RELATED RATES PRACTICE

March 22, 2017

STEPS FOR SOLVING PROBLEMS WITH RELATED RATES
(1) Draw a picture representing the problem.
(2) Write down what you know and what you need to find out.
(3) Label your picture with the known and unknown variables.
(4) Find the equation that relates the variables.
(5) Take the derivative of the equation relating the variables with respect to t. Remember your Derivative Rules!
(6) Substitute the given values into the equation from Step 5.
(7) Use the equation from Step 4 to find the missing pieces of information.
(8) Solve for the final missing piece and you're done!

(1) If the radius of a balloon is increasing at a constant rate of 0.03 in/min, how fast is the volume of the balloon changing at the time when its radius is 5 inches?

(2) An oil spill expands in a circular pattern. Its radius increases at a constant rate of 1 m/s. What is the rate of change of the area of the spill at time t = 1 minute?

(3) The length of a rectangle increases by 3 ft/min while the width decreases by 2 ft/min. When the length is 15 ft and the width is 40 ft, what is the rate of change of:

(a) the area?

(b) the perimeter?

(4) The volume of a tree is given by $V = \frac{1}{12\pi}C^2h$, where C is the circumference of the tree at ground level (in meters) and h is the height of the tree (in meters). Both C and h are functions of time (in years).

(a) Find a formula for $\frac{dV}{dt}$. What does it represent?

(b) Suppose the circumference grows at a rate of 0.2 meters per year and the height grows at a rate of 4 meters per year. How fast is the tree growing when the circumference is 5 meters and the height is 22 meters?