

Related Rates

1. A spherical balloon is being inflated at a constant rate of 100 cubic feet/minute. How fast is the radius of the balloon increasing at the instant when the radius is 5 feet?

2. A ladder is 25 feet long with one end against a vertical wall and the other end on the ground. The lower end is being moved away from the wall at a rate of 4 feet/second. How fast is the top of the ladder descending when the bottom of the ladder is 7 feet from the wall?

3. The radius of a circular plate is increasing at a rate of 2 centimeters/second. How fast is the area of the plate changing when the radius is 10 cm?

4. The height of a rectangular box is 10 inches. If the length increases at a rate of 2 inches/second and its width decreases at a rate of 4 inches/second, at what rate is the volume of the box changing when the length is 8 inches and the width is 6 inches?

5. An ice cream cone 5 inches high and 2 inches in diameter is leaking ice cream from a hole in the bottom at a rate of $\frac{1}{3}$ cubic inches/minute. At what rate is the level of the ice cream falling when the height of the cone measures 3 inches?

6. A balloon rises at a rate of 8 feet per second from a point 60 feet from an observer. Find the rate of change of the angle of elevation when the balloon is 25 feet above the ground.

7. Let $y = \sin x$, $x = \frac{\pi}{6}$ and $\frac{dx}{dt} = 2$. Find $\frac{dy}{dt}$.