Answer on Question #52215-Physics-Optics

A concave mirror has a radius of curvature of 24.0cm. Determine the object position for which the resulting image is upright and larger than the object by a factor of 3.00. Is the image real of virtual?

Solution

In this case the image is virtual. R = 24.0cm.

$$\left|\frac{v}{u}\right| = 3.$$

$v = -3u$ where u is object distance and v is image distance.

The negative sign arises because image distance is behind mirror (virtual).

Using mirror formula

$$\frac{1}{u} + \frac{1}{v} = \frac{2}{R}$$

with $v = -3u$

$$\frac{1}{u} - \frac{1}{3u} = \frac{2}{24}.$$

$$\frac{2}{3u} = \frac{1}{12}.$$

$$u = \frac{24}{3} = 8\ cm.$$

Answer: $8\ cm$; virtual.