

  
**MASENO SCHOOL**  
Kenya Certificate of Secondary Education 2021

**PHYSICS- Paper 2**

**DEC. 2021                      - 2 hours**

**THE MASENO SCHOOL MOCK**

Name..... Admission No...../.....

**INSTRUCTIONS TO CANDIDATES**

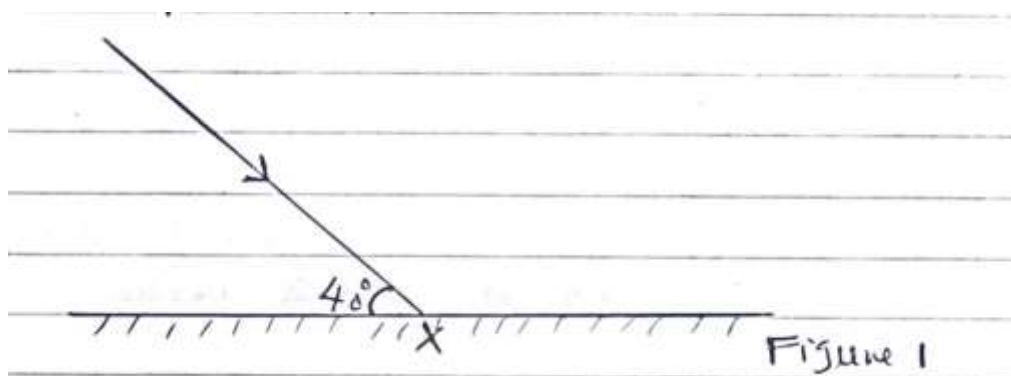
- a) Write your name and Admission No. in the spaces provided above.
- b) Sign and write the date of the examination in the space provided above
- c) This paper consists of Two sections; A and B
- d) Answer ALL the questions in Section A and B in the spaces provided.
- e) All working MUST be Clearly shown
- f) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used for calculations

**FOR EXAMINER'S USE ONLY**

| Section | Question | Maximum score | Candidates score |
|---------|----------|---------------|------------------|
| A       | 1-12     | 25            |                  |
| B       | 13       | 7             |                  |
|         | 14       | 7             |                  |
|         | 15       | 4             |                  |
|         | 16       | 7             |                  |
|         | 17       | 6             |                  |
|         | 18       | 10            |                  |
|         | 19       | 6             |                  |
|         | 20       | 8             |                  |
|         |          |               |                  |
| TOTAL   |          | 80            |                  |

### SECTION A (25 MKS)

1. a) Figure 1 shows a ray of light incident on a plane mirror at point X.



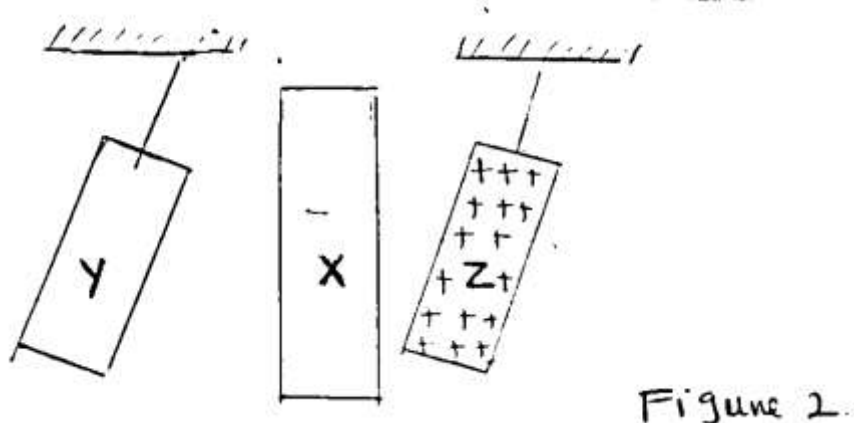
Complete the diagram indicating the angle of reflection.

(2mks)

b) State one characteristic of the image formed on plane mirror,

(1mk)

2. a) Figure 2 shows a stationary charged rod (X) placed between two freely suspended charged rods, Y and Z. The charge on rod Z is indicated.



Identify the type of charge on rods X and Y.

(1mk)

b) State one use of a charged gold leaf electroscope.

(1mk)

3. State the reason why current produced by a simple primary cell decreases rapidly when the cell is in use.

(1mk)

4. a) State the reason why a freely suspended magnet always settles facing a particular direction.

(1mk)

b) Figure 3 shows poles of two bar magnets placed close to one another.

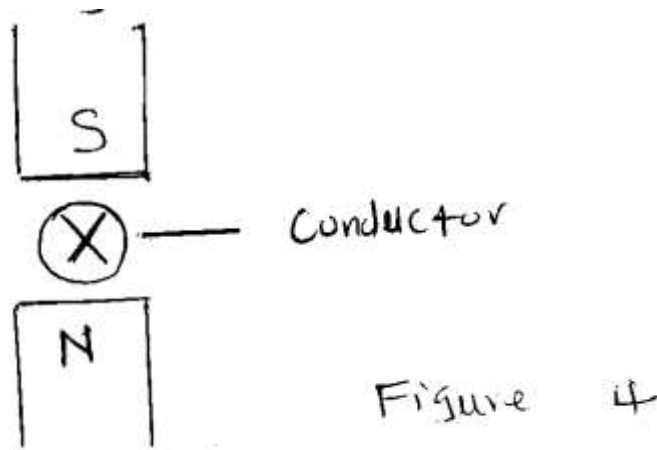


Figure 3

Sketch the magnetic field pattern in the space between the poles.

(1mk)

5. Figure 4 shows the cross section of a conductor carrying some current and held between magnet field.



Indicate using an arrow on the diagram the direction the conductor moves when released. (1mk)

6. a) What is meant by the term echo? (1mk)

b) Compare the speed of sound in air and in steel. (1mk)

c) State one difference between stationary wave and progressive wave. (1mk)

7. a) State one difference sound waves and radio waves. (1mk)

b) Figure 5 shows how displacement varies with distance of a certain wave. (1mk)

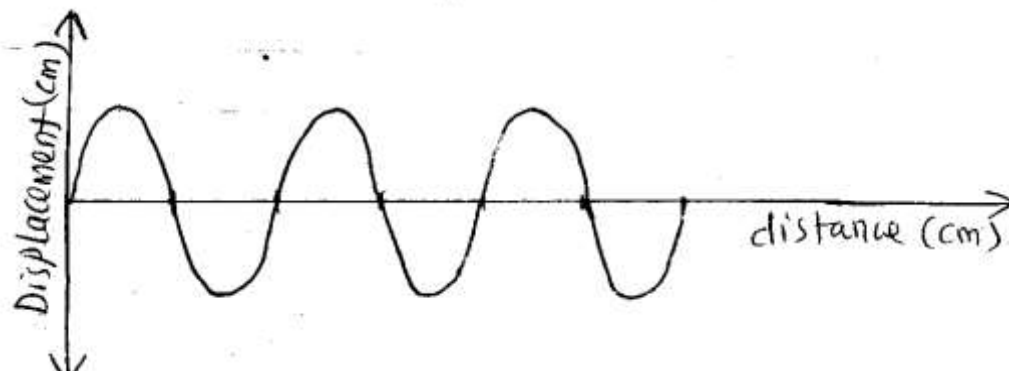
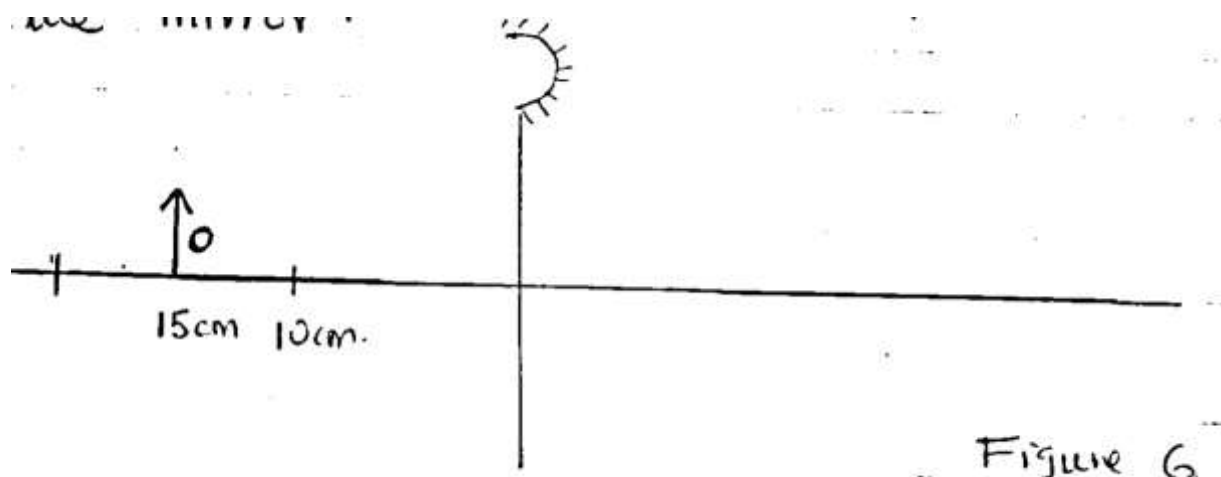


Figure 5

On the same diagram, indicate the wavelength ( $\lambda$ ) of the wave using the symbol. (1mk)

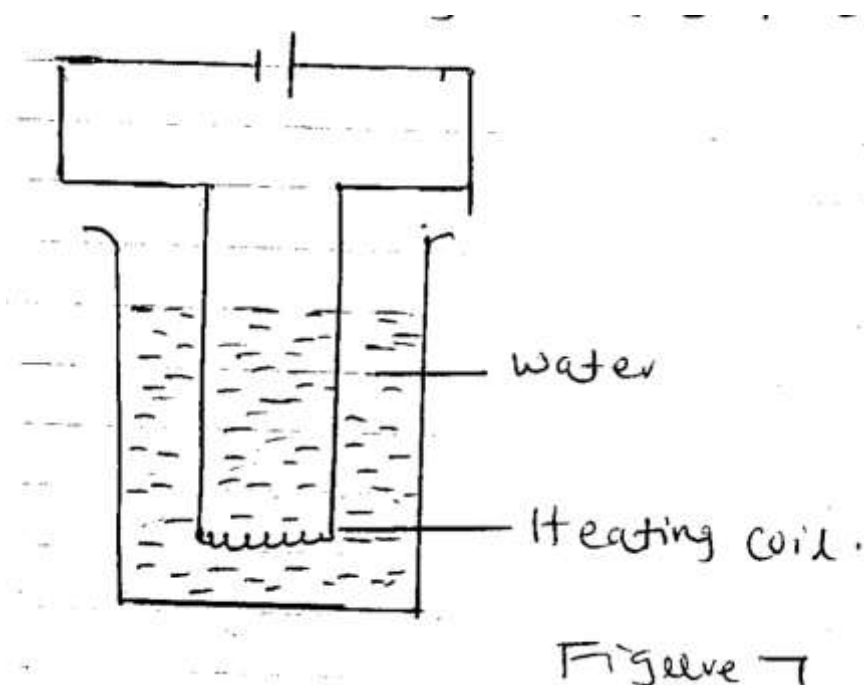
8. a) State one characteristic of images formed by a concave mirror. (1mk)

b) Figure 6 shows a concave mirror of focal length 10cm and an object O, placed 15cm in front of the mirror.



Using a ray diagram, complete the diagram to locate the image, I, formed. (2mks)

9. Figure 7 shows an immersion heater used to heat some water initially at  $25^{\circ}\text{C}$  to boiling point.



State two factors that determine the time taken for the water to boil. (2mks)

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10. A radioactive substance initially has a mass of 0.4g and decays to 0.05g in 75 minutes. Determine the half life of the substance. (2mks)

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11. State one difference between X-rays and infrared waves. (1mk)

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12. Figure 8 (a) and (b) shows P – n junctions, each connected to a cell and a lamp.

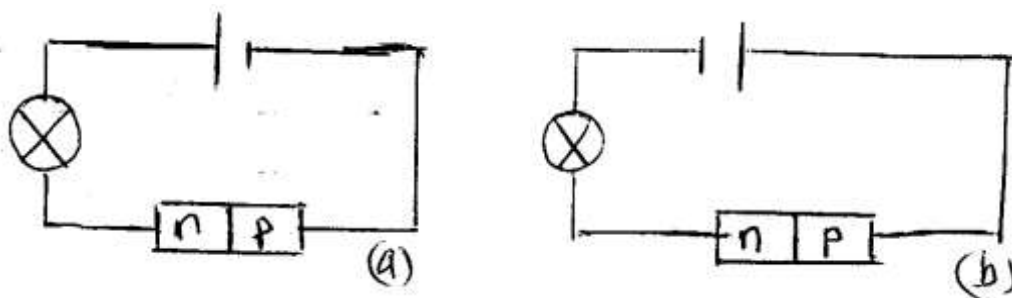


Figure 8

It is observed that the bulb in (a) does not light while the bulb in (b) lights.

Explain the reason for these observations.

(2mks)

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### Section B (55 Marks)

13. a) Define the term critical angle of a refracting media. (1mk)

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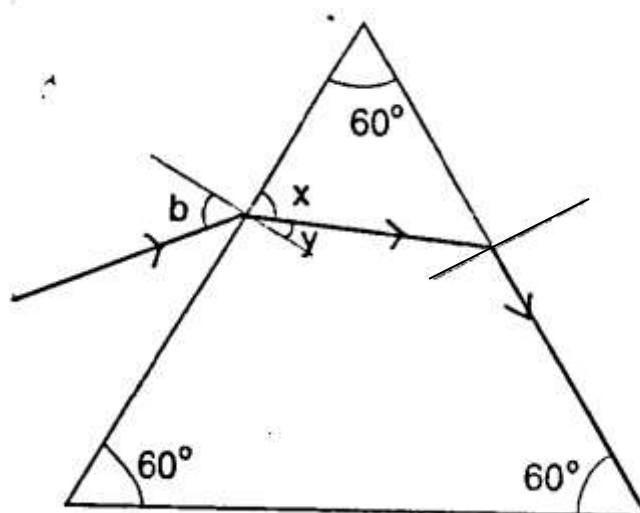
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- b) One of the conditions necessary for total internal reflection to occur is that the critical angle must be exceeded. State the other condition. (1mk)

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- c) The figure below shows a ray of light travelling from air and through a prism made of glass of refractive index 1.7



- i) On the diagram show the critical angle.

(1mk)

ii) Determine the  
I Critical angle

(2mks)

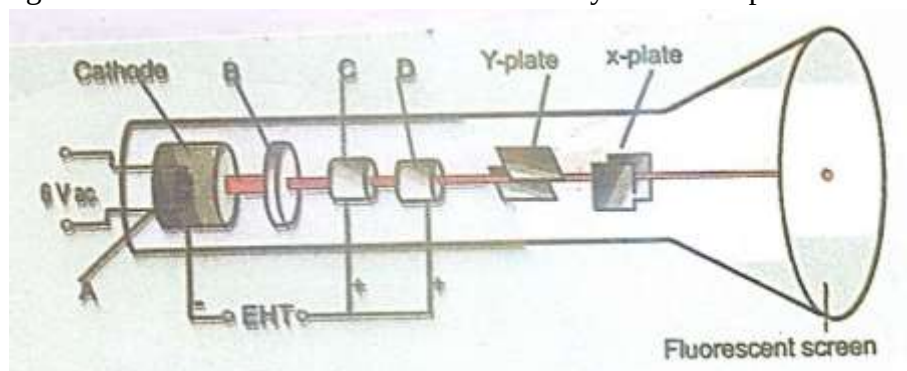
II. Angle x and y

(2mks)

14. a) Define the term “**Thermionic emission**”

(1mk)

b) The figure below shows the sketch of a cathode ray Oscilloscope.



i) Label the parts marked A and C.

(2mks)

A -

C -

ii) State the functions of the parts labeled B and D.

(2mks)

B -

D -

iii) Explain briefly how the C.R.T works.

(2mks)

15. When a radiation of wavelength  $1.8 \times 10^{-9} \text{ m}$  falls on a photo emissive surface, the photoelectrons can be stopped when a positive terminal of 400V is applied on the surface.

Given that the electronic charge =  $1.6 \times 10^{-19} \text{ C}$ , mass of the electron =  $9.1 \times 10^{-31} \text{ kg}$ ,

Planck's constant =  $6.62 \times 10^{-34} \text{ Js}$ ,  $C = 3.0 \times 10^8 \text{ m/s}$ , calculate the;

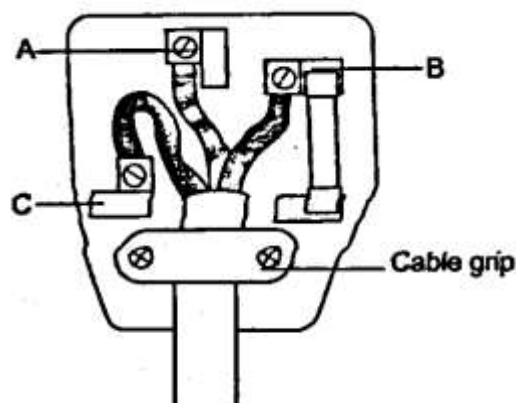
i) the work function of the surface.

(2mks)

ii) the threshold frequency.

(2mks)

16. The figure below shows a 3- pin plug with the wires connected.



- a) i) Identify the pins A, B and C and give the colour code of each. (3mks)

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- ii) State the pin to which a switch should be connected to. (1mk)

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- b) The table below shows appliances connected to the power supply system in a house. Their power rating and duration of use per day is shown.

| Appliance   | Rating (Watts) | Number | Duration/day (hours) |
|-------------|----------------|--------|----------------------|
| Light bulbs | 18             | 10     | 4                    |
| Radio       | 20             | 4      | 12                   |
| TV          | 120            | 1      | 6                    |
| Heater      | 1300           | 1      | 1                    |

- Given that the cost of a KWh of power is Ksh. 22.19, calculate the cost of power for the house for 30 days. (3mks)

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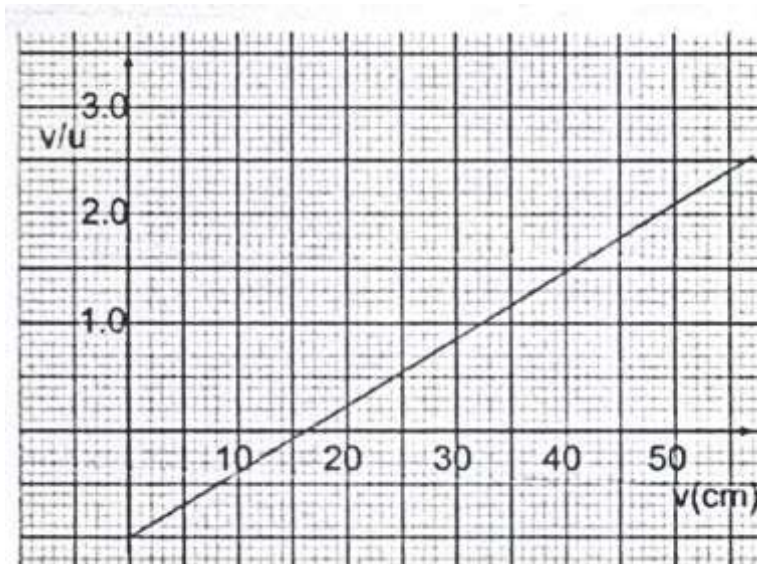
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17. The figure below shows values of  $v/u$  plotted against  $v$ , for a convex lens, where  $v$  = image distance and  $u$  = object distance.



- a) What quantity is represented by the values  $v/u$  plotted on the vertical axis? (2mks)

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- b) Determine the slope  $S$  of the graph. (1mk)

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- c) Determine the x-intercept of the graph. (1mk)

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- d) Given that

$$\frac{v}{u} = \frac{v}{k} + c$$

Determine the values of

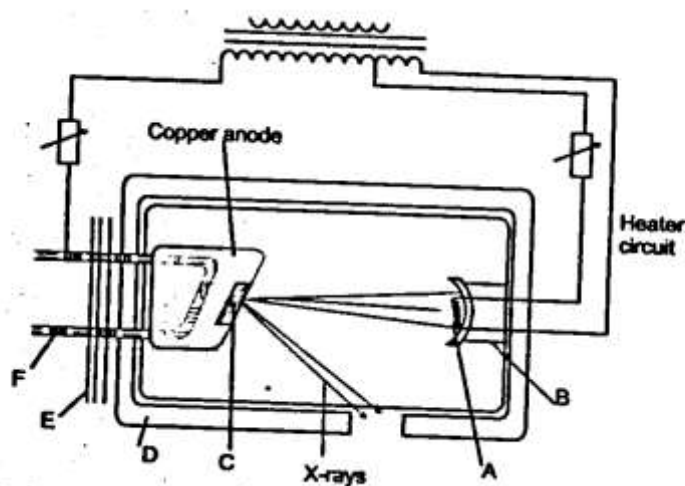
- i)  $k$  (1mk)

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ii) c (1mk)

18. a) Give one difference between x-rays and cathode rays. (1mk)

b) The figure below shows a sketch of an x-ray tube.



i) Label the parts A, B and C. (3mks)

A - \_\_\_\_\_

B - \_\_\_\_\_

C - \_\_\_\_\_

ii) State the purpose of E and F. (1mk)

iii) What physical characteristics are used to decide on the choice of C. (1mk)

b) i) State the function of the part labeled D. (1mk)

c) Electrons from a cathode ray gun are accelerated in an X-ray tube by a potential of 10kV and used to produce X-rays. Only 0.5% of the electron energy converts into X-rays.

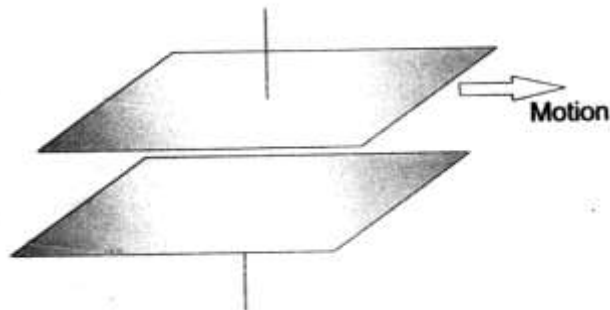
Determine the

i) Maximum energy contained in the cathode electrons. (1mk)

ii) Wavelength of the x-rays produced. (2mks)

(Take  $h = 6.62 \times 10^{-34} \text{Js}$ ,  $C = 3.0 \times 10^8 \text{ m/s}$ )

19. The figure below shows two capacitor plates held parallel to each other.



- a) State and explain what happens to the capacitance of the plates if the top plate is moved as shown.

(2mks)

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- b) Show that if three capacitors in parallel have capacitances  $C_1$ ,  $C_2$  and  $C_3$ , then the network capacitance is given as follows.

$$C_N = C_1 + C_2 + C_3$$

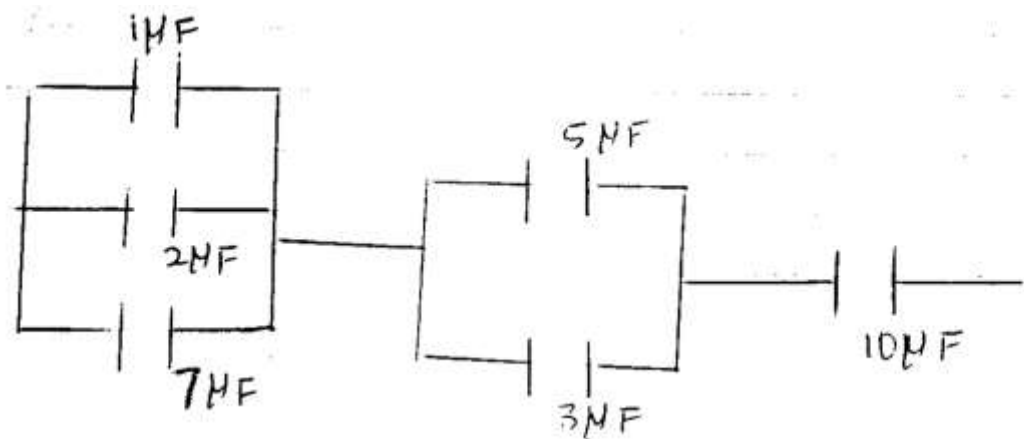
(2mks)

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- c) The figure below shows a network of capacitors.



Determine the network capacitance.

(2mks)

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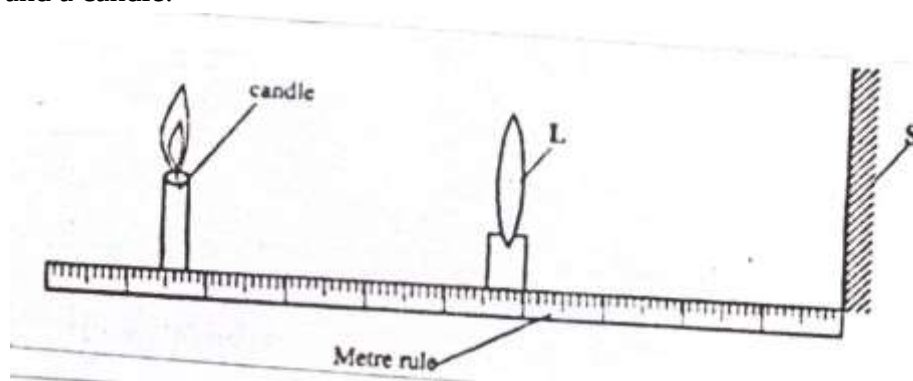


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20. a) The figure below shows an experimental set-up consisting of a mounted lens L, a screen S, a metre rule and a candle.



- i) Describe how the set-up may be used to determine the focal length,  $f$ , of the lens. (4mks)

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- ii) State the reason why the set-up would not work if the lens was replaced with a diverging lens.

(1mk)

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b) An object placed 15cm from a convex lens is magnified two times.

Determine the focal length of the lens.

(3mks)

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