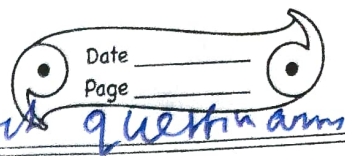


# Reflection and Refraction

Ncert



questionnaire

1. Which of the following materials cannot be used to make a lens

(d) Clay ~~can~~

2.

(d) The position of the object should be between the pole of the mirror and its principal focus

3. The object should be placed at ~~the~~  
(d) the focal length.

4.

(d) Both are likely to be concave.

5.

(d) The mirrors are likely to be either plane or convex.

6.

(c) A convex lens of focal length 5 cm can be used while reading small letters found in a dictionary.

7. Range of the distance = 0 to 13cm from  
the pole of the mirror.  
Nature of the image, virtual, erect  
and larger than object.

8. Concave Mirror. Because concave  
mirrors can produce powerful  
parallel beam of light when light source  
is placed at their principal focus.

9. Convex Mirror - Because of its largest  
field of view.

10. Concave Mirror - Because it concentrates  
the parallel rays of source at principal  
focus.

11. Yes, it will produce a complete image  
of the object as shown in figure. This  
can be verified experimentally by  
observing the image at a distance  
object like face on a screen when  
lower half is covered with a  
black paper. However the intensity or  
brightness of image will reduce.



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Height of the object  $h_o = 5$   
 Distance of the object from converging lens,  $u = -25 \text{ cm}$   
 Focal length of converging lens  
 $f = 10 \text{ cm}$

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

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{10} - \frac{1}{25} = \frac{15}{250}$$

$$v = \frac{250}{15} = 16.66 \text{ cm}$$

Also, for a ~~conv~~ converging lens

$$\frac{h_i}{h_o} = \frac{v}{u}$$

$$h_i = \frac{v}{u} \times h_o = \frac{50 \times 5}{25 + (-25)} = \frac{10}{-3}$$

$$= -3.33 \text{ cm}$$

11 Focal length of concave lens ( $O.P.$ )  $f = -15$   
 Image distance  $v = 10$  cm  
 According to the lens formula

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

$$\frac{1}{10} - \frac{1}{-15}$$

$$= -\frac{1}{10} + \frac{1}{15}$$

$$v = \frac{5}{-15} = -30 \text{ cm}$$

12  $R = 15$  cm  
 $u = -10$  cm

At Q

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

$$\frac{1}{v} = \frac{1}{15} - \frac{1}{-10} = \frac{2+3}{30}$$

$$v = \frac{5}{30} = 6 \text{ cm}$$

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

$$= \frac{+6}{+10}$$

$$= 0.6$$

The image is located at distance of 6 cm from the mirror.

13 The positive sign means image formed by a plane mirror is virtual and erect. Since the magnification is 1 it means that the size of the image is equal to the size of the object.

$$\underline{17} \quad u = 20 \text{ cm}$$

$$h = 5 \text{ cm}$$

$$R = 30 \text{ cm}$$

Radius of curvature = 2 × Focal length  
 $R = 2f$

$$f = 15 \text{ cm}$$

#



A.T.Q

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

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

$$= \frac{1}{15} + \frac{1}{20} = \frac{4+3}{60} = \frac{7}{60}$$

The image is behind the mirror.

$$M = \frac{\text{Image distance}}{\text{Object dist.}} = \frac{-8.57}{-20} = 0.428$$

$$M = \frac{\text{Height of image}}{\text{Height of object}}, \quad \frac{h'}{h}$$

$$h' = m \times h = 0.428 \times 5 = 2.14 \text{ cm}$$

15  
 $u = -27 \text{ cm}$

$$h = 7 \text{ cm}$$

$$f = -18 \text{ cm}$$

A.T.Q

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

$$\frac{1}{v} = \frac{1}{18} + \frac{1}{27}$$

$$= -\frac{1}{18} + \frac{1}{27} = -\frac{1}{54}$$

$$v = -54 \text{ cm}$$

The screen should be placed at distance of 54 cm in front of given mirror

$$m = \frac{-54}{27} = -2$$

$$M \text{ height} = \frac{h'}{h}$$

$$h' = m \times h = 7 \times -2 = -14 \text{ cm}$$

The image formed is inverted

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$$\text{Power of lens} = \frac{1}{f}$$

$$P = -2.0$$

$$f = \frac{-1}{2} = 0.5 \text{ m}$$

A concave lens has a negative focal length. Therefore, it is a concave lens.

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

$$P = 1.5 \text{ D}$$

$$f = \frac{1}{1.5} = \frac{10}{15} = 0.66 \text{ m}$$

A convex lens has positive focal length. Therefore it is a convex lens.