

**Answer on Question #65380, Physics / Optics**

How can be calculated total focal length and power when two lenses are in contact.

**Solution:**

Focal length  $F$  of two thin lenses in contact is given by:

$$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} \quad (1),$$

where  $f_1$  and  $f_2$  are the focal lengths of two thin lenses.

$$\text{Of (1)} \Rightarrow F = \frac{f_1 \times f_2}{f_1 + f_2} \quad (2)$$

Power  $P$  of two thin lenses in contact is given by:

$$P = P_1 + P_2 \quad (3),$$

where  $P_1$  and  $P_2$  are the powers of two thin lenses.

Relationship between power  $P$  and focal length  $F$ :

$$P = \frac{1}{F} \quad (4)$$

(2) in (4):

$$P = \frac{f_1 + f_2}{f_1 \times f_2}$$

**Answer:**

$$\text{Total focal length: } F = \frac{f_1 \times f_2}{f_1 + f_2}$$

$$\text{Total power: } P = \frac{f_1 + f_2}{f_1 \times f_2}$$