

One Tough Question

A cosine function has an amplitude of $\sqrt{2}$,
and a vertical translation of 1. ~~x~~ ~~y~~

If it passes through the point $(3.75, 0)$, and
its instantaneous rate of change is positive at
that point, what is the period of the function?

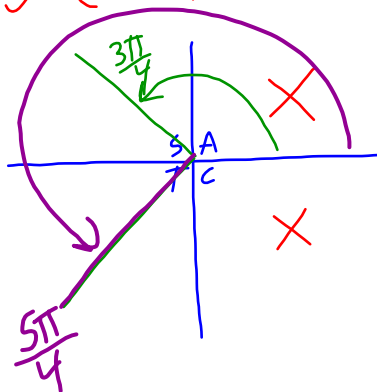
$$y = \sqrt{2} \cos(kx) + 1$$

$$0 = \sqrt{2} \cos(3.75k) + 1$$

$$\frac{-1}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2}} \cos(3.75k)$$

$$\frac{-1}{\sqrt{2}} = \cos(3.75k)$$

$$\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right) = 3.75k$$



$$2\frac{\pi}{4} + \frac{\pi}{4} = \frac{3\pi}{4}$$

$$\frac{3\pi}{4} = 3.75k$$

$$k = \frac{3\pi}{4} \div 3.75$$

$$k = \frac{3\pi}{15}$$

$$k = \pi/5$$

$$\text{Period} = \frac{2\pi}{\pi/5}$$

$$\text{Period} = 10$$

$$\frac{5\pi}{4} = 3.75k$$

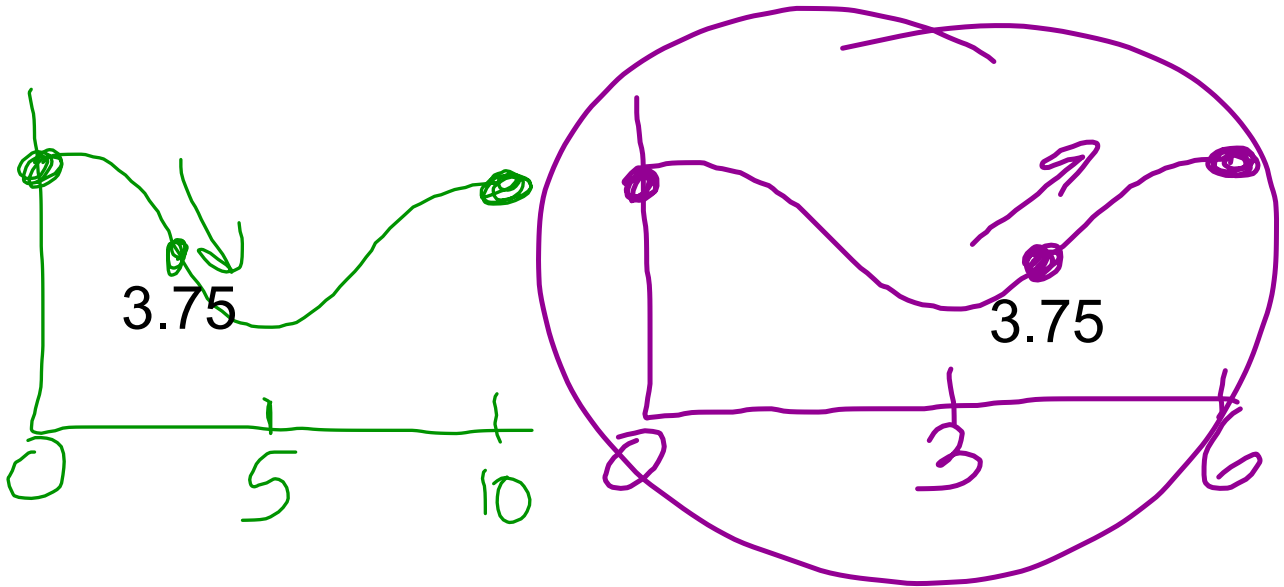
$$k = \frac{5\pi}{4} \div 3.75$$

$$k = \frac{5\pi}{15}$$

$$k = \pi/3$$

$$\text{Period} = \frac{2\pi}{\pi/3}$$

$$\text{Period} = 6$$



Period = 6