

(4.6) Related Rates Assignment #2

Solve each of the following problems.

540. The volume of a cube is decreasing at the rate of $10m^3/hr$. How fast is the total surface area decreasing when the surface area is $54m^2$? (Hint: Write the Volume in terms of surface area.)

541. The length l of a rectangle is decreasing at the rate of 2 cm/sec while the width w is increasing at the rate of 2 cm/sec. When $l = 12$ cm and $w = 5$ cm, find the rates of change of:

a. the area;

b. the perimeter

c. the length of the diagonal of the rectangle.

d. Which of the preceding quantities are decreasing and which are increasing?

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542. Rachael is blowing up a balloon so that the diameter increases at the rate of 10 cm/sec. At what rate must she blow air into the balloon when the diameter measures 4 cm.

544. Suppose Aaron is pumping water into a tank (in the shape of an inverted right circular cone) at a rate of $1600 \text{ ft}^3/\text{min}$. If the altitude is 10 ft and the radius of the base is 5 ft, find the rate at which the radius is changing when the height of the water is 7 ft.

552. A spherical balloon is inflated with helium at the rate of $100\pi \text{ ft}^3/\text{min}$. How fast is the balloon's radius increasing at the instant the radius is 5 ft? How fast is the surface area increasing?