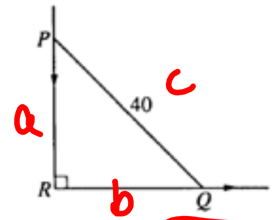


$b' = \frac{3}{4}(a')$

c is const.

34. In the figure above, PQ represents a 40-foot ladder with end P against a vertical wall and end Q on level ground. If the ladder is slipping down the wall, what is the distance RQ at the instant when Q is moving along the ground $\frac{3}{4}$ as fast as P is moving down the wall?

(A) $\frac{6}{5}\sqrt{10}$ (B) $\frac{8}{5}\sqrt{10}$ (C) $\frac{80}{\sqrt{7}}$ (D) 24 (E) 32

$$a^2 + b^2 = 40^2$$

$$2aa' + 2bb' = 0$$

$$aa' + bb' = 0$$

$$aa' + b\left(-\frac{3}{4}a'\right) = 0$$

$$a = \frac{3}{4}b$$

$$a^2 + b^2 = 40^2$$

$$\left(\frac{3}{4}b\right)^2 + b^2 = 40^2$$

$$\frac{9}{16}b^2 + b^2 = 1600$$

$a = 3x = 24$

$b = 4x = 32$

$c = 5x = 40$

$$\frac{25}{16}b^2 = 1600$$

$$b^2 = \frac{1600 \cdot 16}{25} \rightarrow b = \frac{40 \cdot 4}{5} = 32$$

November 18, 2019

39. The radius of a circle is increasing at a nonzero rate, and at a certain instant, the rate of increase in the area of the circle is numerically equal to the rate of increase in its circumference. At this instant, the radius of the circle is

(A) $\frac{1}{\pi}$ (B) $\frac{1}{2}$ (C) $\frac{2}{\pi}$ (D) 1 (E) 2

$A' = C'$

$A = \pi r^2$

$C = 2\pi r$

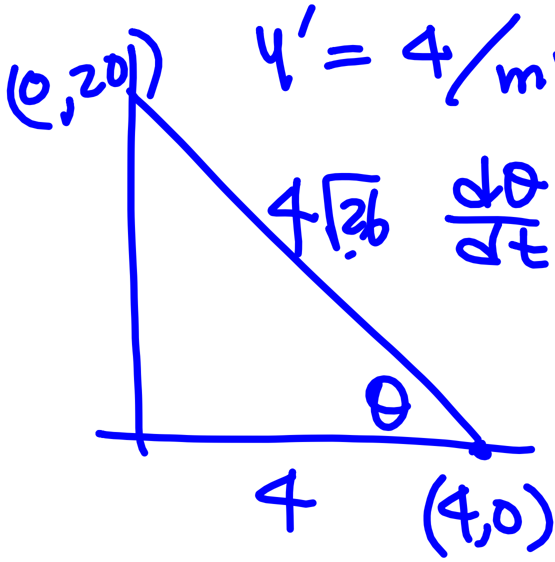
$\cancel{2\pi} r \cancel{r'} = \cancel{2\pi} \cancel{r'}$

$r = 1$

$A' = 2\pi r r'$

$C' = 2\pi r'$

$\frac{dC}{dt} = 2\pi \frac{dr}{dt}$



$y' = 4/\text{min}$

$\frac{d\theta}{dt} = ?$

$\tan\theta = \frac{y}{4}$

$\sec^2\theta \frac{d\theta}{dt} = \frac{1}{4}\frac{dy}{dt}$

$\sec\theta = \frac{\cancel{4}\sqrt{26}}{\cancel{4}}$

$26\,\theta' = 1$

$\theta' = \frac{1}{26}$