Answer on question #52721, Physics, Optics

Question An object placed in front of a convex mirror of radius 20cm produces an erect image which is one-fifth the size of the object. How far is the object from the mirror?

20 cm

30 cm

40 cm

50 cm

Solution Focal length of the mirror is $f = R/2 = 10$ cm. The magnification is

$$M = \frac{h_i}{h_o} = \frac{1}{5}$$

so we know that $d_i = -d_o/5$ now we can use mirror equation to find d_o - distance of object.

$$\frac{1}{f} = \frac{1}{d_o} - \frac{5}{d_i} = -\frac{4}{d_o}$$

$$d_o = 4f = 4 \cdot 10 = 40\, cm$$

Answer is 40 cm.