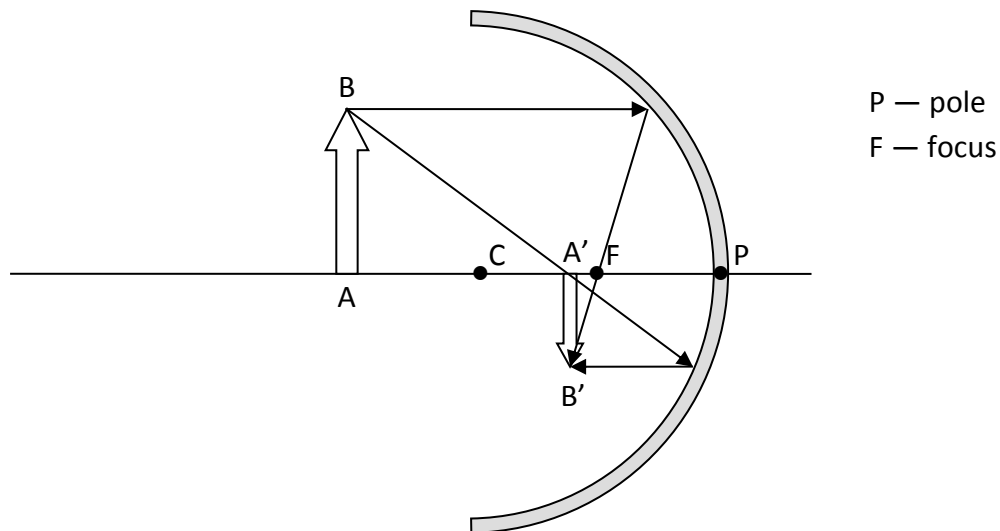Answer on Question #62129 - Physics - Optics

Question:

A 20 cm object is placed on the principal axis of a concave mirror at a distance 12 cm from the pole. If the image is inverted real and 5 cm high find the location of image and the focal length of the mirror?

Solution:

Let |AB| = H, |A'B'| = h, |AP| = D, |A'P| = d, focal length f = |FP|.

H = 20 см, h = 5 cm, D = 12 cm

Magnification for this spherical mirror $M = \frac{h}{H}$.

On the other hand $M = \frac{d}{D}$ and we can write that $\frac{h}{H} = \frac{d}{D}$ and therefore $d = D \times \frac{h}{H}$.

So, $d = 12 \times \frac{5}{20} = 3$ cm.

The formula for spherical mirror looks like this: $\frac{1}{f} = \frac{1}{D} + \frac{1}{d}$. So we can derive that $f = \frac{1}{\frac{1}{D} + \frac{1}{d}}$.

Thus, $f = \frac{1}{\frac{1}{12} + \frac{1}{3}} = 2.4$ cm.

Answer:

The distance of image from the pole is 3 cm.

Focal length of the mirror is 2.4 cm.

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