Reflection and Refraction Ncert questions

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1. Which of the following materials cannot be used to make a lens
(d) Clay ~~Coon~~

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

(b) Convex Mirror - Because of its larger field of view.

(c) Concave Mirror - Because it concentrates the parallel rays of sunlight at principal focus.

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

10/ Height of the object $h_o = 5$

Distance of the Object from converging lens, $u = -25\,cm$

Focal length of converging lens $f = 10cm$

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

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{10} - \frac{1}{28} = \frac{15}{250}$$

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

Also, for a converging lens

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

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

$$= -3.3cm$$

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

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

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

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

$$v = \frac{5}{150} = -30\text{cm}$$

12 f = 15cm
u = -10cm
ATQ

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

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

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

$$M = -\frac{V}{U}$$

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

$$= 0.6$$

The image is located at distance 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.

17) $U = 20\ cm$

$h = 5\ cm$

$R = 30\ cm$

Radius of curvature = 2 * Focal length

$R = 2F$

$F = 15\ cm$

#

A.T.Q

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

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

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

The image is behind the mirror.

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

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

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

15 $u = -27$ cm

$(h) = 7$ cm

$f = -18$ cm

A.T.Q

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

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

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

$$v = -54\,cm$$

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

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

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

$$h' = m \times h = 7 \times -2 = -14\,cm$$

The image formed is inverted

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

$P = -2D$

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

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

17 $P = \frac{1}{f}$

$P = 1.5D$

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

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