Answer on Question #46579-Physics-Electric Circuits

An electrical source with internal resistance r is used to operate a lamp of resistance R. What fraction of the total power is delivered to the lamp?

Solution

An electrical source is connected with the lamp in series. So

$$I_{\text{source}} = I_{\text{lamp}} = I_{\text{total}} = I.$$

Total resistance of an electric circle is

$$R_{\text{total}} = R + r.$$

Total power is

$$P = I^2 R_{\text{total}} = I^2(R + r).$$

Power is delivered to the lamp is

$$P_{\text{lamp}} = I^2 R.$$

Thus

$$\frac{P_{\text{lamp}}}{P} = \frac{I^2 R}{I^2(R + r)} = \frac{R}{R + r}.$$