Circle

Question1

If in two circles, arcs of the same length subtend angles 30° and 78° at the centre, then the ratio of their radii is

KCET 2024

Options:

A. $\frac{5}{13}$

B. $\frac{13}{5}$

C. $\frac{13}{4}$

D. $\frac{4}{13}$

Answer: B

Solution:

Let the radii of the two circles be r_1 and r_2. Let an arc of length l subtend an angle of 30° at the centre of the circle of radius r_1, while let an arc of length l subtend an angle of 78° at the centre of the circle of radius r_2.

Now, $30^\circ = \frac{\pi}{6}$ radian and $78^\circ = \frac{13\pi}{30}$ radian

We know that in a circle of radius r unit, if an arc of length l unit subtend an angle θ radian at the centre, then

$$
\begin{aligned}
& \theta = \frac{l}{r} \text{ or } l = r\theta \\
\therefore \quad & l = \frac{r_1\pi}{6} \text{ and } l = \frac{r_2 13\pi}{30} \\
\Rightarrow \quad & \frac{r_1\pi}{6} = \frac{r_2 13\pi}{30} \\
\Rightarrow \quad & r_1 = r_2 \frac{13}{5} \\
\Rightarrow \quad & \frac{r_1}{r_2} = \frac{13}{5}
\end{aligned}
$$

Question2

The maximum area of a rectangle inscribed in the circle $(x+1)^2+(y-3)^2=64$ is

KCET 2018

Options:

A. 64 sq units

B. 72 sq units

C. 128 sq units

D. 8 sq units

Answer: C

Solution:

To determine the maximum area of a rectangle inscribed in the circle given by the equation $(x+1)^2+(y-3)^2=64$, we can use the known fact that for any rectangle inscribed in a circle, the maximum area is achieved when the rectangle is a square. This maximum area is given by the formula $2r^2$, where r is the radius of the circle.

Looking at the provided circle equation:

$(x+1)^2+(y-3)^2=64$

We can identify that the circle's center is at $(-1,3)$ and its radius is $\sqrt{64}=8$.

Therefore, the maximum area of a rectangle inscribed in this circle is:

$2\times(8)^2=2\times64=128$ square units
