Solve $\log_3 sinx - \log_3 cosx = 0.5$ for $0 \leq x \leq 2\pi$

Use log law:

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

$$\log_3 sinx - \log_3 cosx = 0.5$$

$$\log_3 \frac{sinx}{cosx} = 0.5$$

$$tanx = \frac{sinx}{cosx}$$
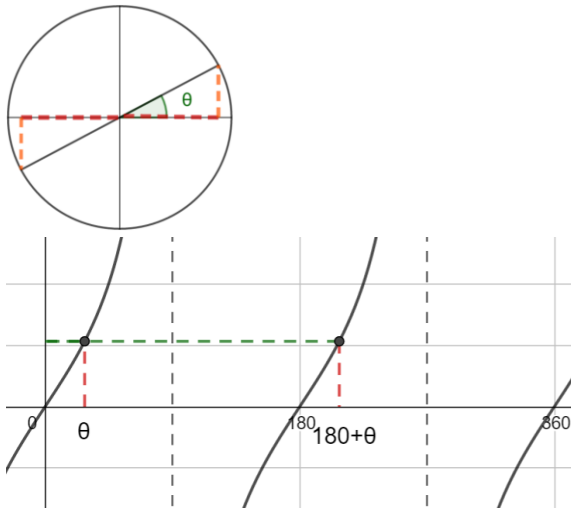
$$\log_3 tanx = 0.5$$

Definition of logarithms:

$$a^x = b \Leftrightarrow x = \log_a b$$

$$3^{0.5} = tanx$$

$$tanx = \sqrt{3}$$

$$\text{Arctan}(\sqrt{3}) = \frac{\pi}{3}$$

Tangent is **positive** in quadrants 1 & 3

$$x = \frac{\pi}{3}, \pi + \frac{\pi}{3}$$

$$\boldsymbol{x = \frac{\pi}{3}, \frac{4\pi}{3}}$$