

Candidate Name _____

Centre Number	Candidate Number

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level

SCIENCE

5124/2

PAPER 2 (PHYSICS)

Wednesday

3 NOVEMBER 2010

1 hour 15 minutes

Additional materials:

Mathematical tables

Graph paper

Writing paper

(Do not allow calculators)

Time: 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number at the top of this page and on any separate answer paper used.

There are **twelve (12)** questions in this paper.

Section A

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions.

Write your answers on the answer paper provided.

At the end of the examination

1. Fasten Answer Booklet used securely to the question paper.

2. Enter the numbers of the **Section B** questions you have answered in the grid below.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

Cell phones are not allowed in the Examination room.

Candidate's use	Examiner's use
Section A	
Section B	
Total	

Section A

[45 marks]

Answer all questions.

Write your answers in the spaces provided on the question paper.

- 1 **Figure 1.1** shows part of a micrometer screw gauge, an instrument used to measure a physical quantity.

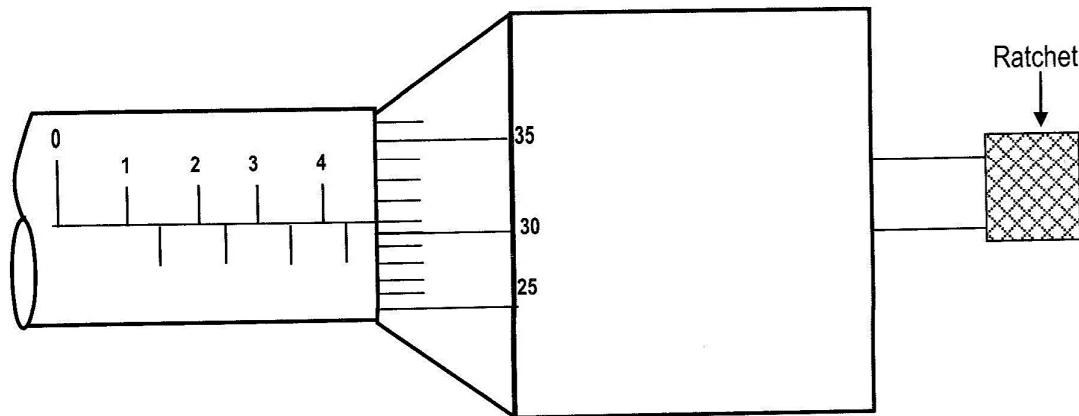


Figure 1.1

- (a) What is the reading shown on the micrometer?

[1]

- (b) What physical quantity is measured by the instrument?

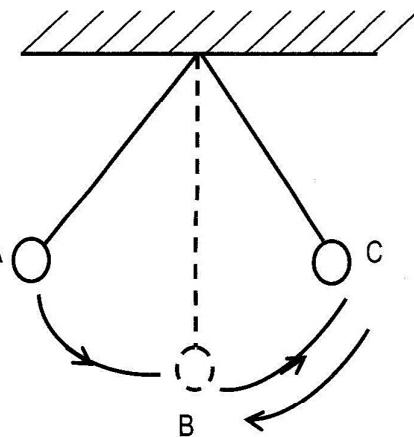
[1]

- (c) What is the function of the ratchet?

[1]

Total: [3]

- 2 **Figure 2.1** shows a simple pendulum that oscillates between position A and C. It takes 2.05 seconds to go from A to C and back to mid-point B.

**Figure 2.1**

- (a) (i) Calculate the period of a pendulum.

[2]

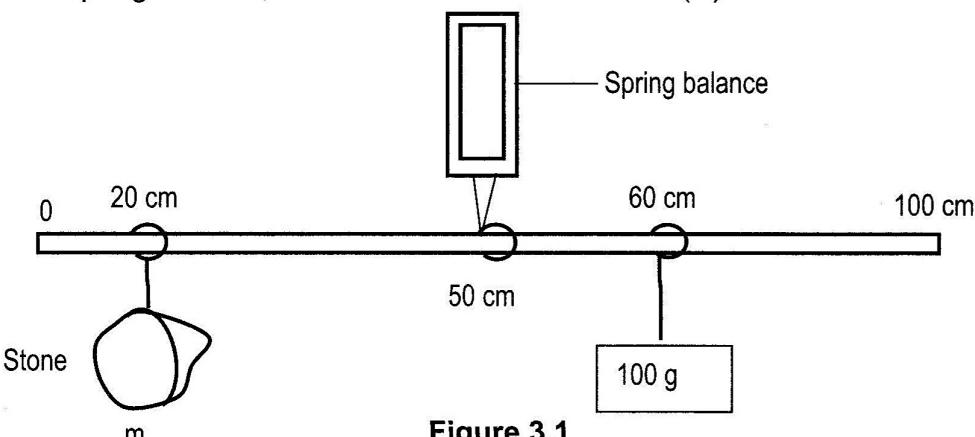
- (ii) Calculate the frequency of the pendulum.

[2]

- (b) Briefly describe how the period of a pendulum would be measured.

[1]
Total: [5]

- 3 (a) **Figure 3.1** shows a uniform metre rule of mass 120g suspended at its mid-point from a spring balance, which is calibrated in Newtons(N).

**Figure 3.1**

A stone, suspended at the 20cm mark, is balanced by a 100g mass suspended on the 60cm mark. Assume $g = 10\text{m/s}^2$.

- (a) Calculate the mass of the stone

[2]

- (b) Why does the mass of the metre rule play no part in the calculation in (a)?

[1]

- (c) What is the reading on the spring balance?

Total: [5]

- 4 Figure 4.1 represents a thick-walled bottle used to carry out an experiment to determine the density of air. The bottle was fitted with a rubber bung and a tap.

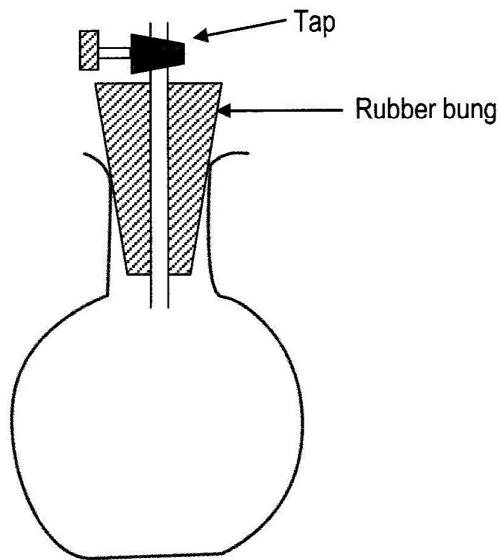


Figure 4.1

The following results were obtained:

Mass of the bottle containing air = 410g
Mass of empty (evacuated) bottle = 409g
Mass of bottle filled with water = 1150g

(a) What mass of water was needed to fill the bottle?

[1]

(b) What was the internal volume of the bottle? Take the density of water as 1g/cm^3 .

[2]

(c) What mass of air filled the bottle?

[1]

(d) What was the density of air?

[2]

Total: [6]

5 Figure 5.1 shows the path taken by a ball thrown vertically up into the air.

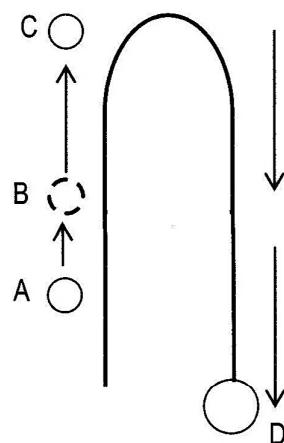


Figure 5.1

(a) (i) State at which position A, B, C or D the ball travels fastest.

[1]

(ii) Explain your answer in (i)

[1]

- (b) Wind is a renewable source of energy. The windmill is used for electrical generation and to pump water.

(i) What is meant by renewable source of energy?

[1]

(ii) State one disadvantage of depending on wind energy.

[1]

(iii) Give an example of a non-renewable source of energy _____

[1]

Total: [5]

- 6 (a) Figure 6.1 shows a cooler box used to keep food cool.

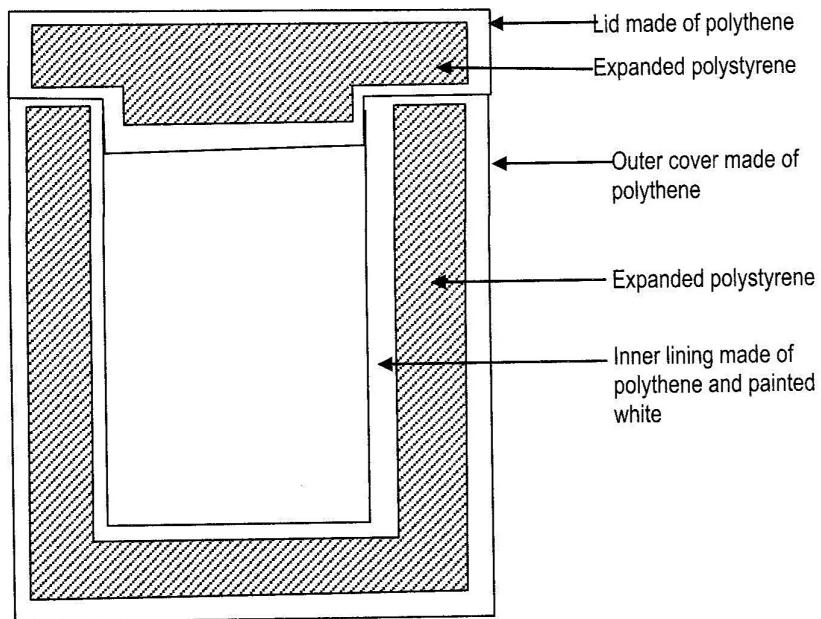


Figure 6.1

Describe how the cooler box keeps food cool for a long period

[2]

- (b) With the aid of a labeled diagram describe an experiment to determine the lower fixed point of a thermometer.

[4]

Total: [6]

- 7 **Figure 7.1** shows some of the components of the electromagnetic spectrum.

Radio waves	Microwaves	Infra-red	Visible light	A	X-ray	Gramma-rays
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- (a) What component is represented by A?

[1]

- (b) State the speed of the following components in a vacuum.

(i) infra-red _____ m/s [1]

(ii) gamma rays _____ m/s [1]

- (c) All electromagnetic waves are transverse.

- (i) What is the meaning of the term “transverse”?

[1]

- (ii) Give another example of a transverse wave, but which is not an electromagnetic wave.

[1]

Total: [5]

- 8 Four rods of identical dimensions but made of different materials are painted white. Two of the rods are magnets, one is made of iron and the remaining one is made of copper. How would you determine the identify of each rod using only the provided loads.

[4]

Total: [4]

- 9 Figure 9.1 shows a cathode ray oscilloscope (CRO)

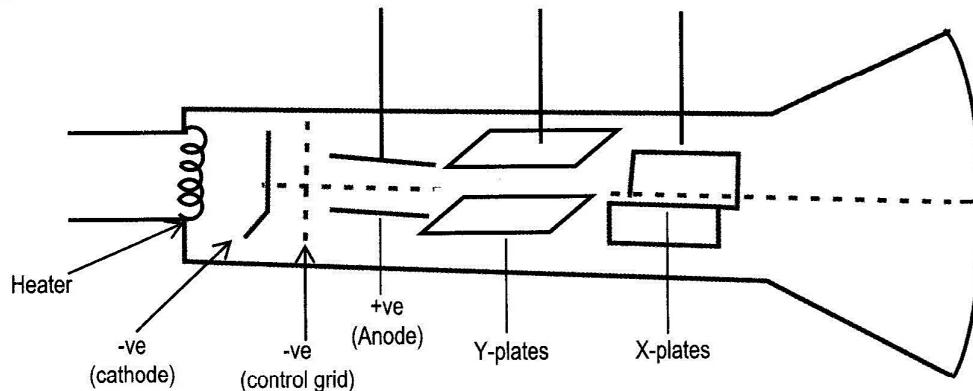


Figure 9.1

- (a) Name the process by which electrons are produced in the CRO.

[1]

- (b) Why is the potential difference between the cathode and anode made very high?

[1]

[1]

- (c) Describe the use of

- (i) the Y-plates

[1]

- (ii) the X-plates

[1]

- (d) Explain why the CRO should be evacuated.

[1]

Total: [6]

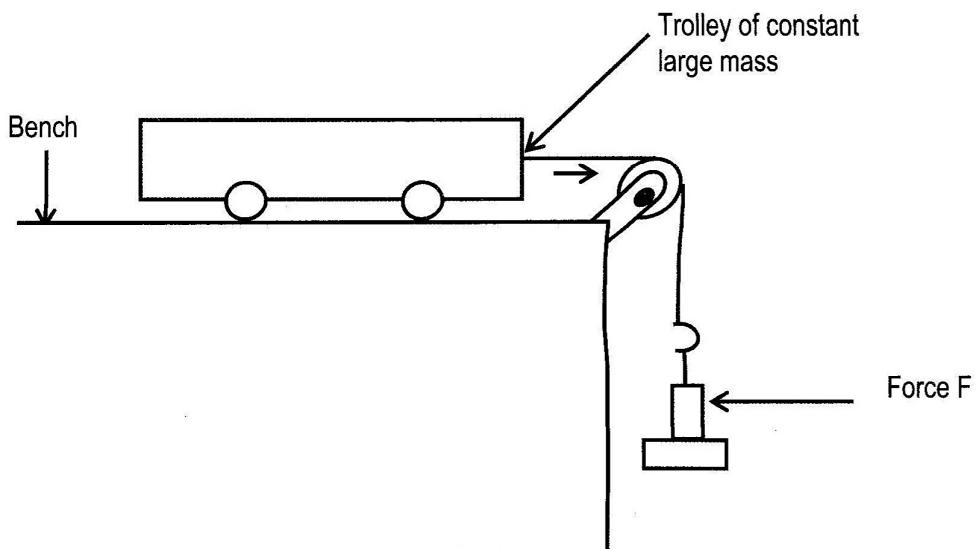
Section B

[20 marks]

Answer any **two (2)** questions from this section.

Use the Answer Booklet provided.

- 10** **Figure 10.1** shows an arrangement for demonstrating the relationship between force and acceleration.



In one particular experiment, the mass of the trolley was kept constant. The time t for the trolley to move a distance of 1.00m from rest was determined for various values of the pulling force F . The acceleration a was then calculated using the equation $S = \frac{1}{2} at^2$, where $S = 1.00\text{m}$. The following various were obtained.

F/N	0.40	0.80	1.20	1.60	2.00
$a/(\text{m/s}^2)$	0.08	0.22	0.43	0.57	0.74

- (a) Plot a graph of F against a [5]
- (b) (i) Determine the slope/gradient of your graph. [2]
- (ii) What physical quantity does the gradient represent? [1]
- (c) In this experiment explain why a pulling force is needed to give zero acceleration.[2]

Total: [10]

- 11 (a) Describe an experiment you would perform to demonstrate that water is a poor conductor of heat. [4]
- (b) **Figure 11.1** shows the essential features of a solar heating panel. A small electric pump circulates a liquid through the pipes.

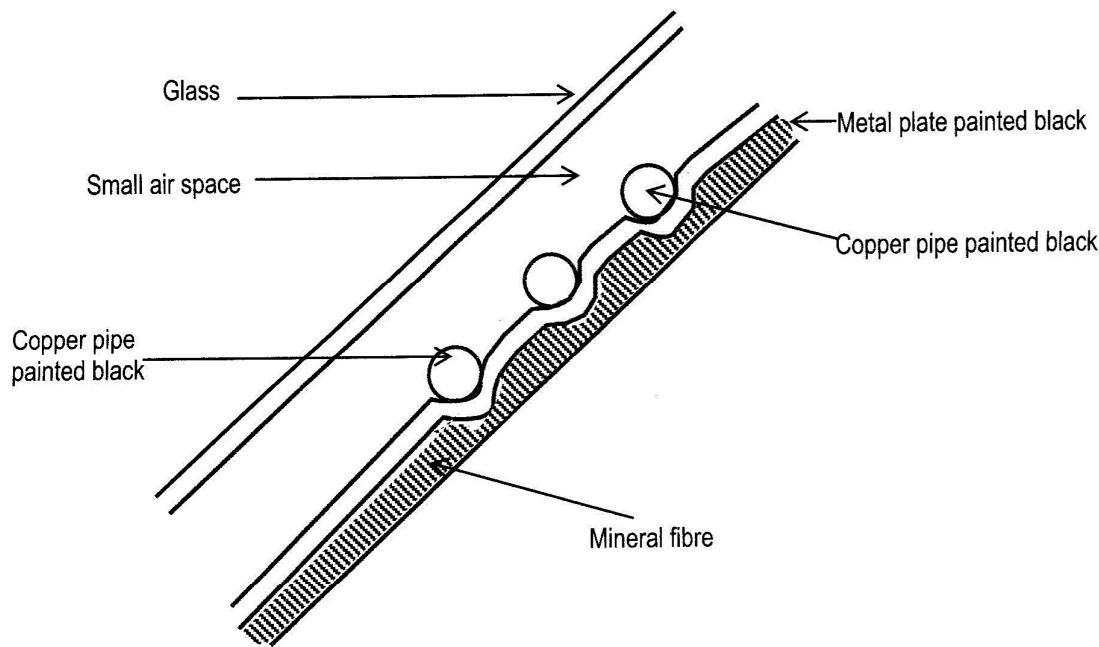


Figure 11.1

State why,

- (i) the pipes and back plate are blackened [2]
(ii) there is a mineral fibre backing to the panel [2]
(iii) the glass sheet increases the energy collected by the panel by a large factor. [2]

Total: [10]

- 12 (a) Figure 12.1 shows an incomplete circuit for an experiment to investigate how the resistance of a torch bulb varies with current flowing through it.

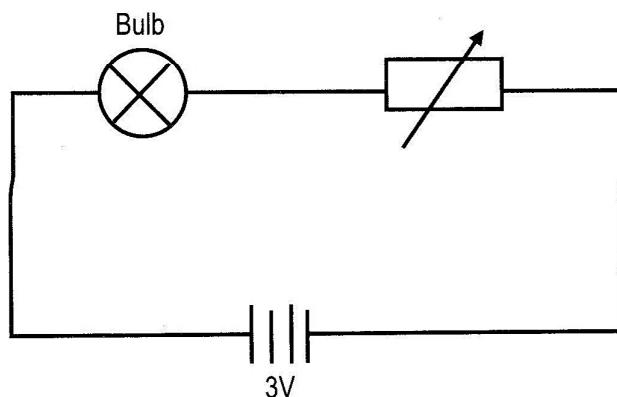


Figure 12.1

- (i) Draw the circuit diagram and add to it an ammeter to measure the current through the bulb and voltmeter for measuring the potential difference (pd) across the bulb. [2]
- (ii) State clearly how you would obtain the readings needed to carry out the investigation. [2]
- (iii) How would you determine the resistance of the bulb? [2]

- (b) (i) If the bulb is 2.5v and takes the current of 0.25A at its working temperature, calculate the resistance of the bulb. [2]
- (ii) The resistance of the bulb when the filament is cold is 5Ω . Sketch the graph you would expect to obtain if you plot resistance against current for the bulb. [2]

Total: [10]

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