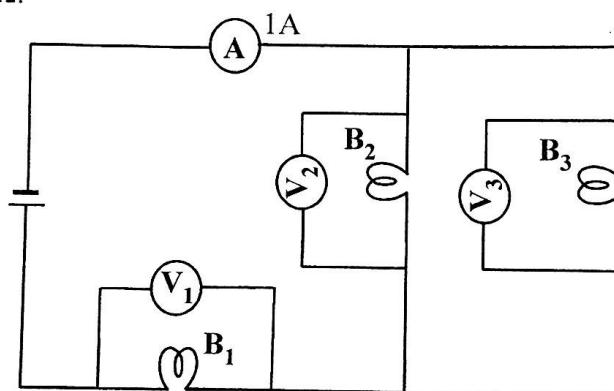


Figure 3

- (i) Which bulb will give brightest light?

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(1 mark)

Continued/...

## 3. (Continued)

- (ii) Calculate the value of  $V_1$ .

(3 marks)

4. a. Give any **two** effects of heat on matter.

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(2 marks)

- b. Explain why temperature remains constant during the change of state of ice to liquid water.

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(3 marks)

5. a. Give any **three** ways in which the mechanical advantage of an inclined plane could be increased.

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(3 marks)

Continued/...

5. (Continued)

- b. Figure 5 is a diagram showing an inclined plane being used to raise a 100 kg box from point A to B.

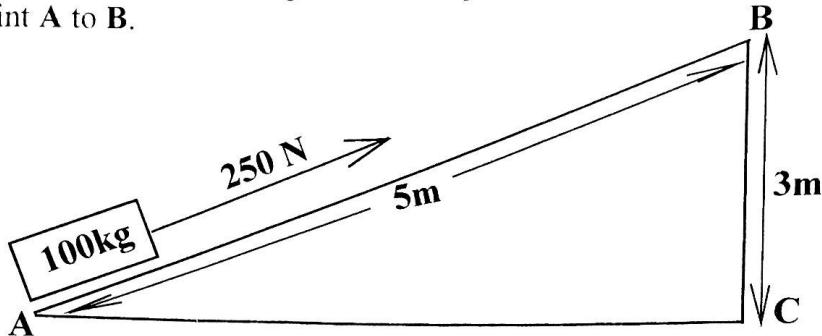


Figure 5

- (i) Calculate the mechanical advantage of the inclined plane.

\_\_\_\_\_

(4 marks)

- (ii) Explain why there is more energy used in pulling the 100 kg box from A to B than lifting it vertically from C to B.

\_\_\_\_\_

(2 marks)

6. a. Mention any one type of nuclear radiation.

\_\_\_\_\_

(1 mark)

**6. (Continued)**

- b. A radioactive sample has a half life of 60 minutes. Calculate the fraction left after 2 hours.

**(3 marks)**

7. a. Define average density.

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**(1 mark)**

- b. Explain why a rotten chicken egg floats on water.

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**(1 mark)**

- c. Calculate the average density of the mixture when  $20\text{ cm}^3$  of paraffin whose density is  $0.7\text{ g/cm}^3$  is mixed with  $10\text{ cm}^3$  of petrol whose density is  $0.9\text{ g/cm}^3$ .

**(4 marks)**

8. a. Give any **two** methods of resolving vectors.

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(2 marks)

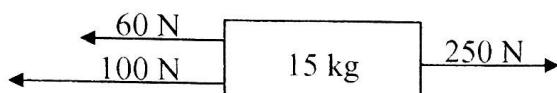
- b. Explain why “displacement” is an example of a vector quantity.

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(2 marks)

- c. **Figure 6** shows a 15 kg box being pulled by three forces.



**Figure 6**

- (i) Calculate the resultant force on the box.

(2 marks)

- (ii) Calculate the acceleration of the box.

(2 marks)

Continued/...

8. c. (Continued)

(iii) Which Newton's law of motion is being investigated in **Figure 6**?

(1 mark)

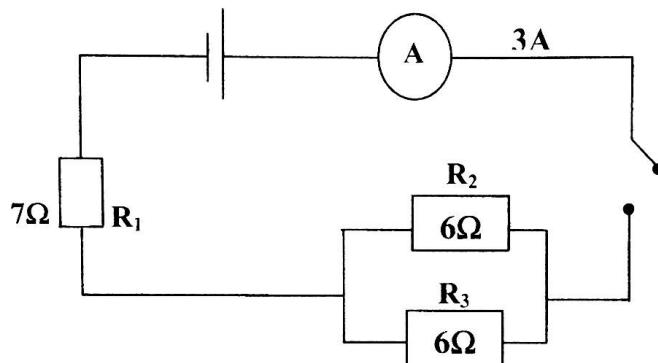
9. a. Mention any **two** factors that affect the resistance of a piece of wire.

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(2 marks)

b. **Figure 7** is an electric circuit diagram.



**Figure 7**

(i) Calculate the current that will flow through  $R_2$  when the switch is closed.

(2 marks)

**9. b. (Continued)**

- (ii) What is the total resistance in the circuit?

**(2 marks)**

**10. a. State the Archimedes' Principle.**

\_\_\_\_\_ **(1 mark)**

- b. Calculate the upthrust force for the displaced water if a 2000 N boat weighs 1500 N when it is partly submerged in water.

**(2 marks)**

**SECTION B (30 marks)**

**11. Explain how each of the following works to prevent accidents caused by electrical faults.**

- a. Earth wire:

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**(5 marks)**

Continued/...

**11. (Continued)**

b. Fuse:

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**(5 marks)**

- 12. a.** Describe how the boiling point of pure water will differ at the top of a mountain and at sea level.

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**(6 marks)**

- b. Describe how a bimetallic strip regulates the temperature in an electric iron.

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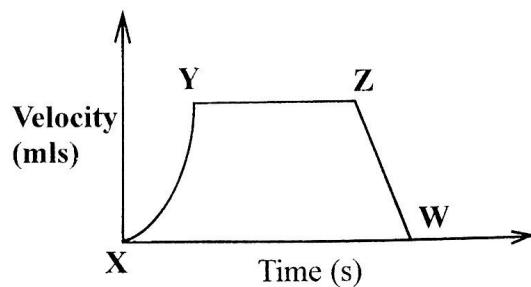
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**(4 marks)**

13. a. **Figure 10** shows a velocity-time graph for a motorist.



**Figure 10**

Describe the motion of the motorist between the following points.

- (i)    X to Y : \_\_\_\_\_ (1 mark)
  - (ii)   Y to Z : \_\_\_\_\_ (1 mark)
  - (iii)   Z to W : \_\_\_\_\_ (1 mark)
- b. Explain how the speed of an athlete could be determined using a stopwatch and a tape measure.
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(7 marks)

**END OF QUESTION PAPER**

This paper contains 12 printed pages



EXAMINATION NO.: \_\_\_\_\_  
**THE MALAWI NATIONAL EXAMINATIONS BOARD**

2017 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

# **PHYSICAL SCIENCE**

**Subject Number: M162/I**

**Wednesday, 28 June**

**Time Allowed: 2 hours  
8:00 – 10:00 am**

## **PAPER I**

(100 marks)

### **Instructions**

1. This paper contains 12 printed pages. Please check.
2. Fill in your Examination Number at the top of each page.
3. Answer all the eight questions in the spaces provided.
4. Use of electronic calculators is allowed.
5. The maximum number of marks for each answer is indicated against each question.
6. In the table provided on this page, tick against the number of the question you have answered.

<b>Question Number</b>	<b>Tick if answered</b>	<b>Do not write in these columns</b>	
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1. a. State any **three** characteristics of radioactive substances.

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(3 marks)

- b. Explain how a beta particle is released from an unstable nucleus.

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(4 marks)

- c. A sample of chlorine gas contains two isotopes,  $^{35}_{17} Cl$  and  $^{37}_{17} Cl$ .

Calculate the relative atomic mass of the chlorine if 75% of the isotopes are of  $^{35}_{17} Cl$  and 25% of the isotopes are of  $^{37}_{17} Cl$ .

(3 marks)

2. a. State any **two** conditions that are necessary for rusting to take place.

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(2 marks)

Continued/...

## 2. (Continued)

- b. Figure 1 is a diagram showing the process of electroplating a carbon rod.

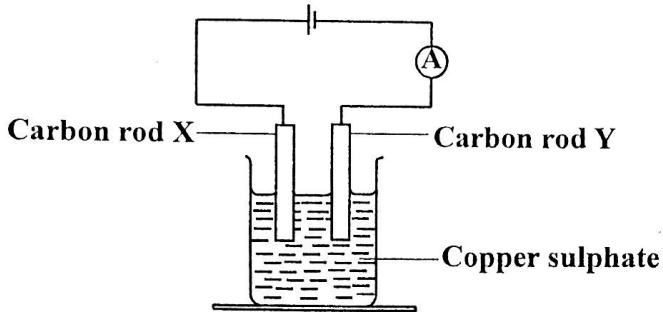


Figure 1

- (i) Which carbon rod would be electroplated? \_\_\_\_\_ (1 mark)
- (ii) Give any two observations that will be made in the experiment after some time.  
\_\_\_\_\_  
\_\_\_\_\_ (2 marks)
- (iii) Write down a half equation for the reaction at the carbon rod Y.  
\_\_\_\_\_ (2 marks)
- c. Calculate the molecular formula of a compound if its empirical formula is  $\text{CH}_2\text{O}$  and has a molar mass of 180 g.  
**(RAM: C = 12, H = 1, O = 16).**

(4 marks)

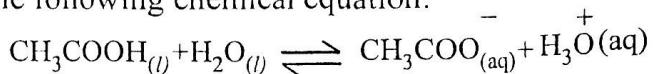
Continued/...

## 2. (Continued)

- d. What is a strong acid?
- 

(1 mark)

- e. Ethanoic acid ( $\text{CH}_3\text{COOH}$ ) reacts with water ( $\text{H}_2\text{O}$ ) according to the following chemical equation:



- (i) Identify the **two** conjugate acid-base pairs.
- 

(2 marks)

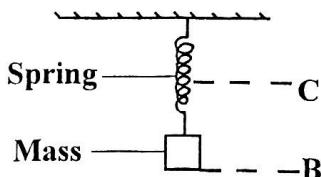
- (ii) Explain how the  $\text{H}_3\text{O}^+$  ion was formed.
- 
- 
- 

(3 marks)

3. a. Define "period" of an oscillating system.
- 
- 

(1 mark)

- b. **Figure 2** is a diagram showing a mass hanging on a spring. If the mass is pulled to point A and released, it vibrates between points A and C through the rest position, B.



A

Figure 2

- (i) What type of energy does the mass possess at point C?
- 

(1 mark)

Continued/...

## 3. b. (Continued)

(ii) At which point is the kinetic energy of the mass greatest?

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(1 mark)

(iii) Why will the oscillations stop after some time?

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(2 marks)

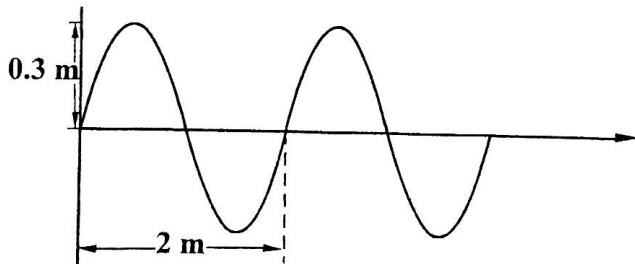
c. Give any **three** examples of transverse waves.

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(3 marks)

d. **Figure 3** is a diagram of a wave.



**Figure 3**

(i) What is the amplitude of the wave?

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(1 mark)

(ii) What type of wave is shown in **Figure 3**?

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(1 mark)

## 3. d. (Continued)

- (iii) Calculate the frequency of the wave if its speed is 8 m/s.

(3 marks)

4. a. State any **three** sources of sulphur.

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(3 marks)

- b. **Table 1** shows the arrangement of some elements in the Periodic Table.

**Table 1**

H								He
Li	Be	B	C	N	O	F	Ne	
Na	Mg	Al	Si	P	S	Cl	Ar	
K	Ca					Br	Kr	

- (i) To which period does Li belong?

---

(1 mark)

- (ii) Write the electron configuration for P.

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(1 mark)

Continued/...

## 4. b. (Continued)

- (iii) Explain the trend in reactivity when moving up the group of **Br, Cl** and **F**.

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(4 marks)

- (iv) Draw an electron dot and cross diagram to show bonding in a carbon dioxide molecule.

(4 marks)

5. a. State any **two** properties of a vector quantity.

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(2 marks)

- b. **Table 2** shows how the velocity of an object increased with time.

**Table 2**

Velocity (m/s)	0	1.5	3.0	4.5	6.0	9.0
Time (s)	0	1	2	3	4	6

- (i) Plot a graph of velocity against time.

Continued/...

## 5. b. (i) (Continued)


(ii) What was the velocity of the object when time was 5s? (4 marks)

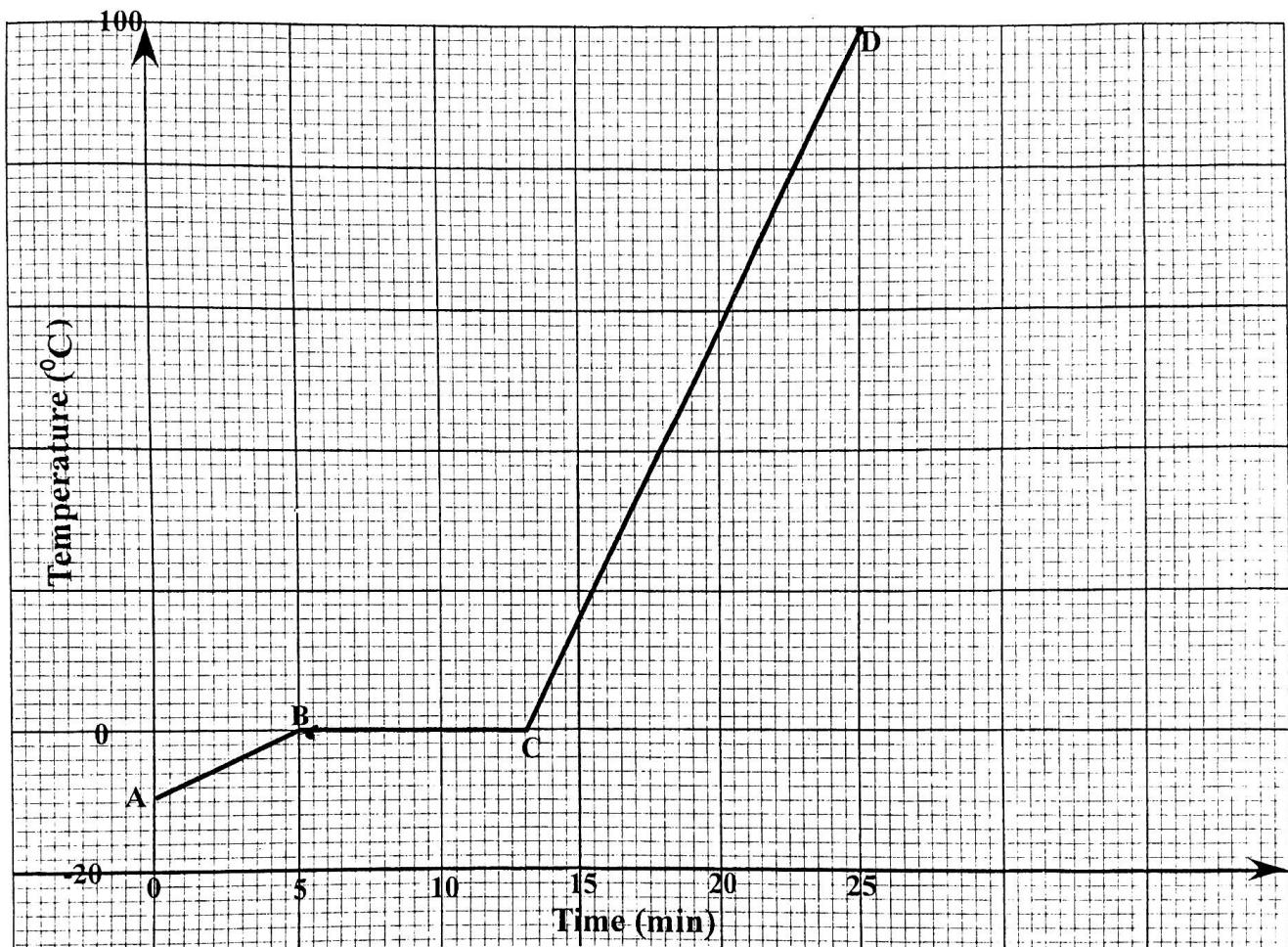
6. a. Define “absolute temperature” . (1 mark)

b. Convert 25 degrees celsius into kelvins. (1 mark)

(3 marks)  
Continued/...

## 6. (Continued)

- c. Figure 4 is a graph of temperature against time for water that was heated.



**Figure 4**

- (i) In what state of matter was the water between points A and B?

**(1 mark)**

- (ii) What was the temperature of the water when time was 10 minutes?

**(1 mark)**

- (iii) Explain the shape of the graph between points B and C.

**(3 marks)**  
Continued/...

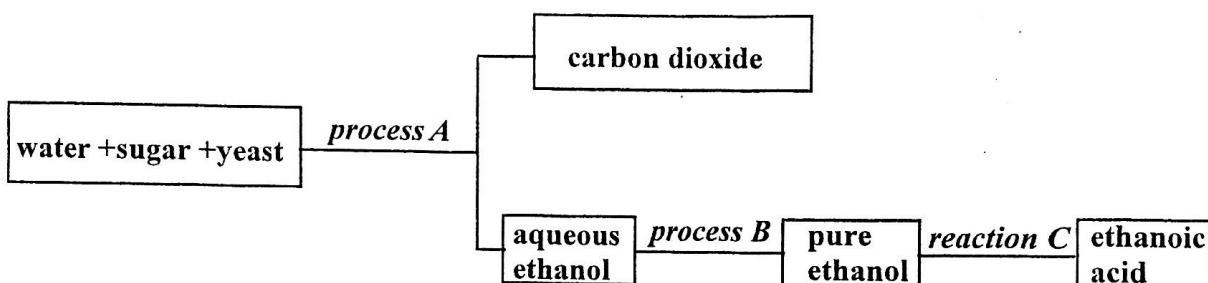
7. a. (i) State the products that are formed when ethanol burns in excess oxygen.
- 

(2 marks)

- (ii) Mention **two** organic families whose members react to produce esters.
- 

(2 marks)

- b. **Figure 5** is a diagram showing how ethanol and ethanoic acid is produced.

**Figure 5**

- (i) Name processes **A** and **B**.

Process **A**: \_\_\_\_\_ (1 mark)

Process **B**: \_\_\_\_\_ (1 mark)

- (ii) What is the role of the yeast?
- 

(1 mark)

- c. Given below are general formulae of some homologous series represented by the letters **M**, **N**, **O** and **P**.

<b>M</b>	$C_nH_{2n}$
<b>N</b>	$C_nH_{2n-2}$
<b>O</b>	$C_nH_{2n+1}OH$
<b>P</b>	$C_nH_{2n+1}COOH$

- (i) Name the homologous series represented by the letters **M**, and **P**.
- 

(2 marks)

Continued/...

7. c. (Continued)

(ii) Which general formulae represent hydrocarbons?

d. Draw any **three** isomers of butanol ( $C_4H_9OH$ ). (2 marks)

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(3 marks)

e. Explain why pentanol ( $C_5H_{11}OH$ ) has a higher melting point than ethanol ( $C_2H_5OH$ ).

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(3 marks)

8. a. Define "electrical resistance".

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(1 mark)

b. Explain how thickness of a wire affects the electrical resistance in a circuit.

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(3 marks)  
Continued/...

## 8. (Continued)

- c. Explain how a polythene rod becomes negatively charged when rubbed with a cloth.

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(3 marks)

- d. Calculate the heat dissipated when an electric iron rated 240 V, 8A works for 120 seconds.

(3 marks)

- e. Explain how heating silicon enables it to conduct electricity.

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(4 marks)

**END OF QUESTION PAPER****NB:** This paper contains 12 printed pages.