

Answer on Question #43200 – Physics – Electric Circuits

Question.

A $26\ \Omega$ loudspeaker and an $8\ \Omega$ loudspeaker are connected in parallel across the terminals of an amplifier. Assuming the speakers behave as resistors, calculate the equivalent resistance of the two speakers.

Given:

$$R_1 = 26\ \Omega$$

$$R_2 = 8\ \Omega$$

Find:

$$R = ?$$

Solution.

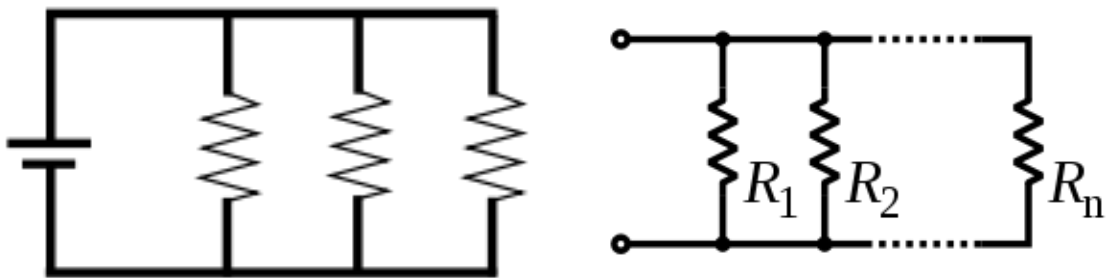


Fig.1. The parallel circuit.

By definition to find the total resistance of all components, add the reciprocals of the resistances R_i of each component and take the reciprocal of the sum. Total resistance will always be less than the value of the smallest resistance.

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$$

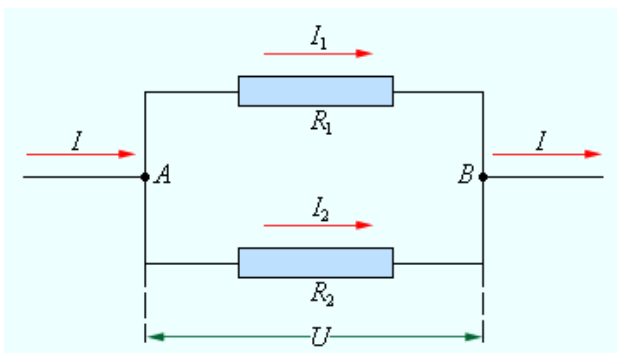


Fig.2. The parallel circuit of loudspeakers in our case.

In our case,

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \rightarrow R = \frac{R_1 R_2}{R_1 + R_2}$$

Calculate:

$$R = \frac{26 \cdot 8}{26 + 8} = \frac{208}{34} = 6.12 \Omega$$

Answer.

$$R = \frac{R_1 R_2}{R_1 + R_2} = 6.12 \Omega$$