

## Related Rates Problems

1. Air is pumped into a spherical balloon at a rate of  $50 \text{ cm}^3$  per minute. How fast is the radius of the balloon increasing when the diameter is 20 cm?
2. A 15-foot ladder is resting against a wall. The bottom of the ladder is initially 10 feet away from the wall, and is being pulled away from the wall at a rate of  $\frac{1}{4}$  feet per second. How fast is the top of the ladder moving after 8 seconds?
3. A tank in the shape of a cone (vertex down) has a height of 10 feet and the radius at the top is 5 feet. Water is being pumped into the tank at a rate of  $3 \text{ ft}^3$  per minute. How fast is the water level rising when the depth of water in the tank is 6 feet?
4. A rocket launches vertically, 5 miles away from a tracking device at the same elevation as the launch site. The tracking device measures the angle of elevation of the rocket above ground. If the angle of elevation changes at  $\frac{\pi}{90}$  radians/second, find the velocity of the rocket in miles per hour when the angle of elevation is  $\frac{\pi}{6}$  radians.