Answer on Question#65152, Physics / Optics

Question

An object $10\ cm$ in front of a concave mirror forms an image $5\ cm$ behind the mirror. What is the focal length of the mirror?

Solution

Location of image behind a concave mirror implies that we have the case when object is between focal point and mirror (image magnified).

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

where f − focal length, d_o − object distance, d_i − image distance.

Accordingly to the sign convention used here, for concave mirror f should be positive, as well as d_o, while d_i can change sign: "+" if image real (in front of the mirror) and "−" if image virtual (behind the mirror).

Then, for given case:

$$\frac{1}{f} = \frac{1}{10} - \frac{1}{5} = -\frac{1}{10} \rightarrow f = -10 < 0$$

Contradiction. Thus, there is no possible solution.