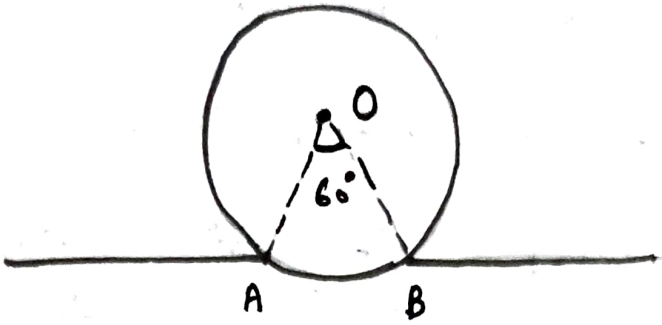
Qus. A Resistor of 24Ω resistance is bent in the form of a circle as shown in fig.
What is the effective resistance between points A and B?



Solution- Resistance of the portion making an angle 60° at centre O is

Resistance by 2π —— R

means Resistance of the portion making an angle 360°

360° —— R {full Resistance}

Resistance of portion making an angle 1° 1° —— $\frac{R}{360^\circ}$

Resistance of portion making an angle 60° →

$$60^\circ \text{ —— } \frac{R}{360^\circ} \times 60^\circ = \frac{R}{6}\,\Omega$$

Given $R = 24\,\Omega$ so, $\frac{R}{6} = \frac{24}{6} = 4\,\Omega$

Resistance of portion making an angle of 60° at centre $0^\circ = 4\,\Omega$

Let $R_1 = 4\,\Omega$

R_2 = Resistance of remaining portion $= 24 - 4 = 20\,\Omega$.

as R_1 & R_2 are in parallel

so effective resistance b/w A & B

$$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{4} + \frac{1}{20} \Rightarrow \frac{5+1}{20} = \frac{6}{20}\,\Omega$$

$$R_{eff} = \frac{20}{6}\,\Omega = \frac{10}{3}\,\Omega.$$ Ans