An object moves in a quadrant of radius R from point A to B such that A & B lie on two ends of the quadrant & the force applied is always directed towards B. Find the work done.

**Solution:**

Formula for work:

$$A = \int_A^B \vec{F} * \overrightarrow{ds} = \int_A^B F * ds * \cos\alpha * d\alpha (1)$$

$$ds = R * \alpha$$

For a small angle alpha:

$$\alpha \approx \sin\alpha$$

$$ds = R\sin\alpha\ (2)$$

$$(2) in\ (1):$$

$$A = \int_A^B FR\sin\alpha * \cos\alpha\, d\alpha = \int_A^B FRcos\ \alpha\, d(cos\alpha) = \frac{FR\cos^2\alpha}{2} \Big| \begin{matrix} B \\ A \end{matrix} =$$

$$= \frac{FR\cos^2\alpha}{2} \Big| \begin{matrix} 0 \\ \frac{\pi}{4} \end{matrix} = \frac{FR\cos^2 0}{2} - \frac{FR\cos^2 45^o}{2} =$$

$$= \frac{FR}{2} - \frac{FR}{4} = \frac{FR}{4}\ (F - force, R - radius)$$

**Answer:** A=$\frac{FR}{4}$