Answer on Question 52380, Physics, Optics

Question:

A convex mirror has a radius of $20cm$. An object is placed $30cm$ in front of the mirror. Determine where the image will appear.

a) $-4.5cm$

b) $-5.5cm$

c) $-6.5cm$

d) $-7.5cm$

Solution:

Let's first find the focal length of the convex mirror. By the definition, the focal length of the curved mirror is half a radius of curvature:

$$f = \frac{R}{2} = \frac{20cm}{2} = 10cm.$$

Then, from the mirror equation we have:

$$\frac{1}{d_{image}} + \frac{1}{d_{object}} = \frac{1}{-f},$$

$$\frac{1}{d_{image}} + \frac{1}{30cm} = \frac{1}{-10cm},$$

$$\frac{1}{d_{image}} = -\frac{1}{10cm} - \frac{1}{30cm} = -\frac{4}{30cm} = -\frac{2}{15cm} = -\frac{1}{7.5cm},$$

$$d_{image} = -7.5cm.$$

The negative sign of d_{image} indicate that image is located behind the convex mirror.

Answer:

d) $-7.5cm$