

UNIT 4
Reflection of Light

10/12/2020 – Class 35

Assignment Answer

1. What are the characteristics of image, if the object is placed beyond C in a concave mirror?

Small image, Inverted, Real. Image formed between F and C.

2. What are the characteristics of image, if the object is placed at C in front of a concave mirror?

Same size, Inverted, Real. Image is formed at C.

Activity 1

Find the equation to calculate the focal length (f) of a mirror?

If 'f' is the focal length of the mirror, 'u' is the distance from the object to the mirror and 'v' is the distance from the image to the mirror, then

$$\mathbf{1/f = 1/u + 1/v \text{ (mirror equation)}}$$

Rearrange the above equation, we get

$$1/f = (u + v) / uv$$
$$f = uv / (u + v)$$

$$\mathbf{f = uv / (u+v)}$$

Activity 2

Find the equation to calculate the image distance (v)?

$$1/f = 1/u + 1/v$$
$$1/f - 1/u = 1/v$$
$$1/v = 1/f - 1/u$$
$$1/v = (u - f) / uf$$

$$\mathbf{v = uf / (u-f)}$$

Activity 3

Find the equation to calculate the object distance (u)?

$$1/f = 1/u + 1/v$$
$$1/f - 1/v = 1/u$$
$$1/u = 1/f - 1/v$$
$$1/v = (v - f) / vf$$

$$\mathbf{u = vf / (v-f)}$$

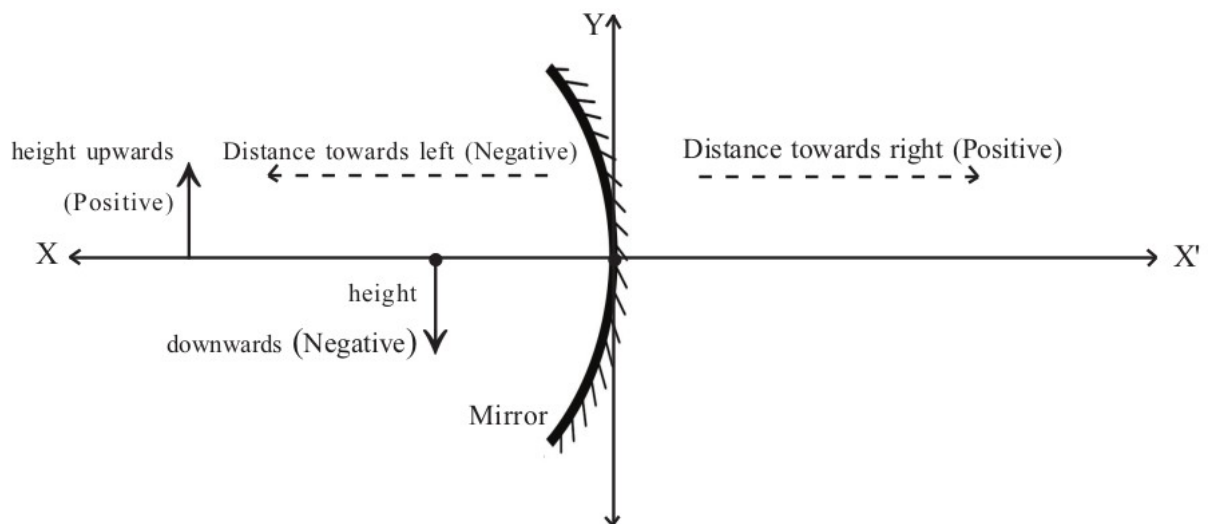
Activity 4

While using different types of mirrors, the position and nature of image changes in accordance with the change in the position of the object. On such occasions finding the size and nature of image is also equally important as finding the focal length. New Cartesian Sign Convention has been formulated for this purpose.

In all experiments related to lenses and mirrors the distances are measured in the same way as in graphs.

- Distances are measured considering the Pole of the mirror as the origin (O).
- Those measured to the right from O are positive and those in the opposite direction are negative.
- Distances measured upwards from X axis are positive and those downwards are negative. The incident ray is to be considered as travelling from left to right.

Record the measurements shown in the figure using the New Cartesian Sign Convention.

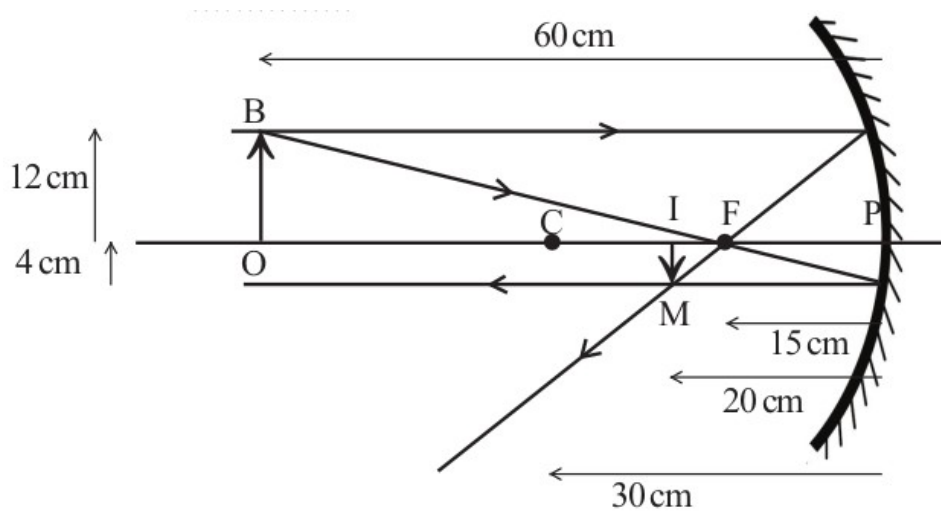


Distance to the object from the mirror (u) = **Negative**
Distance to the image from the mirror (v) = **Negative** (If image is real)
Height of object (OB) = **Positive**
Height of image (IM) = **Negative** (If image is real)

If Virtual image is formed, then image is behind the mirror. So,
Distance to the image from the mirror (v) = **Positive**
Height of the image (IM) = **Positive**.

Activity 5

The given figure shows the image formation by a concave mirror. Analyse the figure and write down different measures using New Cartesian Sign Convention.



Distance of object from the mirror, (u)	- 60 cm
Distance of image from the mirror, (v)	- 20 cm
Focal length (f)	- 15 cm
Radius of curvature (r)	- 30 cm
Height of object (OB)	+ 12 cm
Height of image (IM)	- 4 cm

Assignment

The height of image is expressed with a positive sign. What are the peculiarities of the image that you can understand from this?