

FlexiPrep: Downloaded from flexiprep.com

For solved question bank visit doorsteptutor.com and for free video lectures visit [Examrace YouTube Channel](#)

NCERT Class X Science Class: Chapter – 10. Light – Reflection and Refraction – Part-8 (For CBSE, ICSE, IAS, NET, NRA 2022)

Doorsteptutor material for CBSE/Class-10 Science is prepared by world's top subject experts: [fully solved questions with step-by-step explanation](#)- practice your way to success.

Question 35:

The image of a candle flame formed by a lens is obtained on a screen placed on the other side of the lens. If the image is three times the size of the flame and the distance between lens and image is 80 cm, at what distance should the candle be placed from the lens? What is the nature of the image at a distance of 80 cm and the lens?

Answer:

Given,

$$m = 3$$

$$v = 80$$

As we know that,

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

$$-3 = \frac{80}{u}$$

$$u = -\frac{80}{3} \text{ cm}$$

Therefore, image is real and inverted. The lens is convex.

Question 36:

Size of image of an object by a mirror having a focal length of 20 cm is observed to be reduced to $\frac{1}{3}$ of its size. At what distance the object has been placed from the mirror? What is the nature of the image and the mirror?

Answer:

$$m = -\frac{1}{3} \left(\text{in case of concave mirror} \right)$$

$$f = -20 \text{ cm}$$

$$m = -\frac{1}{3} = -\frac{v}{uv} = \frac{u}{3}$$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$-\frac{1}{20} = \frac{1}{v} + \frac{1}{3v}$$

$$v = -\frac{80}{3} \text{ cm}$$

$$u = -80 \text{ cm}$$

$u = -80 \text{ cm}$. Image is real and inverted. Mirror is concave

Question 37:

Define power of a lens. What is its unit? One student uses a lens of focal length 50 cm and another of -50 cm . What is the nature of the lens and its power used by each of them?

Answer:

The power of a lens is defined as reciprocal of it's focal length, expressed in meters

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

Where f is in meter.

Its unit is Diopter.

Focal length = 0.5m so power = 2

As it is + ve

And focal length = $-0.5m$

Therefore, power = -2

Lens is convex in the first case and concave in the second case. Power is equal to 2 diopter in the first case and -2 diopter in the second case. Indicates virtual image

Question 38:

A student focused the image of a candle flame on a white screen using a convex lens. He noted down the position of the candle screen and the lens as under

Position of candle = 12.0 cm

Position of convex lens = 50.0 cm

Position of the screen = 88.0 cm

(i) What is the focal length of the convex lens?

(ii) Where will the image be formed if he shifts the candle towards the lens at a position of 31.0 cm?

(iii) What will be the nature of the image formed if he further shifts the candle towards the lens?

(iv) Draw a ray diagram to show the formation of the image in case (iii) as said above.

Answer:

(i) Object distance u = position of convex lens - position of candle

$$U = -(50 - 12) = -38 \text{ cm}$$

Image distance v = position of screen - position of convex lens

$$V - 88 = -50 \text{ cm}$$

$$v = 38 \text{ cm}$$

Applying the lens formula:

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{f} = \frac{1}{38} - \frac{-1}{38}$$

$$\frac{1}{f} = \frac{1}{19}$$

Focal length = 19 cm

(ii) When the candle is shifted towards the lens at a position of 31.0 cm:

Object distance u = (50 - 31)

$$U = -19 \text{ cm}$$

Applying the lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{19} = \frac{1}{v} - \frac{1}{-19}$$

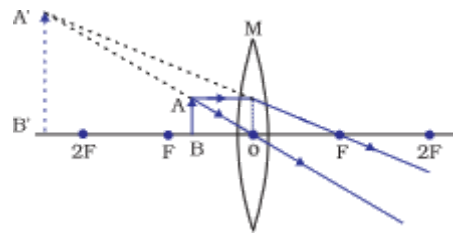
$$\frac{1}{v} = 0$$

Therefore, v is infinity.

(iii) If the candle is further shifted towards the lens, then the nature of the image formed will be virtual, erect and magnified.

(iv) The ray diagram will be as follows:

Virtual and erect



©FlexiPrep. Report ©violations @<https://tips.fbi.gov/>

Developed by: [Mindsprite Solutions](#)