

Name: _____

Date: _____

Learning Goal 3.7

Creating confidence in word problems.

Play Day**General Steps:**

1. Draw a diagram if possible and write down the givens using appropriate notations.
2. Write down which rate you want to solve for.
3. Write an equation that relates the variables of the problem. If there are more than two variables, try to eliminate one by substitution and/or the geometric property of the problem.
4. Use implicit differentiation to differentiate both sides of the equation with respect to t .
5. Substitute the given information into the resulting equation and solve for the unknown rate.

1. It is found that a certain manufacturer produces q thousand units per week when the unit price is $\$p$. Suppose the relationship between q and p is $q^2 - 3pq + p^2 = 5$. What is the rate of change of the supply when the quantity produced is 4 000 units and the unit price is $\$11$, increasing at a rate of $\$0.10$ per week?
2. You are inflating a spherical balloon at the rate of $7 \text{ cm}^3/\text{s}$. How fast is the radius increasing when the radius is 4 cm?
3. Water is poured into a conical container at the rate of $10 \text{ cm}^3/\text{s}$. The cone points directly down, and it has a height of 30 cm and a base radius of 10 cm. How fast is the water level rising when the water is 4 cm deep at its deepest point?
4. A swing consists of a board at the end of a 10 ft long rope. Think of the board as a point P at the end of the rope, and let Q be the point of attachment at the other end. Suppose that the swing is directly below Q at time $t = 0$, and is being pushed by someone who walks at $6 \text{ ft}/\text{s}$ from left to right.
 - a. How fast is the swing rising after 1 s?
 - b. What is the angular speed of the rope in deg/s after 1 s?
5. A road running north to south crosses a road going east to west at the point P . Car A is driving north along the first road and car B is driving east along the second road. At a particular time car A is 10 km to the north of P and travelling at $80 \text{ km}/\text{hr}$, while car B is 15 km to the east of P and traveling at $100 \text{ km}/\text{hr}$. How fast is the distance between the two cars changing?