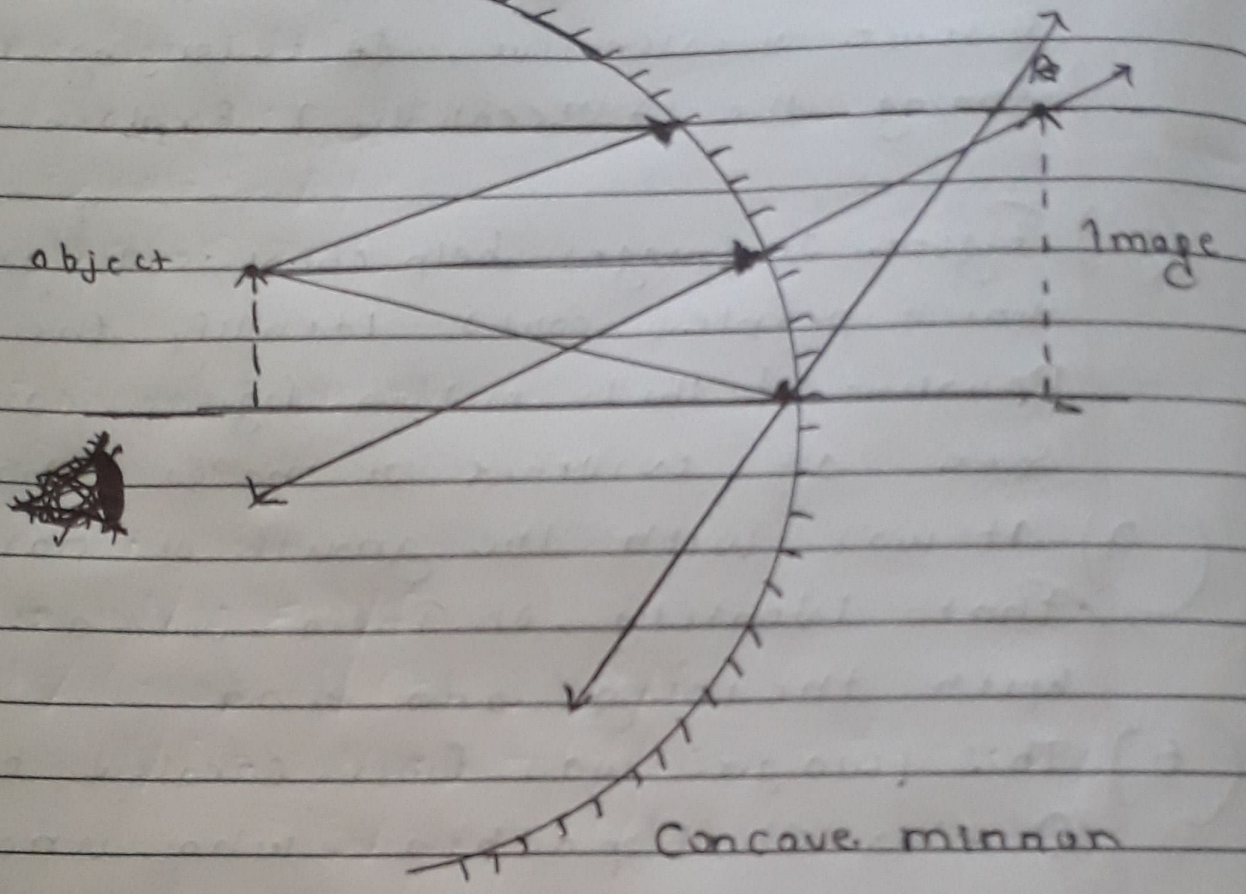
seen as evidence of

11) (a)



$f = -20cm$

$v = -10\ cm$

use formula, $1/v + 1/v = 1/f$

or, $1/v = 1/f - 1/v$

or $1/v = 1/20 - 1/-10$

$1/v = -1/20 + 1/10 = 1/20$

or $v = +20cm$

Hence image position is 20cm right side from the pole of concave mirror as shown in diagram

$u = -36$ cm

$f = -12$ cm

We know that

$1/v + 1/u = 1/f$

$= 1/v + 1/(-36) = 1/(-12)$

$\Rightarrow 1/v = 1/36 - 1/12 = (1-3)/36 = (-2/36)$

$= (1/18)$

The position of the image is 18cm in front the mirror

magnification $m = h_2/h_1 = -(v/u)$

$h_2/10 = -((-18)/(-36))$

$h_2 = -5$ cm

The image formed is real and inverted

3) $f = +10$cm

$h_0 = 2$cm

$h_1 = 6$cm

We need to find the object distance

So we know that

magnification $m = h_1/h_0$

$h_1/h_0 = 6/2$

$= 3$ (erect image)

$m = -v/u$

$3 = v/u$

$v = -3u$

Let now consider minnon formula

$1/v + 1/u = 1/f$

$1/3u + 1/u = 1/(-10)$

$\Rightarrow u = -2.0/3$

$u = -6.7\,cm$

(4) $u = -15\,cm \qquad v = -10\,cm$

$f =$

We know that

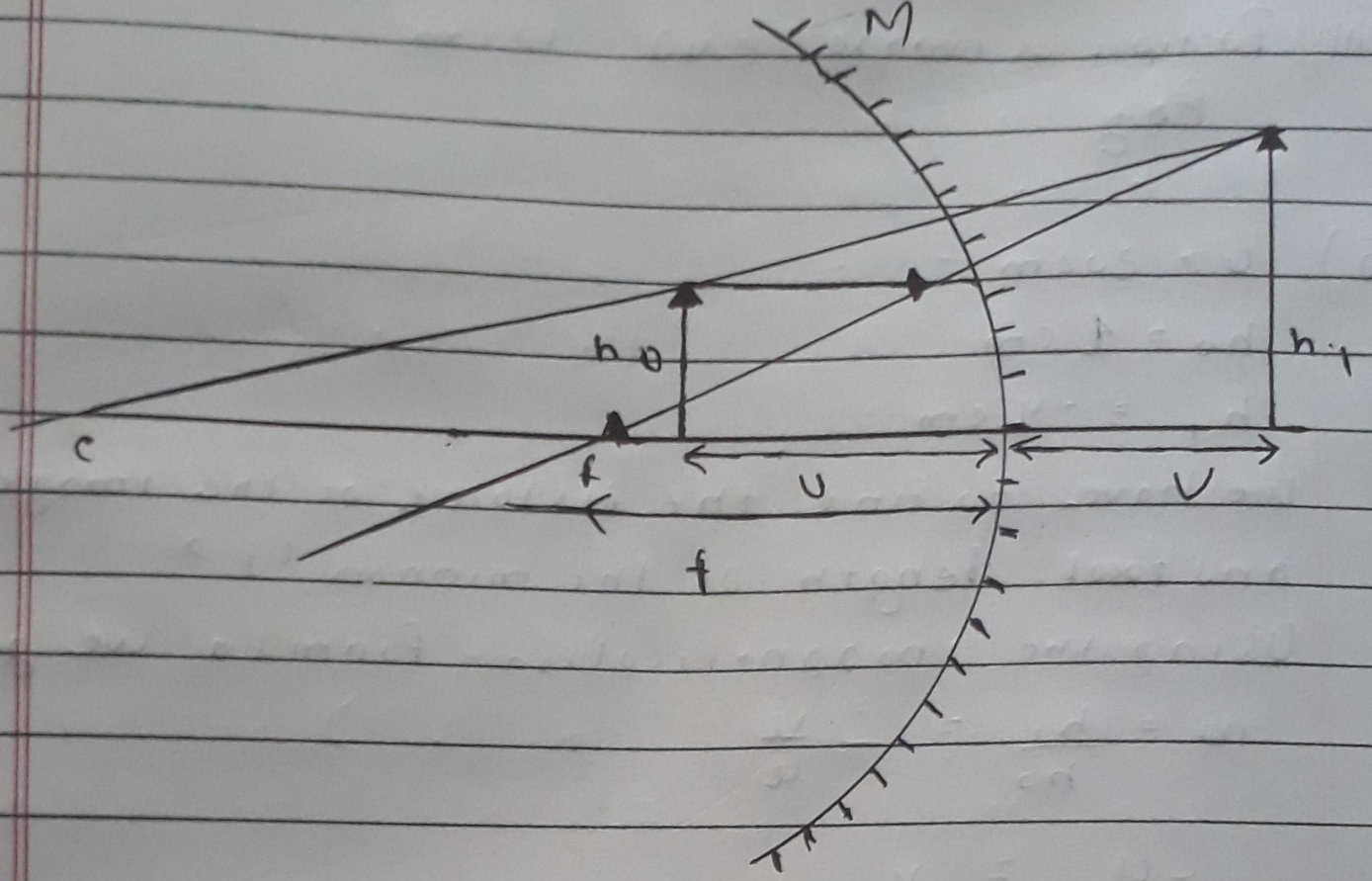
$1/v + 1/u = 1/f$

$1/(-10) + 1/(-15) = 1/f$

$1/f = -(1/10) - (1/15) = -(3-2)/30$

$= 5/30 = -1/6$

$f = -6$



(h) = 3cm

(u) = -8cm

(h') = 4.5

Let's first 'v' first =

$$-v/u = h'/h$$

$$v = -u \times h'/h$$

$$v = (-8) \times 4.5/3$$

$$v = 12cm$$

focal length of mirror = ?

$$1/f = 1/v + 1/u$$

$$1/f = 1/12 + 1/-8$$

$$1/f = -1/24$$

$$24 = -f$$

$$f = -24$$

(iii) Postion of image (v) = 12 cm

(16) $u = 20cm$

$h_o = 1 cm$

$h_i = -4 cm$

We have to find the distance of the image 'v' and focal length of the mirror 'f'

Using the magnification formula we get.

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

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

$$v = 20 \times -4 = -80 cm$$

Thus the distance of the image 'v' is 80cm

Now using the mirror formula we get

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

$$\frac{1}{f} = \frac{1}{-80} + \frac{1}{-20} = -\frac{1}{80} - \frac{4}{80} =$$

$$\frac{1}{f} = -\frac{1}{16}$$

$$f = 16cm$$

Thus the focal length of the concave mirror is 16 cm

$h_o = 7.8$ cm

a. $1/v = 1/f - 1/u$

$1/v = -1/18 + 1/27 = -1/2.4$

$v = -5.4$ cm

$h_1/h_o = v/u$

$h_1/h_o = v/u$

$h_1/7 = +54 / -27$ $h_1 = -2 \times 7 = -14$ cm

) $h_1 = 30$ cm, $u = -10$ cm, $f = -20$ cm

$1/v + 1/u = 1/f$

$1/v = 1/f - 1/u = 1/(-20) - 1/(-10)$

$-(1/20) + 1/10 = (-1+2)/20$

$= 1/20$

$v = 20$ cm

$m = -(v/u) = h_2/h_1$

$\Rightarrow (20)/(-10) = h_2/3$

$h_2 = 6$ cm

(19) $h_1 = 2cm$ $u = -9cm$, $f = -4cm$

We know that

$1/v + 1/u = 1/f$

$1/v = 1/f - 1/u = 1/(-4) - 1/(-9)$

$-(1/4) + 1/9 = (-9+4)/36 = (5/36)$

$v = -7.2cm$

The image is formed at a distance 7.2cm in front of the mirror

$m = -(v/u) = (-7.2)/-9 = 0.8$

$m = h_2/h_1 \Rightarrow 0.8 = h_2/2 \Rightarrow h_2 = 1.6cm$

Hence the image is 1.6 cm in size real and inverted

(20) Given

$u = -20cm$, $m = -3$

We know that

$m = -(v/u)$

$m = -3 = (v/(-20))$

$v = -60cm$

We have

$1/u + 1/v = 1/f$

$1/(-60) + 1/(-20) =$

$1/f = \frac{-1}{60} - \frac{1}{20}$

$m = 3$

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

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

$3u = -3v$

Therefore the distance of the image (v) is $3v$

Again using the mirror formula we get,

$1/f = 1/v + 1/u$

$1/f = 1/-3v + 3/3v = 2/3v$

$f = 3v/2$

$v = \frac{2f}{3} = \frac{(2 \times (-15))}{3}$

$v = -10cm$