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SC5123/B WASSCE 2020 PHYSICS 3 Practical ALTERNATIVE B 2¾ hours	B
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Name

Index Number

THE WEST AFRICAN EXAMINATIONS COUNCIL
West African Senior School Certificate Examination
for School Candidates

SC 2020

PHYSICS 3
PRACTICAL
ALTERNATIVE B
[50 marks]

2¾ hours

Write your name and index number in the spaces provided above.

Answer two questions only.

*You are allowed an additional 15 minutes before the start of the examination to read this question paper. During this time, you must **not** touch the apparatus.*

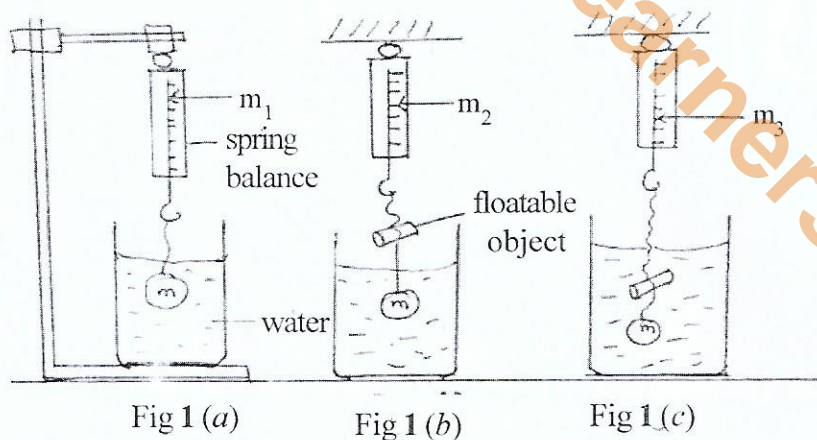
*You are required to record your observations as soon as they are made. The observations and any mathematical working and answers to questions should be written in your answer booklet; scrap paper must **not** be used. Attach your graphs to your answer booklet.*

*You are **not** expected to copy out your work again neatly. The record may be kept in pencil provided it can be read clearly. If any piece of the apparatus provided has a label with a letter on it, this letter **must** be recorded in your answer booklet in order that the Examiner may identify which set of apparatus you used.*

***Neither** a detailed description of the apparatus **nor** a full account of the method of carrying out the experiments is required. You should however, note any special precautions you have taken clearly.*

*You may use diagrams or otherwise to express **exactly** what the readings you have recorded mean and how they were obtained.*

1. (a)



You are provided with a retort stand, spring balance, thread, set of masses, beaker, water floatable object and other necessary apparatus.

Carry out the following instructions using the diagram above as a guide.

- (i) Fill the beaker with water to about two thirds its volume.
- (ii) Attach the mass $m = 50$ g to the spring balance and immerse it in the water as shown in Fig 1(a).
- (iii) Read and record m_1 , the reading on the spring balance.
- (iv) Tie m to the floatable object, hang the bodies on the suspended spring balance such that m is completely immersed in the water as shown in Fig 1(b).
- (v) Read and record m_2 , the reading on the spring balance.
- (vi) Evaluate $(m_2 - m_1)$.
- (vii) Immerse both m and the floating object in the water as shown in Fig 1(c).
- (viii) Read and record m_3 , the reading on the spring balance.
- (ix) Evaluate $(m_2 - m_3)$.
- (x) Repeat the procedure for $m = 70$ g, 90 g, 110 g and 130 g. In each case, determine m_1 , m_2 and m_3 and also evaluate $(m_2 - m_1)$ and $(m_2 - m_3)$.
- (xi) Tabulate the results.
- (xii) Plot a graph with $(m_2 - m_1)$ on the vertical axis and $(m_2 - m_3)$ on the horizontal axis.
- (xiii) Determine the slope, s , of the graph.
- (xiv) State two precautions taken to obtain accurate results.

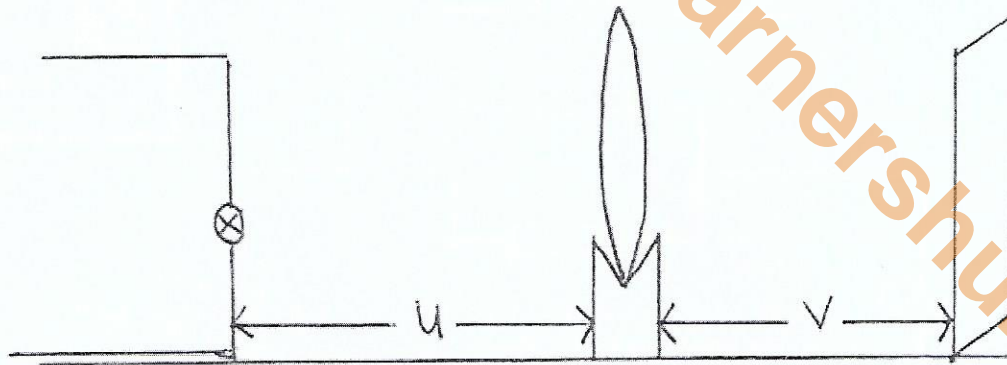
[21 marks]

- (b) (i) State Archimedes' principle. [2 marks]
- (ii) A body has a mass 60 g when immersed in water, 61 g when immersed in water with a floatable object attached to it. If the total mass of the floatable object and the body when both of them are immersed in water is 59 g, determine the relative density of the floatable object.

[2 marks]

2. (a)

3



You are provided with a ray box, metre rule, converging lens, screen and other necessary apparatus.

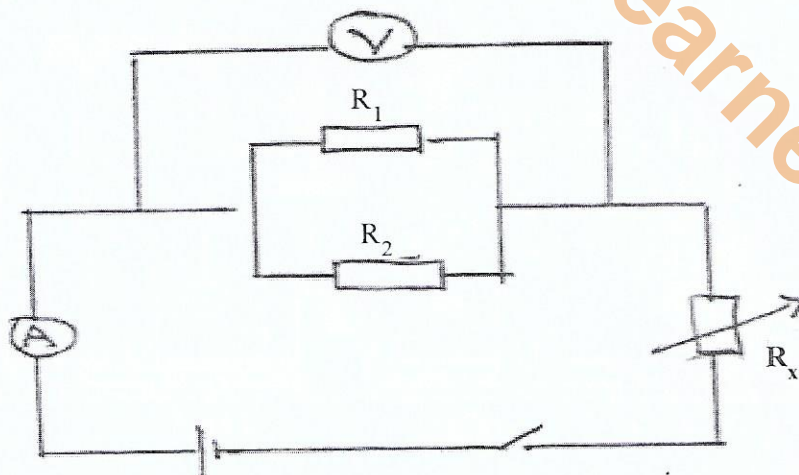
Using the diagram above as a guide, carry out the following instructions.

- (i) Determine and record the focal length f_o of the lens.
- (ii) Set the distance between the illuminated ray box and the lens at $u = 25.0$ cm.
- (iii) Adjust the position of the screen until a sharp image of the cross wire is formed on it.
- (iv) Measure and record the distance v between the screen and the lens.
- (v) Evaluate the magnification, m , of the image on the screen.
- (vi) Evaluate m^{-1} .
- (vii) Repeat the procedure for **four** other values of $u = 30.0$ cm, 35.0 cm, 40.0 cm and 45.0 cm and determine v , m and m^{-1} in **each** case.
- (viii) Tabulate the results.
- (ix) Plot a graph with m^{-1} on the vertical axis and u on the horizontal axis, starting **both** axes from the origin $(0, 0)$.
- (x) Determine the slope, s , of the graph.
- (xi) Determine the intercept, c , on the vertical axis.
- (xii) State **two** precautions taken to ensure accurate results.

[21 marks]

- (b) (i) In a projection lantern, at what distance from the lens should the slide be placed to obtain an erect, large image on the screen? [1 mark]
- (ii) An object has its erect image formed 30 cm from a converging lens. If the focal length of the lens is 15 cm, how many times is the image bigger than the object? [3 marks]

3. (a)



You are provided with an ammeter, a voltmeter, two standard resistors $R_1 = 2\ \Omega$ and $R_2 = 2\ \Omega$, key, a battery of e.m.f. E , a resistance box R_x and other necessary materials.

- (i) Measure and record the e.m.f. E , of the battery.
- (ii) Select $R = 1\ \Omega$ from R_x .
- (iii) Close the key, read and record the current, I , on the ammeter and its corresponding voltage, V , on the voltmeter.
- (iv) Repeat the procedure for **four** other values of $R = 2\ \Omega, 3\ \Omega, 4\ \Omega$ and $5\ \Omega$. In **each** case, read and record the corresponding I and V .
- (v) Tabulate the results.
- (vi) Plot a graph with V on the vertical axis and I on the horizontal axis.
- (vii) Determine the slope, s , of the graph.
- (viii) State **two** precautions taken to ensure accurate results.

[21 marks]

- (b) (i) State the **four** factors that affect the resistance of a wire.

[2 marks]

- (ii) A $2\ \Omega$ resistor is connected in parallel with a resistor of resistance R . If the p.d across R is $1.2\ \text{V}$ and the same amount of current of $0.6\ \text{A}$ flows through R and the $2\ \Omega$ resistor, determine the value of R .

[2 marks]

END OF PAPER