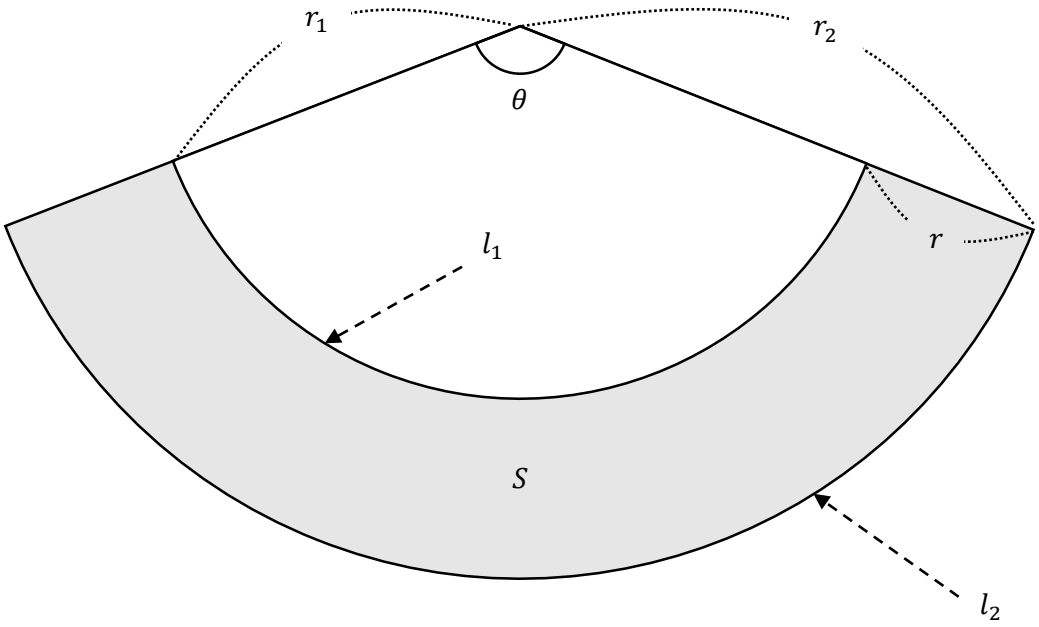
Area of Arc

$\theta = \frac{l}{r}$ $\quad\quad$ $l = r\theta$

$S_{circle} = \pi r^2$ $\quad\quad$ $S_{arc} = \pi r^2 \cdot \frac{\theta}{2\pi} = \frac{1}{2} r^2 \theta$



$r = r_2 - r_1$

$$S = \frac{1}{2} {r_2}^2 \theta - \frac{1}{2} {r_1}^2 \theta = \frac{1}{2}\theta({r_2}^2 - {r_1}^2) = \frac{1}{2}\theta(r_2 + r_1)(r_2 - r_1)$$

$$= \frac{1}{2}\theta(r_1 + r_2) \cdot r = \frac{1}{2} r(r_1\theta + r_2\theta) = \frac{1}{2} r(l_1 + l_2)$$