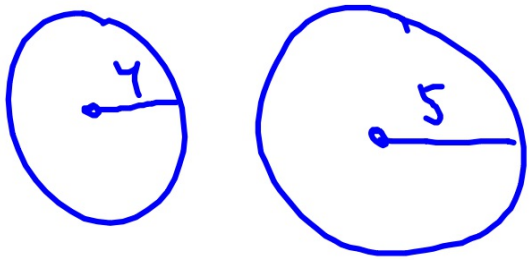
2.6A Related Rates

WCID? I can solve related rates problems

A Circle → Change its radius



1. Time is the boss
2. Related Rates measure how the change in 1 quantity affects another
3. Steps
   a. Determine what you need
   b. Determine what you have
   c. Draw a picture (sometimes)
   d. Write an equation
   e. Derive and Solve

Ex. If $y = x^2 + 3$ find $\frac{dy}{dt}$ if when $x = 1$ $\frac{dx}{dt} = 2$.

a. $\frac{dy}{dt}$

b. $\frac{dx}{dt} = 2$
$x = 1$

c. N|A

d. $y = x^2 + 3$

e. $\frac{dy}{dt} = 2x\frac{dx}{dt}$

$\frac{dy}{dt} = 2(1)(2) = 4$

Ex. If $\frac{dx}{dt} = 1$ when $x = 6$,

find $\frac{dy}{dt}$ if $x^2 + y^2 = 100$.

a. $\frac{dy}{dt}$

b. $\frac{dx}{dt} = 1$

$x = 6$

c. N/A

d. $x^2 + y^2 = 100$

e. $2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$-2x\frac{dx}{dt}$ $\quad -2x\frac{dx}{dt}$

$\frac{2y\frac{dy}{dt}}{2y} = \frac{-2x\frac{dx}{dt}}{2y}$

$= \frac{-2(6)(1)}{2(8)}$

$= -\frac{3}{4}$

$x^2 + y^2 = 100$

$(6)^2 + y^2 = 100$

$36 + y^2 = 100$

$y^2 = 64$

$y = 8$