

ASSIGNMENT.

1)

$$u = -10 \text{ cm}$$

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

Alq Mirror Formula:

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

$$\Rightarrow \frac{1}{v} = \frac{-1}{20} + \frac{1}{10}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{20} \quad \Rightarrow v = 20 \text{ cm}$$

2. The Characteristics of Image are:

- It is virtual & erect.
- It is magnified.

12)

$$u = -36 \text{ cm}$$

• Height of the Object (h) = -100 cm

$$f = -12 \text{ cm}$$

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

$$\frac{1}{-12} = \frac{1}{v} + \frac{1}{-36}$$

$$\frac{1}{v} = \frac{1-3}{36} = \frac{-2}{36}$$

$$v = -18$$

$$m = \frac{h_1}{h_2} = \frac{v}{u}$$

$$\Rightarrow \frac{h_1}{10} = \frac{-18}{36} = \frac{-1}{2}$$

$$\Rightarrow h_1 = -5 \text{ cm. (height of image)}$$

$$18) \quad h = 20 \text{ m}$$

$$f = -100 \text{ m}$$

$$h_2 = 60 \text{ m}$$

distance of object from mirror

$$u =$$

$$m = \frac{h_1}{h_2} = \frac{-v}{u}$$

$$m = \frac{6}{20} = \frac{-v}{u}$$

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

$$\Rightarrow \frac{1}{6} = \frac{1}{v} + \frac{1}{u}$$

$$\Rightarrow \frac{1}{10} = \frac{1}{3u} - \frac{3}{3u}$$

$$\Rightarrow \frac{1}{10} = \frac{1-3}{3u}$$

14)

$$u = +5 \text{ cm}$$

$$v = 10 \text{ cm}$$

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

⇒

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

$$= \frac{-3-2}{30}$$

⇒

$$b = -6 \text{ cm}$$

15)

i) $u = -8 \text{ cm}$

$$h_2 = 30 \text{ cm}$$

$$h_1 = 4.5 \text{ cm}$$

$$b = ?$$

⑤

$$m = \frac{h_1}{h_2} = \frac{-v}{u}$$

$$= \frac{4.5}{30} = \frac{-v}{8}$$

$$= v = \frac{4.5 \times 8}{3}$$

$$= 12 \text{ cm}$$

b)

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

$$h_2 = 1 \text{ cm}$$

$$h_1 = -4 \text{ cm}$$

$$\therefore m = \frac{h_1}{h_2} = \frac{-4}{1}$$

$$\frac{-4}{1} = \frac{+v}{+20}$$

$$\Rightarrow v = \frac{20 \times (-4)}{1} = -80 \text{ cm.}$$

focal length

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

$$\Rightarrow \frac{1}{f} = \frac{1}{-80} + \frac{1}{-20} = \frac{-5}{80}$$

$$\Rightarrow f = -16 \text{ cm.}$$

17. $u = -27 \text{ cm}$
 $h_2 = 7 \text{ cm}$
 $F = -18 \text{ cm}$

distance,

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

$$\Rightarrow \frac{1}{-18} = \frac{1}{v} - \frac{1}{27}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{27} - \frac{1}{18}$$

$$\Rightarrow \frac{-1}{54} = \frac{1}{v}$$

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

18. $u = -9 \text{ cm}$
 $h_2 = 2 \text{ cm}$
 $F = -4 \text{ cm}$

or

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

$$\Rightarrow \frac{1}{-4} = \frac{1}{v} + \frac{1}{-9}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{9} - \frac{1}{4}$$

$$\Rightarrow \frac{1}{v} = \frac{-5}{36} \Rightarrow v = 7.2 \text{ cm}$$

20)

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

$$m = -3$$

$$b = ?$$

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

$$\Rightarrow -3 = \frac{v}{20}$$

$$\Rightarrow v = -60 \text{ cm}$$

P

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

$$\Rightarrow \frac{1}{b} = \frac{1}{60} + \left(-\frac{1}{20}\right)$$

$$= \frac{-1-3}{60}$$

$$= \frac{-4}{60}$$

$$b = -15 \text{ cm}$$

22. Radius of Curvature = -1.5m

$$R = \frac{1}{\frac{1}{R}} = \frac{1}{-1.5} = -0.75\text{m}$$

\Rightarrow Distance of Object = -10m

Distance of Image,

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

$$\Rightarrow \frac{1}{0.75} = \frac{1}{v} + \frac{1}{-10}$$

$$\Rightarrow \frac{-100}{75} = \frac{1}{v} - \frac{1}{10}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{10} - \frac{4}{3}$$

$$\Rightarrow v = 0.81\text{m}$$

24. Distance of Object = -10cm

$$M = 3$$

Image =

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

$$3 = \frac{-v}{-10}$$

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

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

$$\Rightarrow \frac{1}{s} = \frac{1}{30} - \frac{3}{30} = -\frac{2}{30}$$

$$\Rightarrow \frac{1}{s} = -\frac{1}{15}$$

$$\Rightarrow s = -15 \text{ cm}$$

$$2b) \quad f = 20 \text{ cm}$$

$$u = -\frac{1}{4}$$

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

$$\frac{1}{4} = \frac{v}{u}$$

$$v = \frac{u}{4}$$

$$\Rightarrow \frac{1}{s} = \frac{1}{v} + \frac{1}{u}$$

$$\Rightarrow \frac{1}{s} = \frac{4}{u} + \frac{1}{u}$$

$$\Rightarrow \frac{1}{20} = \frac{5}{u}$$

$$\Rightarrow u = -100 \text{ cm}$$

30) $u = -15 \text{ cm}$
 $f = -30 \text{ cm}$
image distance -

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

$$\Rightarrow \frac{1}{-30} = \frac{1}{v} - \frac{1}{15}$$

$$\Rightarrow \frac{1}{v} = \frac{2-1}{30} = \frac{1}{30}$$

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