

Qn No. 1

Chapter Name:5 prakasathinde apavarthanam

Qn..

The critical angle of glass is 42° .

1. What is meant by Critical Angle ?
2. When the angle of incidence in glass is 42° what will be the angle of refraction ?
3. Name the Phenomenon occur when the angle of incidence is 40° , Define this phenomenon.
4. Name the Phenomenon occur when the angle of incidence is 45° , Define this phenomenon.

Hint.

a)When a ray of light passes from a medium of greater optical density to that of lower optical density, the angle of incidence at which the angle of refraction becomes 90° is the critical angle.

b) 90°

c) refraction.When a ray of light entering obliquely from one transparent medium to another, its path undergoes a deviation at the surface of separation. This is refraction.

d)Total internal reflection.

When a ray of light passes from a medium of higher optical density to a medium of lower optical density at an angle of incidence greater than the critical angle, the ray is reflected back to the same medium without undergoing refraction. This phenomenon is known as total internal reflection.

Marks :(4)

Hide Answer

Qn No. 2

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Qn..Pick out the wrong statements from the following and rewrite them after correction.

- a.Refraction is due to the difference in the optical density of different media.
- b.Velocity of light is greater in the media with higher optical density.
- c.Optical density of glass is less than that of water.
- d.Velocity of light in vacuum is 3×10^8 m/s.

Hint..wrong statements b,c

Marks :(2)

Hide Answer

Qn No. 3

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Qn.

Find the magnification of the image formed when the object is placed at $2F$ of a convex lens.

(Greater than 1, 1, Less than 1, 0)

Hint.Magnification=1 (one)

Marks :(1)

Hide Answer

Qn No. 4

Chapter Name:5 prakasathinde apavarthanam

Qn.

A person use a spectacle of power of lens -1.25 D.

- What type of lens is this?
- What is mean by power of a lens?
- Find the focal length of the lens ?

Hint.

- Power of the lens is negative. So it is a concave lens. (1 score)
- Power of a lens is the reciprocal of its focal length (1 score)

c.

$$f = \frac{1}{P} \text{ (} \frac{1}{2} \text{ score)}$$

$$= \frac{1}{-1.25}$$

$$= \frac{-100}{125} = \frac{-4}{5} \text{ (1 score)}$$

$$= -4/5 \times 100$$

$$= -20\text{cm (} \frac{1}{2} \text{ score)}$$

Marks :(4)

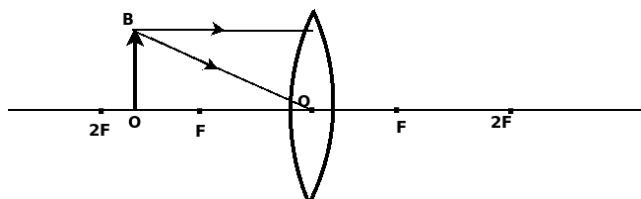
Hide Answer

Qn No. 5

Chapter Name:5 prakasathinde apavarthanam

Qn.

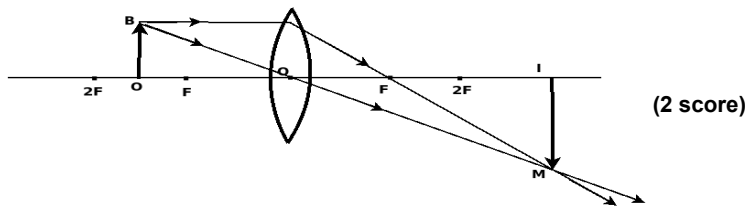
Analyse the ray diagram. OB indicates an object placed in front of the convex lens.



- Complete the ray diagram using given incident rays and find the position of the image formed.
- What will be the position of image when the object is placed at $2F$.
- Where should be the object placed to get a virtual image ?

Hint.

a.



(2 score)

- a. Beyond 2F (1 score)
- b. Image is formed at 2F. (1 score)
- c. An object is placed in between optic centre and focus

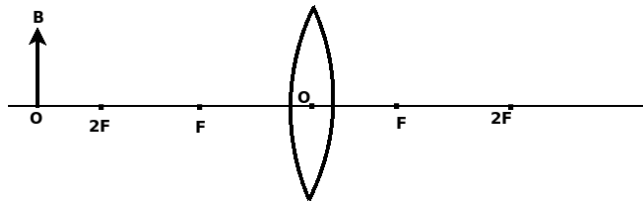
Marks :(4)

Hide Answer

Qn No. 6

Chapter Name:5 prakasathinde apavarthanam

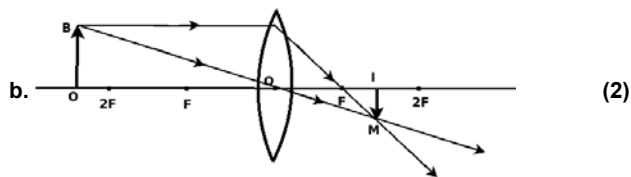
Qn.
The diagram below is of an object OB placed in front of a lens



- a..Which type of lens is used here ?
- b.Complete the ray diagram and find the position of the image.
- c.Write any two characteristics of the image.

Hint.

- a. Convex lens (1)



(2)

Images formed in between F and 2F.

- c. Real and inverted images formed. (1)

Marks :(4)

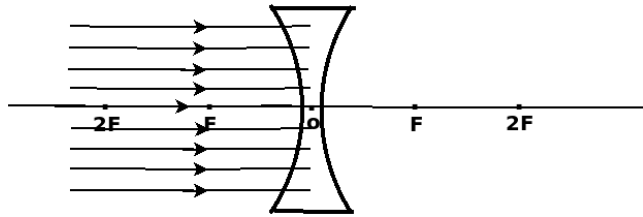
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Qn No. 7

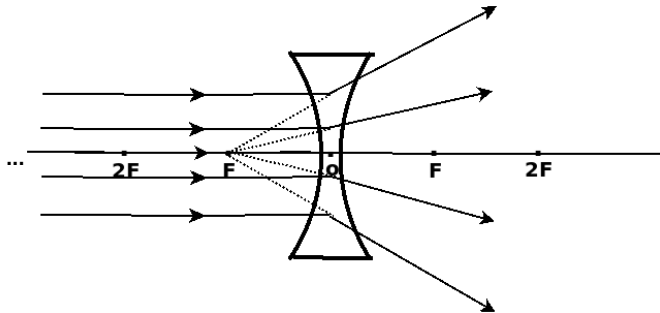
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Qn.

Complete the diagram and label the principal focus of the concave lens.



Hint.



Marks :(2)

Hide Answer

Qn No. 8

Chapter Name:5 prakasathinde apavarthanam

Qn.

An image with twice the size of the object is produced on a screen using a convex lens of focal length 15cm.

1. What is the Object distance from lens ?
2. What is the Image distance from lens ?

Marks :(3)

a) $f = +15\text{cm}$
 $m = -2$ (convex lens create real images so its magnification is negative)

$$m = \frac{v}{u} \quad \left(\frac{1}{2} \text{ score}\right)$$

$$-2 = \frac{v}{u}$$

$$v = -2u$$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \quad \left(\frac{1}{2} \text{ score}\right)$$

$$\frac{1}{15} = -\frac{1}{2u} - \frac{1}{u}$$

$$\frac{1}{15} = -\frac{1}{2u} - \frac{1}{u} \times \frac{2}{2}$$

Hint.

$$\frac{1}{15} = \frac{-3}{2u}$$

$$2u = -45 \quad \left(\frac{1}{2} \text{ score}\right)$$

$$u = \frac{-45}{2}$$

$$u = -22.5 \text{ cm} \quad \left(\frac{1}{2} \text{ score}\right)$$

b) $v = -2u$
 $= -2 \times -22.5$
 $= 45 \text{ cm} \quad (1 \text{ score})$

Hide Answer

Qn No. 9

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Qn.

Statements related to the images formed by lenses are given below. Tabulate them into those related to real images and those related to virtual images.

- a. Inverted
- b. cannot be captured on screen
- c. can be captured on a screen
- d. image formed when actual intersection of light rays occur
- e. erect
- f. magnification will be negative

Hint.

Real images

a, c, d, f

virtual images

b, e

Marks :(3)

Hide Answer

Qn No. 10

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Qn.

The image of a lit candle is produced on a screen using convex lens. Find the position of the object in each of the following conditions.

- a. Obtains an image of size equal to the object
- b. Obtains an image smaller than object
- c. Obtains an real image bigger than the object.

Hint.

- a. 2F Or C (1 score)
- b. Beyond 2F Or Beyond C (1 score)
- C. In between 2F and F (In between C and F) (1 score)

Marks :(3)

Hide Answer

Qn No. 11

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Qn.

The terms given are related to lens. Using these fill up the following statements.

(Focal length, Pricipal axis, Optic centre, Centre of curvature, Radius of curvature.)

- 1.is the centre of the lens.
- 2. The distance between the optic centre and the principal focus is
- 3. The centre of a sphere of which lens is a part is known as
- 4. The imaginary line joining the two centres of curvature of the lens and passing through the optic centre is

Hint.

- a. Pole ($\frac{1}{2}$ score)
- b. Focal length ($\frac{1}{2}$ score)
- c. Centre of curvature ($\frac{1}{2}$ score)
- d. Principal axis ($\frac{1}{2}$ score)

Marks :(2)

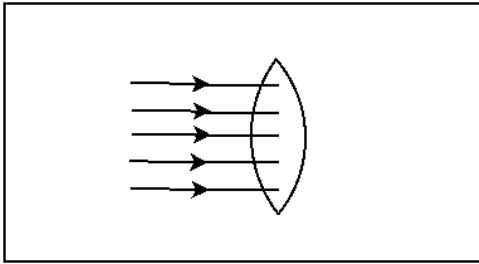
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Qn No. 12

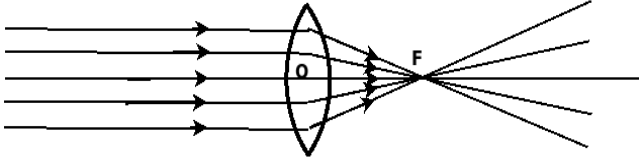
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Qn.

The light lays falling parallel to the principal axis of a convex lens is shown in the diagram. Complete the diagram & label the principal focus of the lens.



Hint.



F is the focus

Marks :(2)

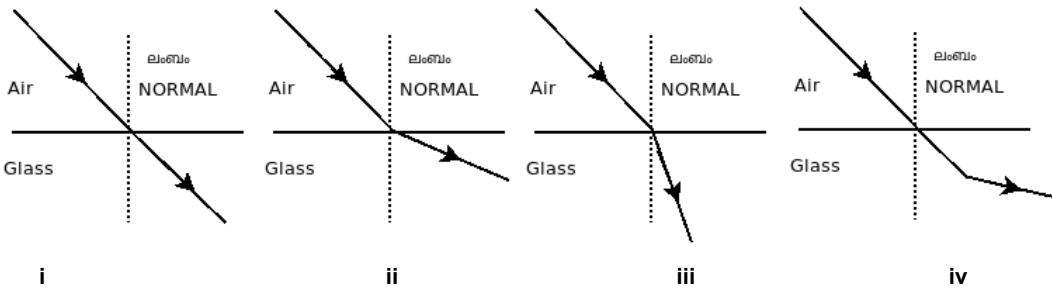
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Qn No. 13

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Qn.

Light ray entering glass from air at an angle is shown in the diagram. Which among the following is the correct one.



Hint.

Figure iii, It bent towards the normal

Marks :(1)

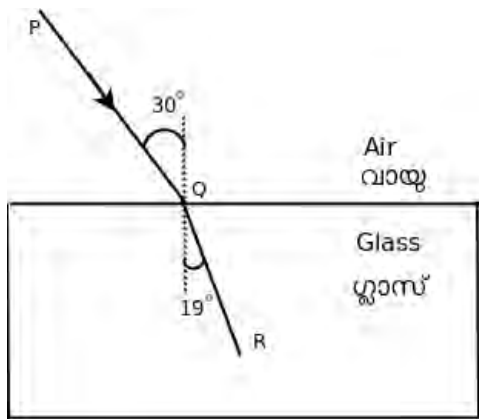
Hide Answer

Qn No. 14

Chapter Name:5 prakasathinde apavarthanam

Qn.

The diagrams show light ray entering glass slab from air



Analyse these diagrams and answer the following questions.

1. Which is the incident ray ?
2. Which is the refracted ray ?
3. Which is the angle of incidence ?
4. Which is the angle of refraction ?
5. What happens to the light ray when it enter the glass from air at an angle.
6. Which is this phenomenon?

Hint.

- a. PQ
- b. QR
- c. 30°
- d. 19°
- e. It bend towards the normal (refraction takes place)
- f. Refraction

Marks :(4)

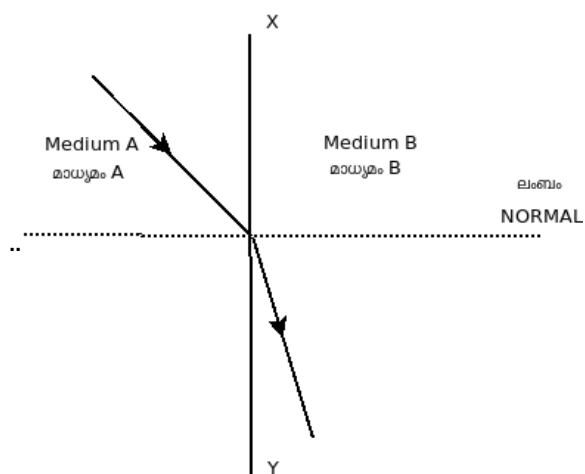
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Qn No. 15

Chapter Name:5 prakasathinde apavarthanam

Qn.

Observe the figure. XY is the surface of separation of the media A and B. Light ray enters B from A



1. When the light ray enter B from A

(no deviation, move towards the normal, moves away from the normal)

2. Among media A & B. Which has more optical density?

3. In which medium does the light travel with more velocity?

Hint.

a. It bent towards the normal (1 score)

b. Medium B (1 score)

c. Medium B (1 score)

Marks :(3)

Hide Answer

Qn No. 16

Chapter Name:5 prakasathinde apavarthanam

Qn.

Find the relation and complete the word pair

Focal length : metre

Power of lens :

Hint.

Power of lens:Diopetre

Marks :(1)

Hide Answer

Qn No. 17

Chapter Name:5 prakasathinde apavarthanam

Qn.

Find the power of a convex lens with focal length 10cm

$$f = +10 \text{ cm}$$

$$= \frac{+10}{100} \text{ m} \quad \left(\frac{1}{2} \text{ score} \right)$$

$$= \frac{+1}{10} \text{ m} \quad \left(\frac{1}{2} \text{ score} \right)$$

Hint.

$$p = \frac{1}{f}$$

$$= \frac{1}{+10}$$

$$= +10 \text{ D} \quad (1 \text{ score})$$

Marks :(2)

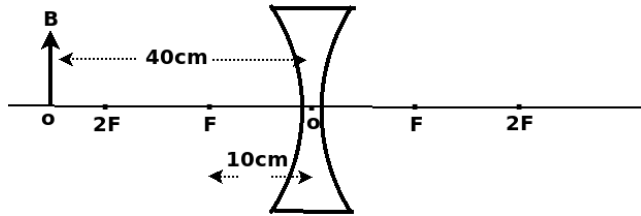
Hide Answer

Qn No. 18

Chapter Name:5 prakasathinde apavarthanam

Qn.

Object AB is placed in front of a concave lens



a. What is the focal length of the lens in New Cartesian sign convention

b. Calculate the image distance

Hint.

a) $f = -10 \text{ cm}$ (1 score)

b) $u = -40 \text{ cm}$

$f = -10 \text{ cm}$

$v = uf / u+f$

$$= \frac{-40 \times -10}{-40 + -10} \text{ (} \frac{1}{2} \text{ score)}$$

$$= \frac{+400}{-50}$$

$= -8 \text{ cm}$ (1 score)

Marks :(3)

Hide Answer

Qn No. 19

Chapter Name:5 prakasathinde apavarthanam

Qn.

An object is placed 20 cm from the convex lens, virtual and erect images formed 100 cm from the lens .

a. Find out the focal length of the lens ?

b. What is the power of the lens?

a) $u = -20 \text{ cm}$

$v = -100 \text{ cm}$

$f = \frac{uv}{u-v}$ (1/2 score)

$= \frac{-20 \times -100}{-20 - (-100)}$ (1/2 score)

$= \frac{+2000}{80}$

Hint. $= +25 \text{ cm}$ (1 score)

b) $f = +25 \text{ cm}$ (1/2 score)

$= \frac{+25}{100} m$

$= \frac{+1}{4} m$ (1/2 score)

$p = \frac{1}{f}$

$= +4D$ (1 score)

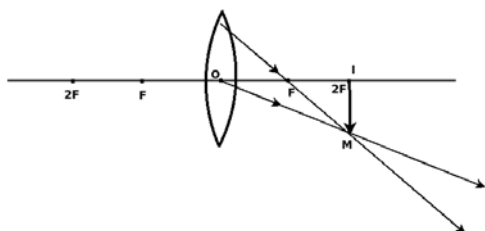
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Qn No. 20

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Qn.

The diagram shows the image formation by a convex lens.

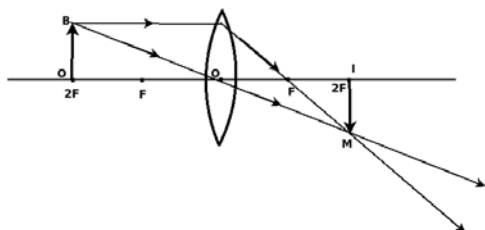


a. Find the position of the image by completing the ray diagram.

b. What is the magnification of the image? Justify your answer.

Hint.

a)



Object is placed at 2F (2 score)

b. Magnification is one, because size of the image is equal to the size of the object. (1 score)

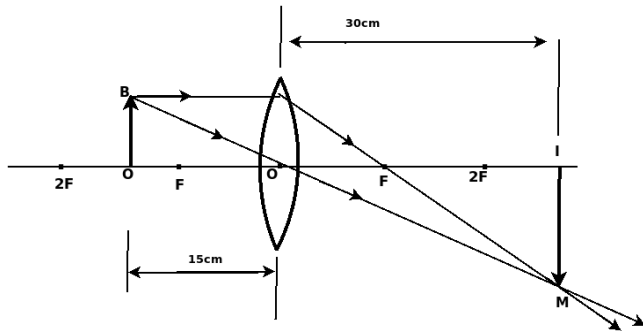
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Qn No. 21

Chapter Name:5 prakasathinde apavarthanam

Qn.

The diagram shows the image formation by a convex lens.



- Find out the focal length using new Cartesian method.
- Find its magnification using ray diagram,?

Hint.

a) $u = -15 \text{ cm}$

$v = +30 \text{ cm}$

$$f = \frac{uv}{u-v} \quad (1/2 \text{ score})$$

$$= \frac{-15 \times 30}{-15 - 30} = \frac{-450}{-45} \quad (1/2 \text{ score})$$

$$= +10 \text{ cm} \quad (1/2 \text{ score})$$

b. $m = \frac{v}{u} \quad (1/2 \text{ score})$

$$= \frac{30}{-15} \quad (1/2 \text{ score})$$

$$= -2 \quad (1/2 \text{ score})$$

Marks :(3)

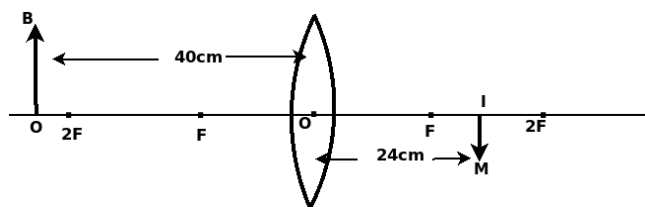
Hide Answer

Qn No. 22

Chapter Name:5 prakasathinde apavarthanam

Qn.

Express the following measurements in New Cartesian Sign Convention. IM is the image of object OB.



- a. Object distance (u) = _____
- b. Image distance (v) = _____
- c. Height of the Object (OB) = _____
- d. Height of the Image (IM) = _____

Hint.

- a) $u = -40$ cm ($\frac{1}{2}$ score)
- b) $v = +24$ cm ($\frac{1}{2}$ score)
- c) $OB = +2$ cm ($\frac{1}{2}$ score)
- d) $IM = -1$ cm ($\frac{1}{2}$ score)

Marks :(2)

Hide Answer

Qn No. 23

Chapter Name:5 prakasathinde apavarthanam

Qn.
Method of measuring distances according to New Cartesian Sign Convention is given below. Choose the correct statements from these.

- a. All the distances are measured from F.
- b. The distances measured in the direction of incident ray are positive.
- c. It is assumed that the incident rays travel from right to left.
- d. X axis is considered as the principal axis.

Hint.

- b. All distances measured along the direction of incident light is positive.
- d. X axis is considered as the principal axis.

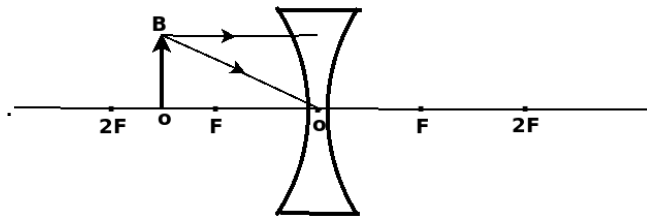
Marks :(2)

Hide Answer

Qn No. 24

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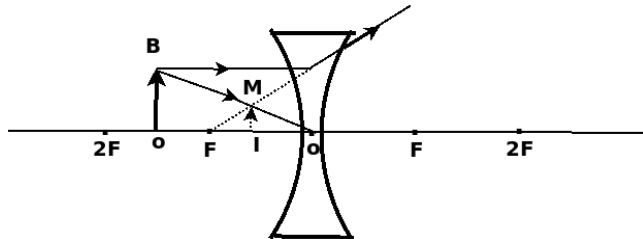
Qn.
Observe the figure carefully and an object 'OB' is placed in front of the concave lens



- Find the position of the image by completing the diagram ?
- Can this image be screened? why.?
- If the position of the object is in $2F$, where is the position of the image?

Hint.

a)



Virtual and erect images formed in between F and O .

- No, because it is a virtual image
- Image is always formed in between focus and centre. but it is a virtual and erect and diminished image

Marks :(2)

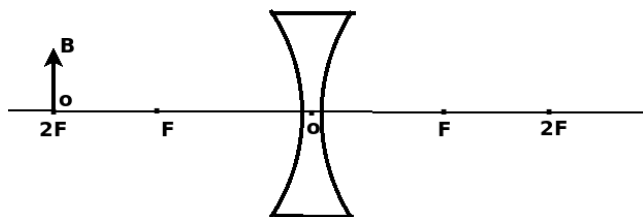
Hide Answer

Qn No. 25

Chapter Name:5 prakasathinde apavarthanam

Qn.

An object is placed in front of the lens is given below.

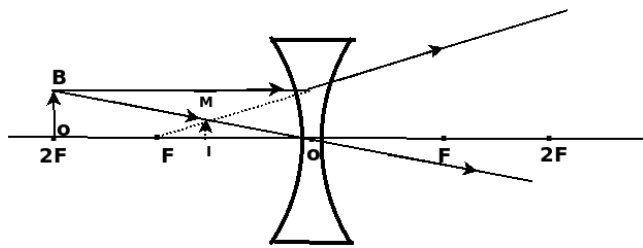


- Whether the principal focus of this lens is real or virtual (1)
- Find out the position of the image by completing the figure. (2)
- Write any two nature of the image. (1)

Hint.

a. Convex lens

b.



Images formed in between F and 2F.

c. Real and inverted images formed.

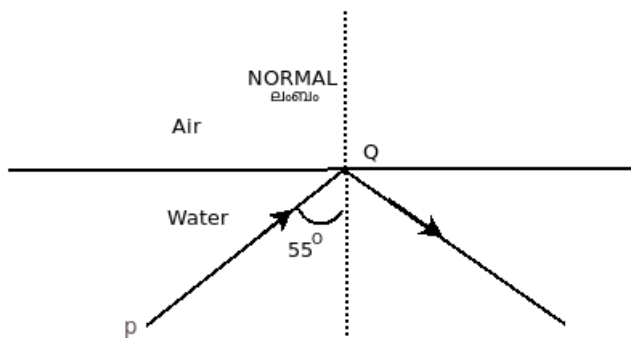
Marks :(4)

Hide Answer

Qn No. 26

Chapter Name:5 prakasathinde apavarthanam

Qn.
Observe the figure given below



- Why the ray PQ reflected this way?
- Name the phenomenon?
- What will happen to the ray of light when angle of incidence is 30° at Q

Hint.

- Angle of incidence is greater than that of critical angle.
- Total internal reflection.
- refraction takes place when it travels from water to air.

Marks :(3)

Hide Answer

Qn No. 27

Chapter Name:5 prakasathinde apavarthanam

Qn.
Observe the table and answer the questions given below

Medium	Refractive index
A	1.33
B	1.62
C	1.47
D	1.52

- a) In which medium the speed of light is maximum?
- b) Which of the following is correct based on the speed of light in the media?
 1) $A > B > D > C$ 2) $A > C > B > D$ 3) $A > C > D > B$ 4) $A < C < D < B$ (1)
- c) Find out the speed of light in medium B? (speed of light in vacuum = 3×10^8 m/s)

Hint.

a) Medium A.

b) 3) $A > C > D > B$ (1 score)

c) $n = c/v$ ($1/2$ score)

$$v = 3 \times 10^8 / 1.62 \text{ (} 1/2 \text{ score)}$$

$$= 1.85 \times 10^8 \text{ m/s (1 score)}$$

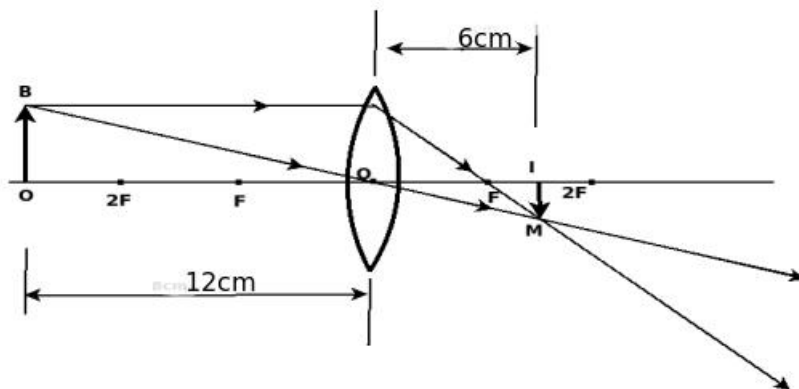
Marks :(4)

Hide Answer

Qn No. 28

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Qn.



- a. Find u and v in terms of new cartesian sign convention?
- b. Is the image real?
- c. Find out the focus of the lens from the diagram. Justify the answer by using lens formula

Hint.

a) $u = -12\text{cm}$ (1/2 score)

$v = +6\text{ cm}$ (1/2 score)

b) യഥാർത്ഥം (1 score)

c) $f = +4\text{ cm}$ (1/2 score)

ചെൻസ് സമവാക്യം അനുസരിച്ച് $f = \frac{uv}{u-v}$ (1/2 score)

$= \frac{(-12) \times (+6)}{(-12) - (+6)}$ (1/2 score)

$= \frac{-12 \times 6}{-18}$

$= +4\text{ cm}$

Marks :(3)

Hide Answer