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232/2
PHYSICS
PAPER 2
JULY 2019
(Theory)
2 Hours

FORM THREE-2019

Kenya Certificate of Secondary Education (K.C.S.E)

Instructions to Candidates

- *Write your name and index number in the spaces provided in the question paper.*
- *This Paper consists of TWO sections: Sections A and B.*
- *Answer **ALL QUESTIONS** in sections A and B in the spaces provided after each question*
- *All working must be clearly shown.*
- *Non programmable calculators and KNEC Mathematical tables may be used*

For Examiner's Use Only

SECTION	Question	Maximum Score	Candidate's Score
A	1 – 10	25	
B	11	13	
	12	09	
	13	10	
	14	11	
	15	12	
	Total Score	**80**	

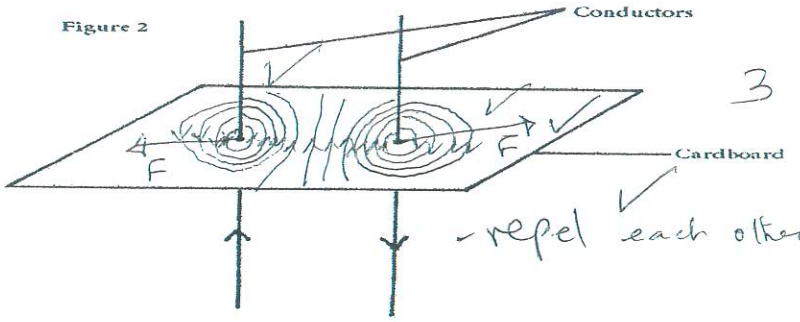
This paper consists of 11 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

SECTION A: (25 MARKS)

Answer all questions in this section in the spaces provided

1. Figure 1 below shows the conductors carrying current in opposite directions through a cardboard. Indicate on the cardboard the resulting magnetic field pattern and the effect of the current through them on the conductors. (3mks)

Figure 2



- repel each other

2. State why repulsion is the surest way of testing polarity of a magnet. (1mark)

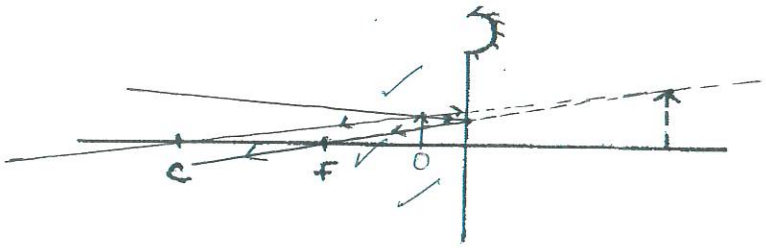
Repulsion only occurs between like poles of magnets.

3. State **two** major defects of a simple cell. (2mks)

Polarization

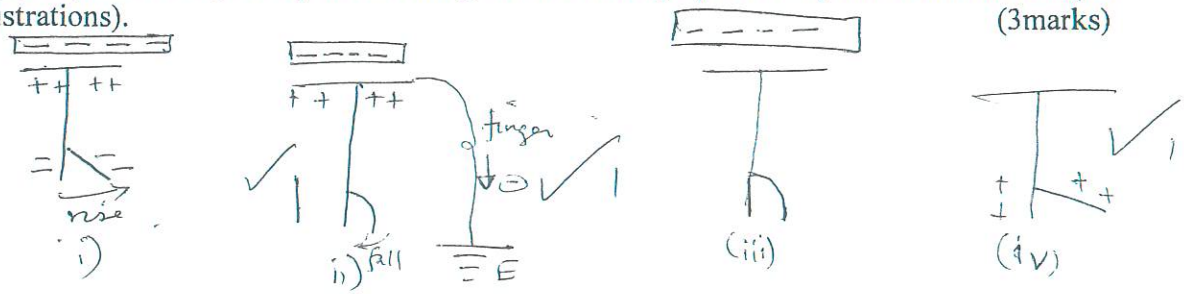
Local action.

4. **Figure 2** drawn to scale shows an image of an object placed in front of a concave mirror.

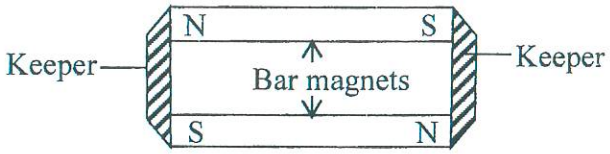


Complete the diagram to locate the position of the object and determine the magnification. (3marks)

5. (a) Explain clearly how you can charge an electroscope positive by induction method.(use illustrations). (3marks)



(b) **Figure 3** shows how magnets are stored in pairs with keepers at the ends.



Explain how this method of storing helps in retaining magnetism longer. (2 marks)

✓ The keepers acquire opposite polarities at poles such that the dipoles are attracted to align themselves forming complete closed loops. Hence retaining magnetism.

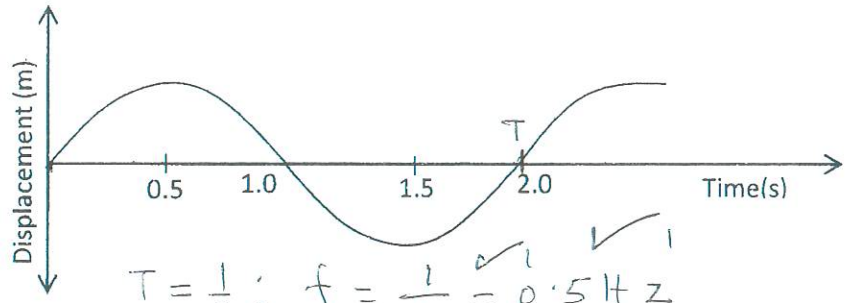
6. State why a convex mirror is better than a plane mirror when used as a driving mirror. (1 mark)

✓ They provide a wider field of view ✓
✓ They provide upright images irregardless of object distance. *

7. (a)Distinguish between a transverse and a longitudinal wave. (1 mark)

✓ A transverse wave is one whose particle vibration is perpendicular or 90° to the direction of wave travel. ✓ while
✓ Longitudinal wave – the particle vibration is parallel (//) to wave travel. ✓

(b) **Figure 4** shows a wave profile. Determine the frequency of the wave. (2 marks)



$T = \frac{1}{f}$; $f = \frac{1}{2} = 0.5\,Hz$ ✓1 ✓1

2

(c) State one reason why ultrasound is preferred to audible sound in echo-sounding. (1 mark)

✓ Ultra-Sound has a higher frequency above ✓1 20kHz of audible sound.

8. (a) State two ways through which a simple electric motor can be made to rotate faster.

✓ Increase in the strength of magnetic fields (strength of magnet). ✓1 (2marks)
✓ Increase in size of current. ✓1
✓

(b) Explain why magnetic field lines do not cross each other. (1mark)

✓ They repel each other sideways. ✓1

9. An electromagnet is made by winding insulated copper wire on an iron core. State ~~three~~ two changes that could be made to increase the strength of the electromagnet. (2 marks)

✓ Increase in the size of current. ✓1
✓ Increase in the number of the turns of the coil ✓1
✓ Using a stronger core. ✓1

09

10. A girl shouts and hears an echo after 0.6 seconds later from a cliff. Determine the distance between her and the cliff. (*Velocity of sound =330m/s)* (2marks)

$\frac{2d}{t} = v$

$\frac{2 \times 330}{0.6} = v$ ✓1

0.3

$v = 1100\ m$ ✓1

SECTION B: (55 MARKS)

Answer ALL the questions in this section in the spaces provided

11.(a) A cell drives a current of 5A through a 1.6Ω resistor. When connected to a 2.8Ω resistor, the current that flows in 3.2A. Determine the Electromotive force E and the internal resistance r of the cell. (3 marks)

$E = IR + Ir$

$E = 5 \times 1.6 + 5r$

$E = 8.0 + 5r$ --- (i)

$E = 3.2 \times 2.8 + 3.2r$ --- (ii)

$E = 8.96 + 3.2r$ --- (iii) } ✓1

$0 = -0.96 + 1.8r$

$0.96 = 1.8r$

$\frac{0.96}{1.8} = \frac{1.8r}{1.8}$

$r = 0.5333\ \Omega$ ✓1 4 s.f.

$E = 8.0 + 5(0.5333)$

$= 8.0 + 2.667$

$= 10.667\ V$ ✓1

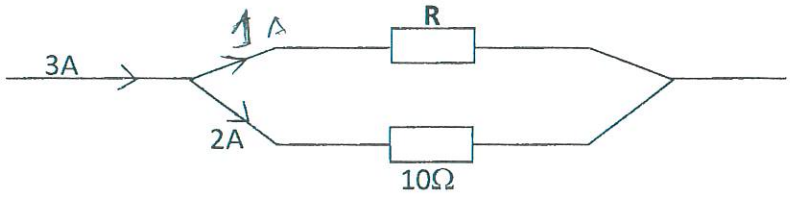
(b) Determine the length of a nichrome resistance wire of cross-sectional area $7 \times 10^{-8} m^2$ required to make a resistor of 10 Ohms. (*Take resistivity of nichrome = $1.10 \times 10^{-6} \Omega m$*). (3 marks)

$R = \frac{\rho l}{A}$; $l = \frac{RA}{\rho}$ ✓1 $= \frac{10 \times 7 \times 10^{-8}}{1.10 \times 10^{-6}}$ ✓1

$= 63.6363 \times 10^{-2}\ m$ ✓1

$= 0.636363\ m$ or $63.63\ cm$.

(c) **Figure 5** shows a current of 3A flowing in the circuit. Determine the resistance of resistor **R**. (3 marks)



11

$V = IR$

$V_{10\Omega} = 10 \times 2 = 20V$ ✓1

$V_R = 20V$, $I_R = 1A$.

$R = \frac{V}{I} = \frac{20}{1} = 20\Omega$ ✓1 ✓1 3

(d) State how the following features of lead acid accumulators affect its internal resistance;

i) Linear dimensions of the plates (1mark)

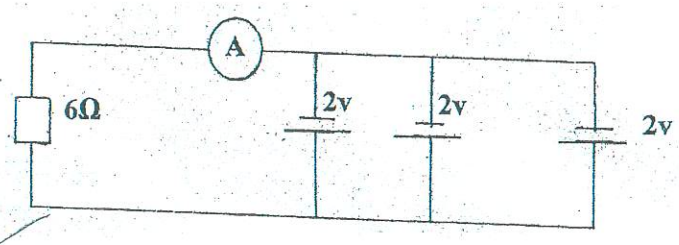
✓ Internal resistance is inversely proportional to ✓1 linear dimension of plates.

ii) Number of the plates (1mark)

Internal resistance increases with large plates. ✓1

(e) **Figure 6** shows three cells connected to 6Ω resistor. Determine the reading of the ammeter (2marks)

Fig. 4



$I = \frac{V}{R} = \frac{2}{6}$ ✓1 ✓1 2

$= \frac{1}{3}$

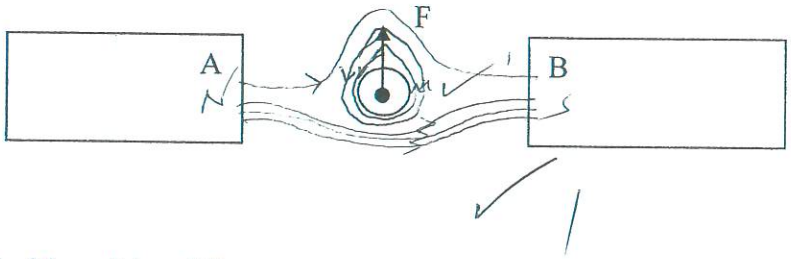
$= 0.3333A$.

12. (a) The current carrying capacity of a battery is 40Ah. Determine how long the battery can be used to supply a steady current of 0.5A. (2 marks)

$t = \frac{Q}{I} = \frac{40Ah}{0.5A}$ ✓1 2

$= 80 hrs$ ✓1

(b) **Figure 7** shows a current – carrying conductor in a magnetic field . The direction of force on the wire is as shown by the arrow.



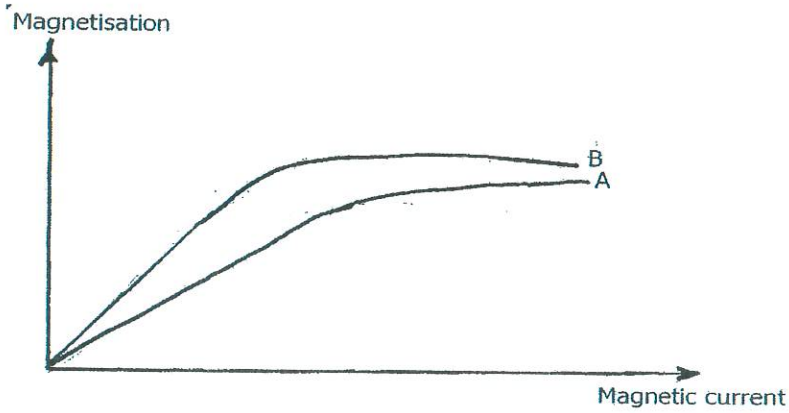
i)State the polarities of A and B. (2marks)

A .....North pole.....

B.....South pole.....

i. Sketch the magnetic field between A and B. (2marks)

b) **Figure 8** two curves obtained in an experiment to magnetize two substances A and B using a current,



Explain the difference in A and B with respect to the domain theory. (3marks)

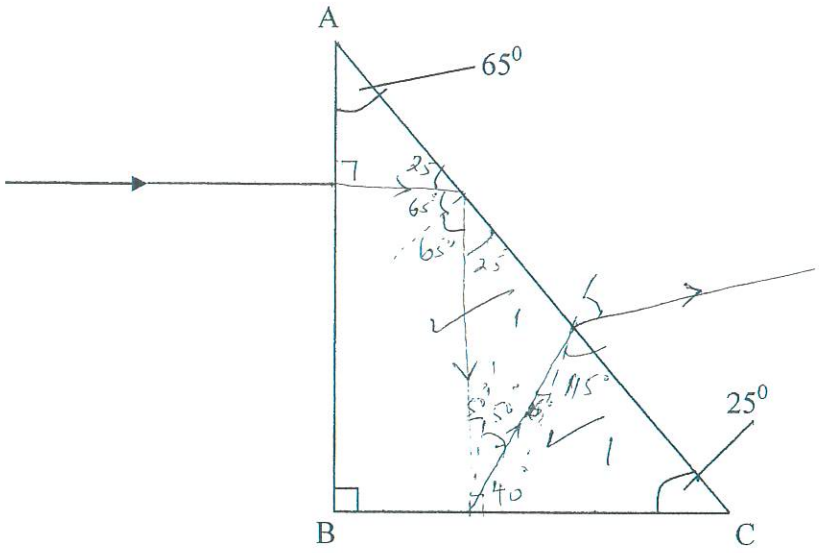
B- Soft magnetic material - the dipoles in domains get aligned faster with less current.

A- Hard " - The dipoles in the domains take time to be aligned with less current.

13. (a) State two conditions necessary for total internal reflection to occur. (2 marks)

- Ray must be travelling from an optically denser medium to optically less dense medium.
- The angle of incidence in optically denser medium must exceed θ_c.

(b) **Figure 9** shows a glass prism and an incident ray striking the face marked AB



$\sin c = \frac{1}{n}$

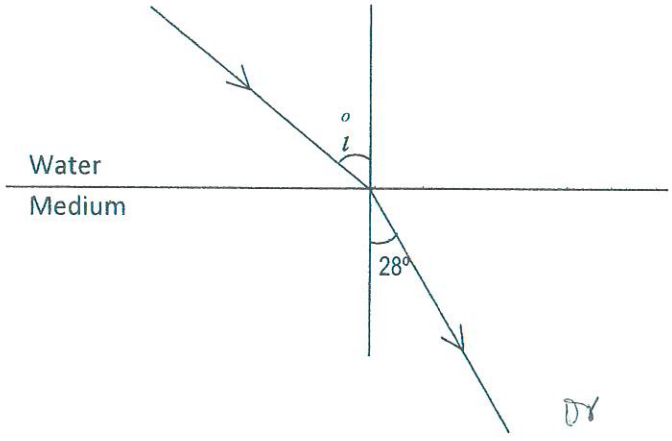
$c = \sin^{-1}\left(\frac{1}{1.5}\right)$

$= 41.8^\circ$

$65^\circ > 41.8^\circ$

Indicate on the diagram the path of the ray until it comes out given the refractive index of glass is 1.5 . (4 marks)

(c)**Figure 10** shows a ray of light travelling between water-glass interface.



OR

$n_1 \sin\theta_{i_1} = n_2 \sin\theta_2$

Determine the value of i given that $a^n g = 1.52$ *and* $a^n w = \frac{4}{3}$. (3 marks)

$n_g = n_w \times n_{ag}$

$= \frac{3}{4} \times 1.52$

$\frac{\sin i}{\sin 28} = 1.14$

$\sin i = 1.14 \times \sin 28$

$i = 32.36^\circ$

09

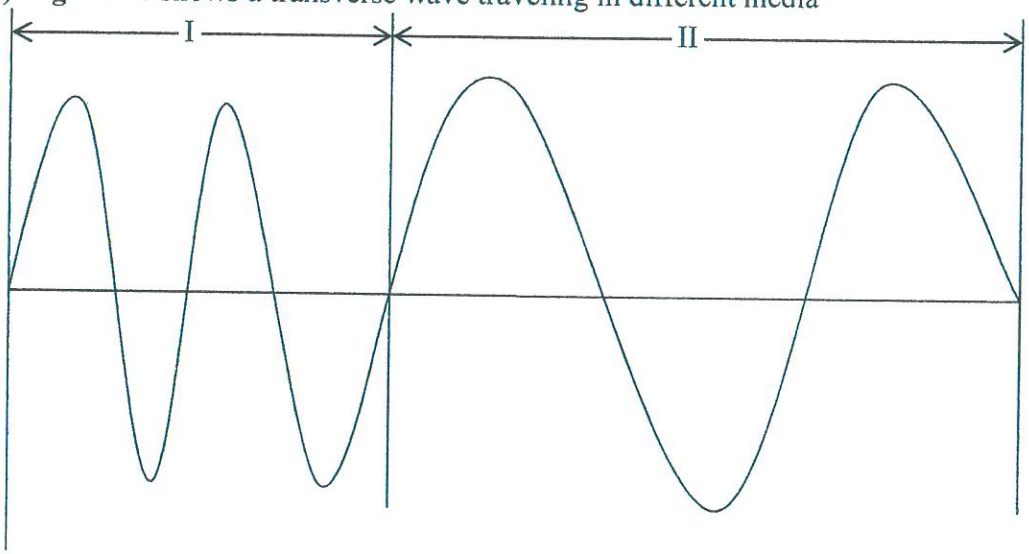
14(a) State TWO conditions for stationary waves to be formed (1mark)

✓ Two progressive waves waves travelling in opposite directions and superposing over each other must have;
• Same speed ✓, same frequency • nearly equal or same amplitude ✓

(b) A light object freely suspended is occasionally observed to oscillate from a mean position to its maximum position in 20ms. Determine its frequency. (3marks)

$$f = \frac{1}{T} = \frac{1}{20\times10^{-3}} = \frac{1000}{20} = 50\,Hz \quad .3$$

(c) **Figure 11** shows a transverse wave traveling in different media



(i) Name any two changes that the waves undergo in moving from medium I to medium II. (2 marks)

✓ Wave length (λ) increases ✓,
✓ Wave speed increases ✓,
✓ Frequency and direction unchanged ✓,

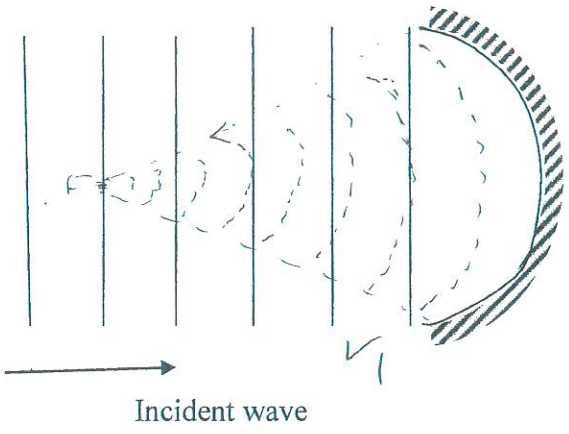
(ii) State with reason which of the two media is denser. (2 marks)

Medium I • The wavelength and speed is lesser. ✓, ✓,

(d) Complete the wave motion in **Figure 12 (i) and (ii).** (1mark)

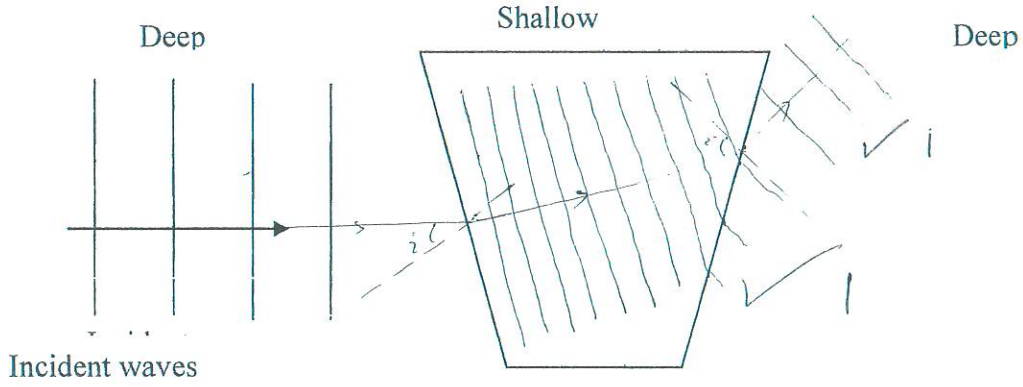
(i)

Figure 12(i)



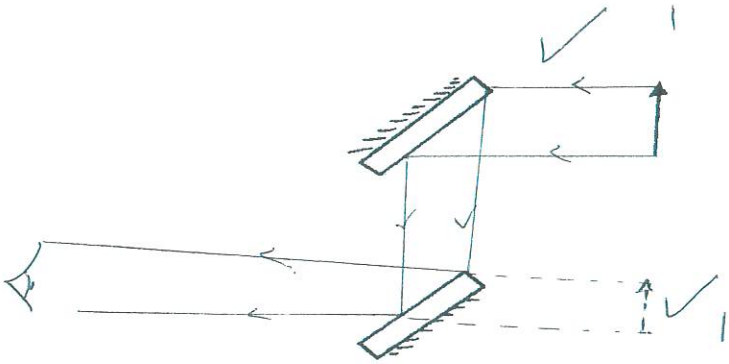
(2 marks)

(ii)

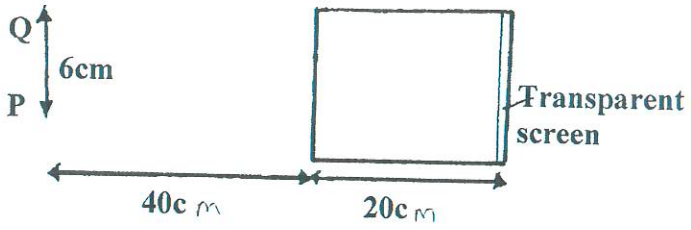


15. (a) Study the ray diagram in figure 7. The observer should be able to see the reflected image after the mirror M2. Show the position of the image

(2mks)



(b) A luminous point object took 3 seconds to move uniformly from P to Q in front a pin hole camera as shown in figure 8



Determine the speed of the image on the screen in cm/s

$\frac{h_i}{h_o} = \frac{v}{u}$ ✓1

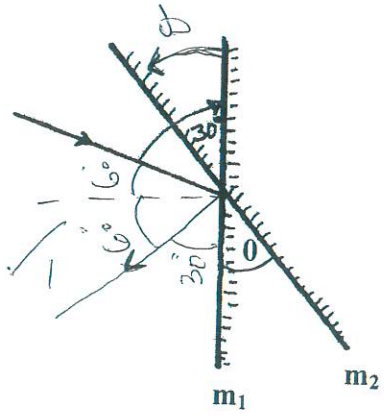
$\frac{h_i}{6} = \frac{20}{40}$ ✓1

$h_i = \frac{20}{40} \times 6 = 3cm$

speed $= \frac{3cm}{3s}$ (3mks)

$= 1 cm/s$ ✓1 3

(c) A ray of light is incident at an angle of 30° to the mirror positioned along the line M, a shown in



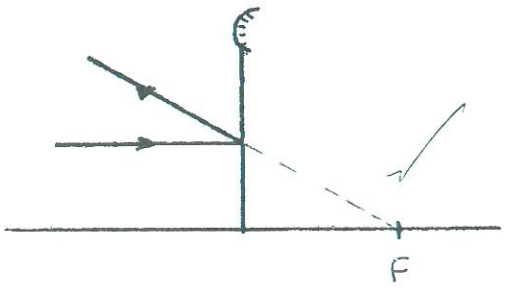
By what angle should the mirror be rotated about 0 to the position M2 for the reflected ray to pass along M1 (2mks

$30° = 2\theta$

$\theta = 15°$ ✓1

05

(d)



f = 2.0 cm ± 1.0 cm

3

Use figure 9(b) to determine the radius of curvature of the convex mirror (3mks)

$r = 2f = 2 \times 2 = 4.0$ cm ± 1 cm

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