More Related Rate Problems

MATH 1501

1. Water is flowing into a cylindrical tank of radius 2 ft at the rate of 8 ft^3/min. How fast is the water level rising?

2. The volume of a right circular cone is increasing at the rate of 25π in^3/min and the diameter of the base of the cone is decreasing at the rate of 1 in/min. At a certain instant, the base diameter is 12 in and the height is 18 in. What is the rate of change of the height of the cone at this instant?

3. The length of each side of an equilateral triangle is increasing at the rate of 4 in/sec. Find the rate of change of the area of the triangle when the length of a side of the triangle is $2\sqrt{3}$ inches long.

4. Water is poured into a cone at the rate of 12 ft^3/min. If the cone is 12 feet high and 6 ft in diameter, how fast is the water level rising when the water is 7 ft deep. NOTE: The vertex of the cone is down.

5. A spherical balloon is expanding under the influence of solar radiation. If its radius is increasing at the rate of 2 in/min, how fast is the volume increasing when the radius is 5 inches?

6. A street urchin is sitting at the base of a wall 5 feet high. He is holding one end of a string; a wharf rat is on the other end of the string. As the rat runs along the top of the wall, the urchin lets out string at the rate of 2 ft/sec, but the string remains taut. Find the rate at which the rat is moving along the wall when 13 feet of sting has been let out by the urchin. Same question if the rat is running along the base of the wall.

7. The base of a triangle is increasing at the rate of 3 in/min while the altitude is decreasing at the same rate. At what rate is the area changing when the base is 10 in and the altitude is 6 in?

8. A spotlight is on the ground 100 feet from a building that has vertical sides. A person 6 feet tall starts at the spotlight and walks toward the building at a rate of 5 feet per second. How fast is the top of the shadow moving <u>*down*</u> the building when the person is 50 feet away from the building?

9. The volume of a cylinder is increasing at the rate of 48π in^3/sec. The height of the cylinder is always twice the radius. Find the rate of change of the surface area of the cylinder when the volume of the cylinder is 128π in^3. NOTE: $A = 2\pi r^2 + 2\pi rh$

10. A conical paper cup (vertex down) is leaking water at the rate of 4π in^3/min. If the cup is 12 inches high and 6 inches in diameter, at what rate is the water level being lowered at the instant the top surface area of the water is 4π square inches?

Answers

1. $\frac{2}{\pi}$ ft/min
2. $\frac{61}{12}$ in/min
3. 12 in^2/sec
4. $\frac{192}{49\pi}$ ft/sec
5. 200π in^3/min
6. $\frac{13}{6}$ ft/sec; 2 ft/sec
7. -6 in^2/min
8. $\frac{6}{5}$ ft/sec
9. 24π in^2/sec
10. 1 in/min