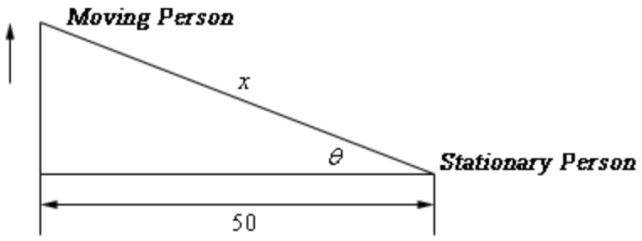
More Word Problems

In today's worksheet we will practice word problems that are commonly associated to related rates problems. That is to say the following questions are similar to many related rates problems where your ability to understand and describe the following word problems combined with implicit differentiation will make you successful in solving the problems.

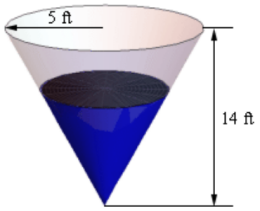
Problem 1. Air is being pumped into a spherical balloon at a constant rate. The volume of the balloon can be described by the function $V(t) = 5t$ where t is the number of minuets after pumping began, and volume is in cubic centimeters. Determine how long after you start pumping will the diameter of the balloon be 20 cm.

Problem 2. A 15 foot ladder is resting against the wall. The bottom is initially 10 feet away from the wall and is being pushed towards the wall at a constant rate. The distance the bottom of the ladder is from the wall can be described by the function $B(t) = \frac{1}{4}t$ where t is the number of seconds since we first started pushing and distance is in feet. How high on the wall is the top of the ladder 12 seconds after we start pushing?

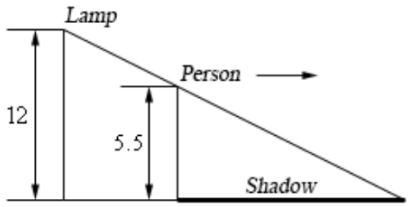
Problem 3. Two people are 50 feet apart. One of them starts walking north at a constant rate. The angle shown in the diagram below can be described by the following function $A(t) = 0.01t$ where t is minuets after the first person started walking and the angle is measured in radians. At what time is distance between the two people 15 feet? (you will most likely need to use a calculator)



Problem 4. A tank of water in the shape of a cone is leaking water at a constant rate. The base radius of the tank is 5 ft and the height of the tank is 14 ft. The volume of water in the cone is given by the function $V(T) = 2t$ where t is the hours after the cone started leaking, and volume is given in cubic feet. How many hours after the cone started leaking will the depth of the water be 6ft? (recall the volume of a cone is given by $V = \frac{1}{3}\pi r^3 h$)



Problem 5. A light is on the top of a 12 ft tall pole and a 5ft 6in tall person is walking away from the pole at a constant rate. The function describing how far away from the pole the person is given by $D(t) = 2t$ where t is seconds after the person started walking and distance is given in feet. How long after the person started walking is the length of the shadow 4ft?



Problem 6. Two people on bikes are separated by 350 meters. Person A starts riding north at a constant rate of 5 m/sec and 7 minutes later Person B starts riding south at a constant rate of 3 m/sec. How far apart are the two riders 25 minutes after Person A starts riding?