

Name Index No.

232/2 Adm. No. Candidate's Signature.....

PHYSICS

Paper 2

(THEORY)

December, 2021

2 hours

SAMIA SUB-COUNTY JOINT EXAMINATIONS

Kenya Certificate of Secondary Education (KCSE)

232/2

PHYSICS

PAPER 2

Time:2 Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name, index number, admission number and sign in the spaces provided above.
2. This paper consists of **two** sections **A** and **B**.
3. Answer **all** the questions in sections **A** and **B** in the spaces provided.
4. All workings **must** be clearly shown where applicable.
5. All numerical answers must be expressed in decimal form
6. Non-programmable silent electronic calculators and KNEC Mathematical tables may be used where applicable.

For Examiner's use only

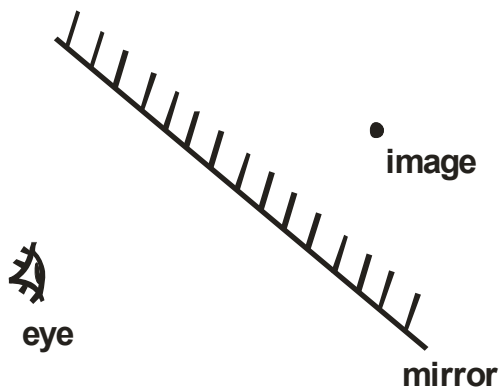
Section	Questions	Maximum Score	Candidate's Score
A	1 – 12	25	
B	13	12	
	14	11	
	15	13	
	16	12	
	17	07	
TOTAL		80	

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

SECTION A (25 MARKS)

Answer ALL the question in this section in the spaces provided

1. The figure below represents a point image formed by a mirror.



Sketch rays to show how the image is formed and seen by the eye. (2 mks)

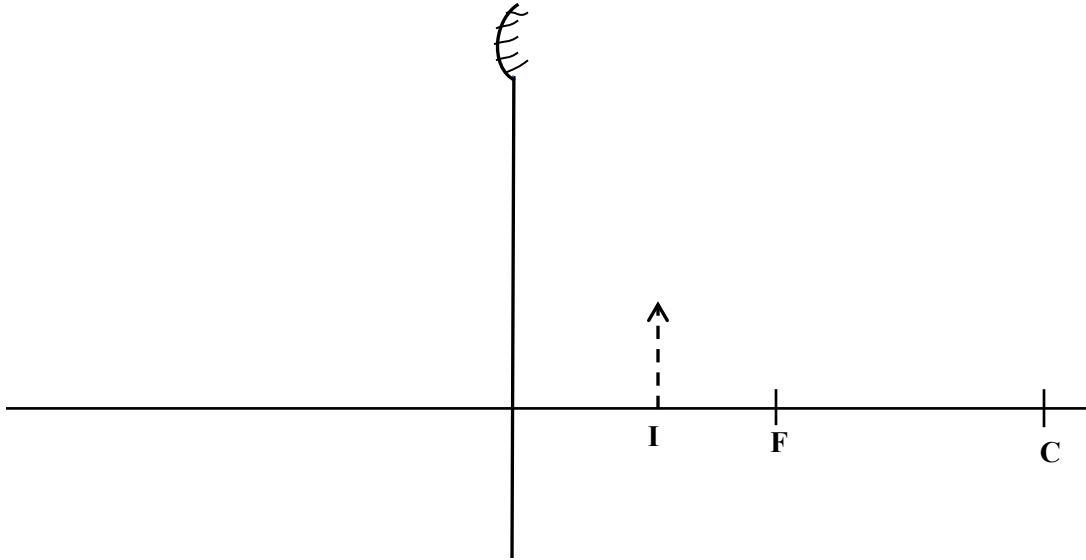
2. State any **two** ways of increasing the size of an image formed by a pinhole camera. (2 mks)

3. A leaf electroscope A is charged and placed on a bench. Another uncharged leaf electroscope B is placed on the same bench and moved close to A until the caps touch each other. **State** and **explain** what is likely to be observed on the leaves of A and B. (2 mks)

4. State **one** way in which polarization reduces the current produced by a simple cell. (1 mk)

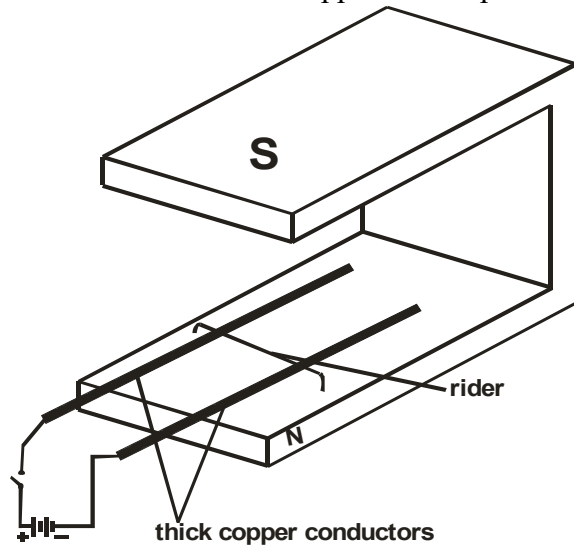
5. Using the domain theory of magnetism, explain why a bar magnet may lose its magnetism when hammered. (1 mk)

6. The figure below shows an image, I formed by an object placed in front of a convex mirror.



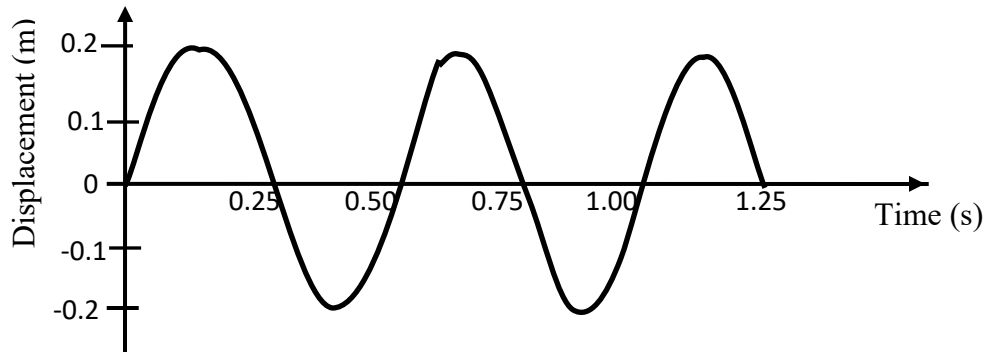
On the same diagram, draw appropriate rays and locate the object. (2 mks)

7. The figure below shows two parallel thick copper conductors connected to a d.c power supply. A rider made from a thin copper wire is placed on the conductors as shown.



State and explain what is observed on the rider when the switch is closed. (2 mks)

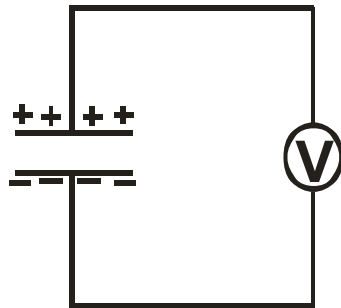
8. The figure below shows how the displacement varies with time for a certain wave.



Determine the frequency of the wave.

(2 mks)

9. The figure below shows a voltmeter connected across two charged parallel plates.

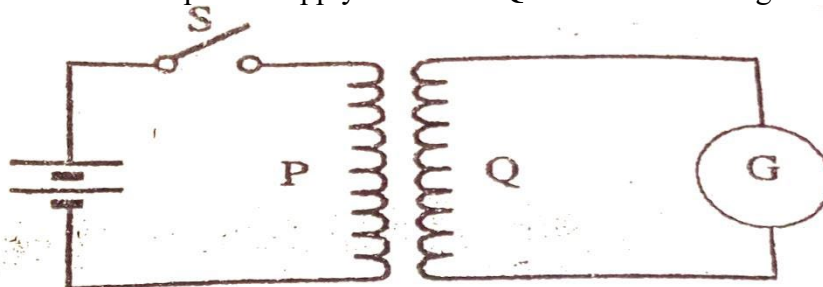


When a thin sheet of mica is inserted between the plates, the reading of the voltmeter is observed to reduce. Explain this observation.

(2 mks)

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

11. The figure below shows two identical copper coils **P** and **Q** placed close to each other. Coil **P** is connected to a d.c power supply while coil **Q** is connected to a galvanometer, **G**.



- a) *State* and *explain* what would be observed on the galvanometer immediately the switch **S** is closed. (2 mks)
- b) State the difference that would be noted in the observation made in (a) if the number of turns in coil **Q** were halved. (1 mk)
12. The activity of iodine was found to be 1 024 counts per minute. After 80 days, the activity became 32 counts per minute. Determine the half-life of iodine. (3 mks)

SECTION B (55 MARKS)

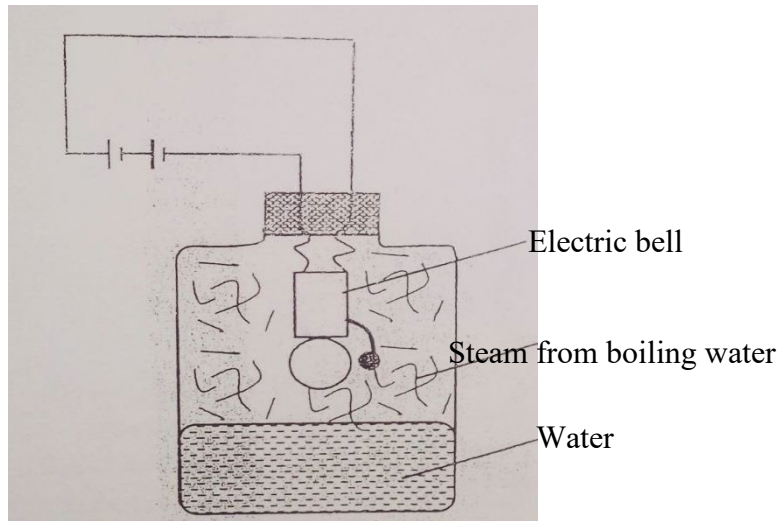
Answer ALL the questions in this section in the spaces provided

13. a) State one difference between light and sound waves (1 mk)

b) In determining the depth of a sea, an echo sounder produces **ultrasonic sound**. Give **two** reasons why this sound is preferred. (2mks)

c) Explain how an increase in temperature affects the velocity of sound in air. (2 mks)

d) The figure below shows a set up made by a Form 2 student to study an aspect of a wave.



(i) State what happens to the sound from the bell as the bottle and its contents are cooled to 0°C (1 mk)

(ii) Explain the observation in (i) above (2 mks)

e) A boy stands some distance from a high wall and claps his hands. He claps again each time he hears an echo.

(i) What *two* measurements would need to be made in order to determine the speed of sound? (2mks)

(ii) The boy's friend notes that it takes 10 s to make 11 claps. Determine how far the boy is from the wall, given that the speed of sound in air is 330 m/s. (2 mks)

14. a) State Ohm's law.

(1 mk)

b) With an aid of a diagram, describe an experiment to verify Ohm's law for a wire. (4 mks)

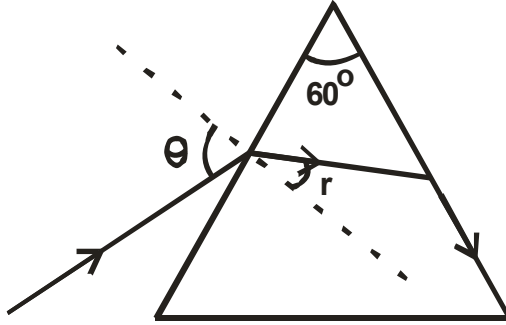
c) Two resistors, R_1 and R_2 are connected in series to a 10 V battery of negligible internal resistance. The current that flows in the set-up is 0.5 A. When R_1 is connected alone to the battery, the current that flows is 0.8 A. Calculate:

(i) The value of R_2 (3 mks)

(ii) The current that flows when R_1 and R_2 are connected in parallel to the same battery (3 mks)

15. a) State **two** conditions necessary for total internal reflection to occur. (2 mks)

b) The figure below shows the part of a ray of yellow light through a glass prism. The speed of yellow light in the prism is 1.88×10^8 m/s.

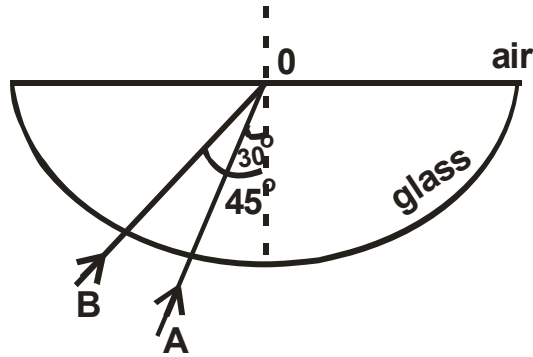


i) Determine the refractive index of the prism material (Speed of light in air, $C = 3.0 \times 10^8$ m/s) (2 mks)

ii) Show on the figure the critical angle C , and determine its value. (3 mks)

iii) Given that $r = 21.2^\circ$, determine angle θ . (2 mks)

c) The figure shows two rays A and B entering a semi-circular glass block which has a critical angle of 42° . The rays are incident at point O.



- (i) Complete the path of the two rays from point O. Label A^1 and B^1 the corresponding rays. (2 mks)
- (ii) Calculate the refractive index of the semicircular glass block. (2 mks)

16. a) (i) State two properties of X — rays (2mks)

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(ii) In a certain X-ray tube, electrons are accelerated by a potential difference of 10KV. Assuming that 5% of the energy is converted into X — rays, determine the frequency of the X-rays produced. ($h = 6.62 \times 10^{-34} \text{Js}$, $e = 1.6 \times 10^{-19} \text{C}$) (3mks)

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b) Describe how a P-type semiconductor is formed (3mks)

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c) Give one experimental observation which shows that each of the following is not an electromagnetic wave: (2 mks)

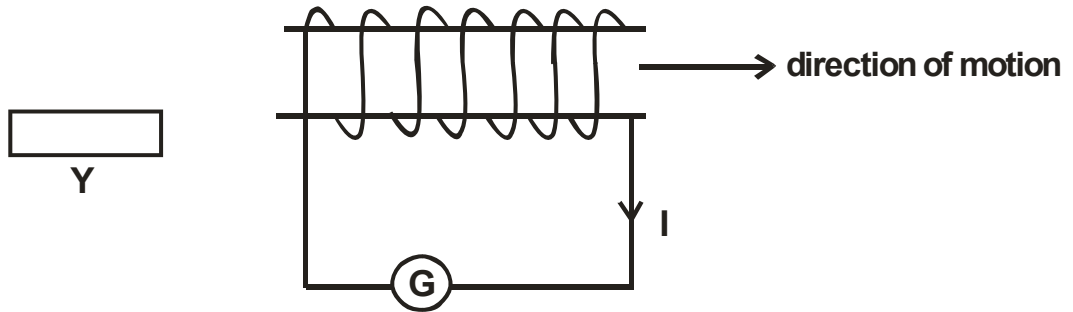
(i) Sound waves

(ii) Cathode rays

d) A source of radiation gives photons of energy 5.9×10^{-19} J. Calculate the wavelength of the photons (Planck's constant, $h = 6.23 \times 10^{-34}$ Js and the speed of light, $c = 3.0 \times 10^8$ m/s) (2 mks)

17.a) State Lenz's law of electromagnetic induction. (1 mk)

b) A coil is moved quickly away from the end of a stationary magnet Y and current noted to flow as shown below.



- (i) Indicate on the same figure, the polarity at the end of the coil near the magnet Y. (1 mk)
- (ii) State the essential condition for emf to be induced in the coil above. (1 mk)

- c) A transformer has 800 turns in the primary winding and 40 turns in the secondary winding. The current in the primary is 0.2 A when connected to an alternating e.m.f of 240V. Find:
- (i) The secondary e.m.f. (2mks)

- (ii) The power in the secondary if the transformer is 80% sufficient. (2mks)