URANGA PHYSICS EXAMINATION

Kenya Certificate of Secondary Education

232/2 PHYSICS **Paper 2**

(Theory)

4TH EDITION (AUG/SEP. 2021) – TIME 2 Hours

Name:……..……School: ……..……

Class ……..Adm No……. …… Index Number……

Candidate's Signature…… Date: ……

Instructions to candidates

a) Write your **name, index number, class** and **school** in the spaces provided above.
b) **Sign** and **Write** the date of Examination in the spaces provided above.
c) This paper consists of **two** sections; **A** and **B.**
d) Answer **all** the questions in section **A** and **B** in the spaces provided.
e) All working **must** be clearly shown.
f) **Silent non-programmable** electronic calculators may be used.
g) Candidates should answer the questions in **English**.

FOR EXAMINERS USE ONLY

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-13	25	
B	14	11	
	15	12	
	16	11	
	17	11	
	18	10	
TOTAL SCORE		**80**	

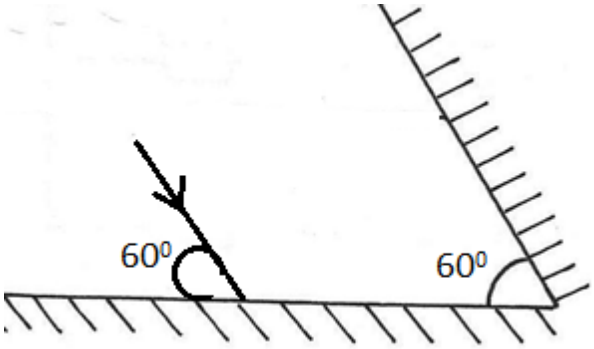
This paper consists of 12 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

Answer all questions in this section

1. **Figure 1** shows two mirrors inclined at an angle of 60^0 to each other. A ray of light is shown incident on one of the mirrors.

Figure 1



Sketch on the diagram, the path of the ray until it leaves the two mirrors. (1 mark)

2. One of the safe ways of storing magnets is by use of **keepers**. Explain how the keepers safeguard the magnets. (2 marks)

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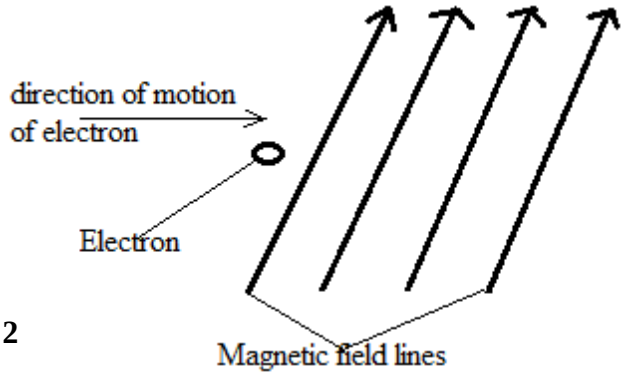
3.

a) **Figure 2** below shows an electron moving in a magnetic field in the direction shown. Sketch the path followed by the electron as it moves in the magnetic field. (1 mark)

Figure 2



b) State one way of increasing the strength of an electromagnet. (1mark)

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4. Give one similarity and one difference between virtual images formed by plane mirrors and concave mirrors. (2 marks)

Similarity

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Difference

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5. **Figure 3** below shows a displacement – time graph of a progressive wave

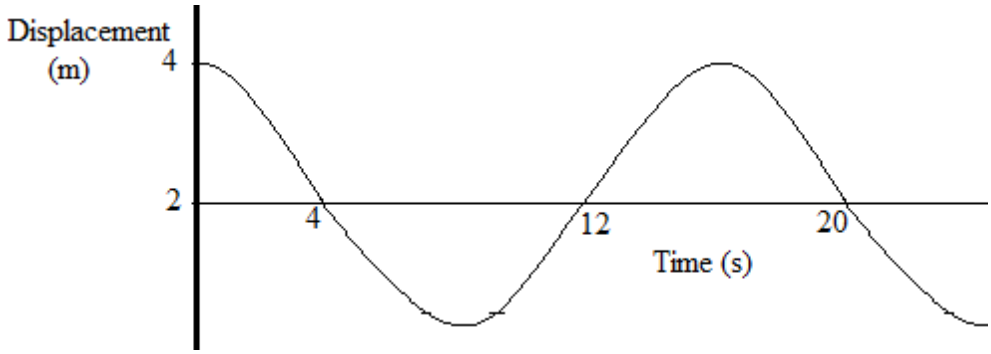

Figure 3

State its amplitude …… (1 mark)

6. Explain how a simple cell works. (3 marks)

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7. In a dark room, a small hole on the roof forms a larger image on the floor. State the property of light illustrated by this observation. (1 mark)

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8. State **two** conditions necessary for total internal reflection to occur. (2 marks)

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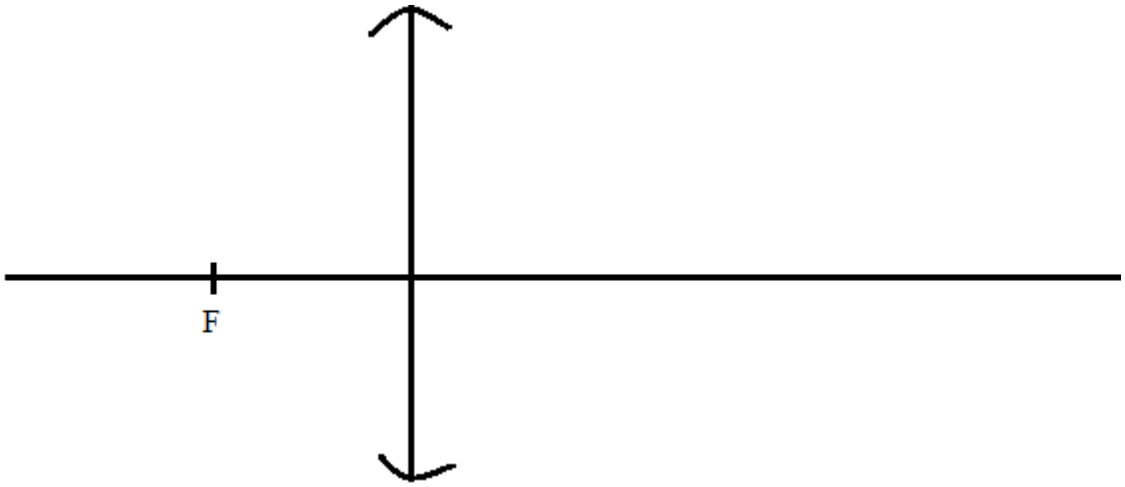
9. The figure below shows a converging lens whose focal point F is marked.



An object is placed in front of the lens such that a real magnified image is formed by the lens. Sketch on the same diagram rays to represent this. (3 marks)

10. A leaf electroscope A is charged and placed on the bench. Another uncharged leaf electroscope B is placed on the same bench and moved close to A until the caps touch. State and explain what is observed on the leaves of A and B. (2 marks)

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11. An electric heater rated 240V, 3000W is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not. (2 marks)

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12. **Figure 4** shows two parallel plates of capacitors connected to a battery. Plate A is displaced slightly upwards.

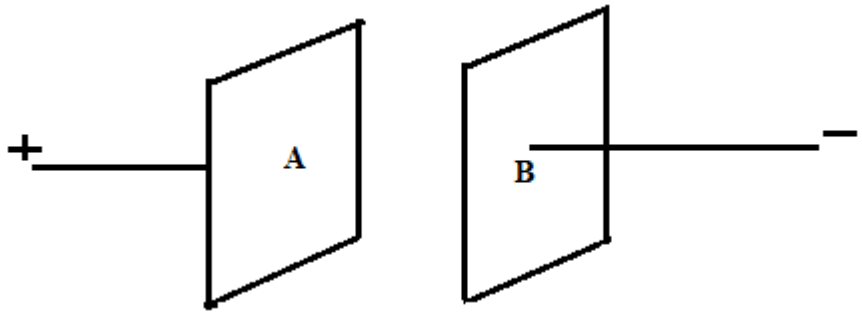

Figure 4

State with reason the effect of this displacement on the capacitance. (2 marks)

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13. **Figure 5** below shows a plotting compass placed between two strong magnets, the tip of the arrow represents the north pole of the compass;

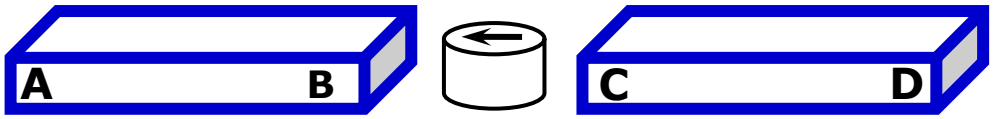

Figure 5

i. What is the polarity of end C of the magnet? (1 mark)

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ii. Draw the set-up of the magnets as seen from **figure 5** above and sketch the magnetic field lines in the region between B and C. (1 mark)

SECTION B (55 MARKS)

Answer all questions in this section

14.

(a) State three factors that affect the capacitance of a parallel plate capacitor. (3 marks)

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(b) **Figure 6** below shows the circuit used to charge a capacitor C.

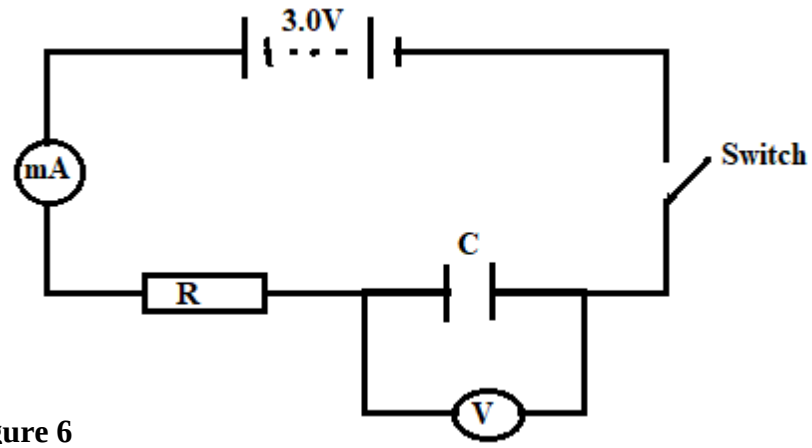

Figure 6

State what would be observed on the following:

(i) The milliammeter (1 mark)

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(ii) The voltmeter (1 mark)

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(iii)Explain how the capacitor gets charged. (3 marks)

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(iv) State the purpose of the resistor R. (1 mark)

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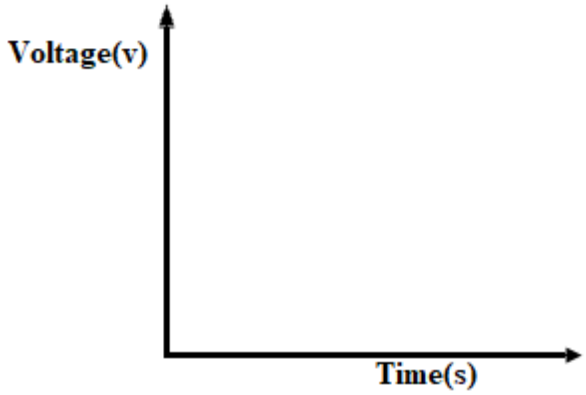
(v) On the axes provided, sketch the graph of voltage, **V** against time, **t.** (2 marks)



15.

(a) Draw a ray diagram to illustrate the critical angle in the interface between glass and air, given that glass is optically denser. (3 marks)

(b) **Figure 7** below shows the path a ray of light in **medium 1** and **medium 2.**

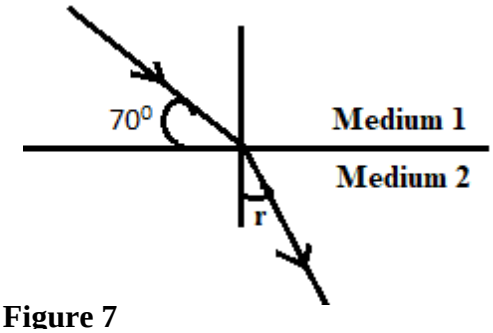


Figure 7

Given that the refractive indices of **medium 1** and **medium 2** are **2.42** and **1.5** respectively, determine the angle of refraction **r** in **medium 2.** (4 marks)

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(c) A water wave of wavelength 1.8 cm is incident on a boundary of shallow water at right angles. If the wavelength in the shallow end is 1.44 cm, determine the refractive index of water for a wave moving from the deep to the shallow. (3 marks)

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(d) Give one reason why prism periscopes are preferred to mirror periscopes. (1 mark)

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(e) State one application of total internal reflection in medicine. (1 mark)

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16.

a) State Ohm's law. (1 mark)

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b) Use **figure 8** below to answer the question that follows.

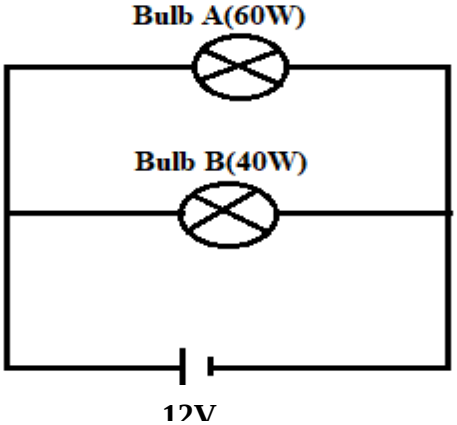

Figure 8

Compare the brightness of the two bulbs. (2 marks)

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c) **Figure 9** below shows a cell in series with a **3Ω** resistor and a switch. A high resistance voltmeter is connected across the cell.

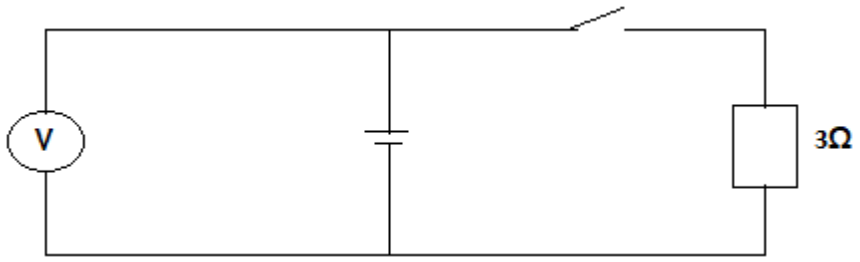

Figure 9

The voltmeter reads 1.5V with the switch open and 1.2 with the switch closed.

(i) State the electromotive force of the cell. (1 mark)

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(ii) Determine the current through the **3Ω** resistor when the switch is closed.

(2 marks)

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(iii) Determine the internal resistance of the cell. (2 marks)

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d) Using Ohm's law, show that the effective resistance of three resistors $\mathbf{R_1}$, $\mathbf{R_2}$ and $\mathbf{R_3}$ connected in series is given by the expression $\mathbf{R_T = R_1 + R_2 + R_3}$ (3 marks)

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17.

(a)

i. **Figure 10** below shows an image formed by a curved mirror. Use ray diagrams to locate the position of the object. (3 marks)

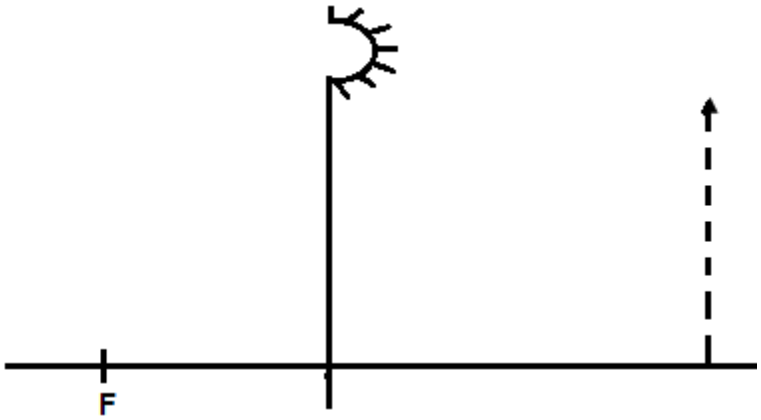

Figure 10

ii. State one application of the mirror above. (1 mark)

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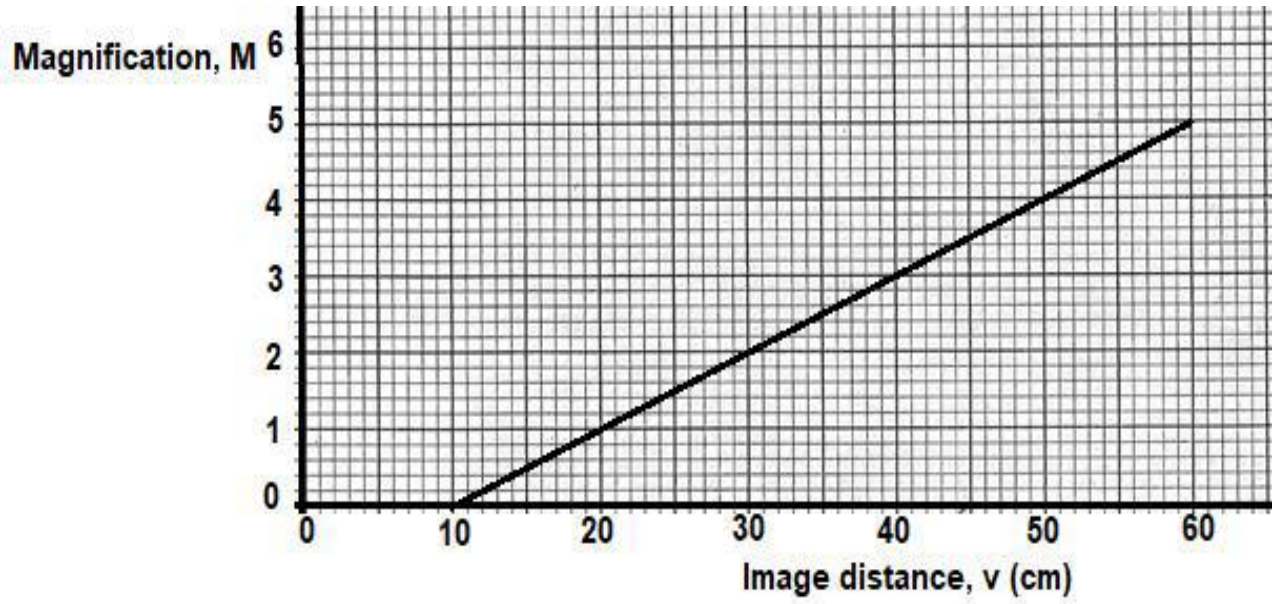
(b) The graph in the figure below shows the variation of **magnification, M** with **image distance**, **v** for a concave mirror.



From the graph determine:

(i) The object distance when the image distance is 45cm. (3 marks)

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(ii) The focal length of the mirror. (4 marks)

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18.

(a) State one factor that affects the speed of sound in solids. (1 mark)

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(b) A search boat uses a signal of 6.0 x10^4 Hz to detect a sunken ship directly below. Two reflected signals are received; one after 0.1 seconds from the sunken and the other after 0.14 seconds from the sea bed. If the speed of sound in water is 1400m/s, determine:-

(i) how high the sunken ship is from the sea bed. (2 marks)

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(ii) the depth of the sunken ship below the boat. (2 marks)

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(c) F**igure 11** below shows light rays from two coherent sources **S1** and **S2** falling on a screen. Dark and bright fringes are observed between A and B.

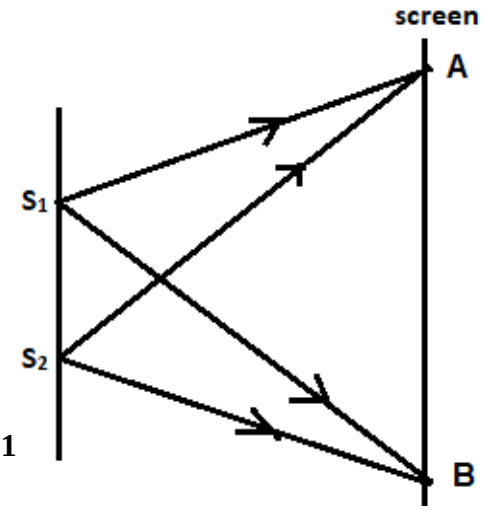

Figure 11

State:

(i) how bright fringes are formed. (1 mark)

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(ii) How dark fringes are formed. (1 mark)

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(iii) What is observed when light of a higher frequency is used. (1 mark)

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(d) State two changes that occur when water waves move from a shallow region to a deep region. (2 marks)

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