4.5 Solving Related Rates

Calculus

Name: _____

Pythagorean	Triangle	Cone	Sphere	Cylinder	Cylinder	Cube
$a^2 + b^2 = c^2$	$A = \dfrac{1}{2}bh$	$V = \dfrac{1}{3}\pi r^2 h$	$V = \dfrac{4}{3}\pi r^3$	$V = \pi r^2 h$	$A = 2\pi r^2 + 2\pi rh$	$V = s^3$

1. If $A = 4lw$, find $\dfrac{dA}{dt}$ when $l = 2$, $w = 3$, $\dfrac{dl}{dt} = -\dfrac{1}{2}$, and $\dfrac{dw}{dt} = 4$.

2. If $\sqrt{a} = \dfrac{3b}{c}$, find $\dfrac{db}{dt}$ when $b = -2$, $c = -3$, $\dfrac{da}{dt} = 6$, and $\dfrac{dc}{dt} = -1$.

3. A ladder 25 feet long is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 feet per second.
   a) How fast is the top moving down the wall when the base of the ladder is 7 feet from the wall?

   b) Consider the triangle formed by the side of the house, the ladder, and the ground. Find the rate at which the area of the triangle is changing when the base of the ladder is 7 feet from the wall.

4. An air traffic controller spots two planes at the same altitude converging on a point as they fly at right angles to each other. One plane is 150 miles from the point moving at 450 miles per hour. The other plane is 200 miles from the point moving at 600 miles per hour. At what rate is the distance between the planes decreasing?

5. A balloon rises at a rate of 2 meters per second from a point on the ground 30 meters from an observer. Find the rate of change of the angle of elevation of the balloon from the observer when the balloon is 25 meters above the ground.

Answers to 4.5 CA #1

| 1. $\frac{db}{dt} = 26$ | 2. $\frac{db}{dt} = -\frac{13}{6}$ | 3a. $-\frac{7}{12}$ ft/sec | 3b. 21.958 ft²/sec | 4. 750 mph | 5. $\frac{12}{305} = 0.039$ radians/sec |