

LESSON 8: RELATED RATES

- Objectives:
1. To recognize a related rate problem
 2. To apply the derivative in solving related rate problems

Solving Related Rate Problems

1. Draw a picture
2. Identify known and unknown values
3. Write an equation involving the variables whose rates of change are either given or to be determined
4. Differentiate both sides of the equation wrt time t
5. Substitute into the resulting equations all known values of variables and rates of change and solve algebraically

Examples

1. The radius r of a circle is increasing at a rate of 2 inches per minute. Find the rate of change of the area when the radius is 6 inches.
2. The radius r of a sphere is increasing at a rate of 2 inches per minute. Find the rate of change of the volume when the radius is 6 inches.
3. At a sand plant, sand is falling off a conveyor into a conical pile at the rate of 10 cubic feet per minute. The diameter of the base of the cone is approximately three times its altitude. At what rate is the height of the pile changing when it is 15 feet high?

4. A 6-foot person is walking away from a light pole at the rate of 10 feet/second. The light is 15 feet above the ground. How fast is the person's shadow lengthening?
5. A 13-foot ladder is leaning against a wall. If the bottom of the ladder begins to slip away from the wall at the rate of 4 ft/sec, how fast is the top of the ladder moving down the wall when the bottom of the ladder is 5 feet from the wall.
6. A lighthouse that sits in a bay has a light which rotates 1 complete revolution each minute. The point A on the straight shoreline that is closest to the lighthouse is 200 yards away. How fast is the light moving along the shore when it is 150 feet from point A?