

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:

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

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