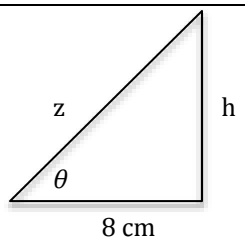
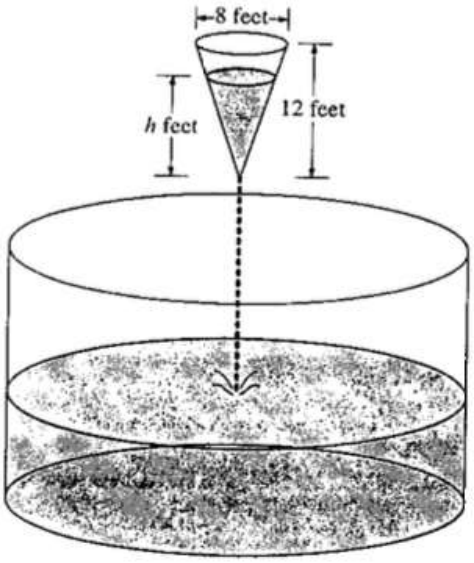
Related Rates 5n1 Name:_____

1.	Functions w, x and y are differentiable with respect to time and are related by the equation $w=x^2y$. If x is decreasing at a constant rate of 1 unit per minute and y is increasing at a constant rate of 4 units per minute, at what rate is w changing with respect to time when x = 6 and y = 20? A) -384 B) -240 C) -96 D) 276 E) 384
2.	The radius of a circle is increasing. At a certain instant, the rate of increase in the area of the circle is numerically equal to twice the rate of increase in its circumference. What is the radius of the circle at that instant? A) $1/2$ B) 1 C) $\sqrt{2}$ D) 2 E) 4
3.	 The base of the right triangle pictured above is 8 cm and the angle θ is increasing at the constant rate of .03 radians per second. How fast, in cm per sec, is the altitude h of the triangle increasing when h = 13? A) 29.125 cm/sec B) 12.626 cm/sec C) .744 cm/sec D) .458 cm/sec E) .874 cm/sec
4.	A person whose height is 6 feet is walking away from the base of a streetlight along a straight path at a rate of 4 feet per second. If the height of the streetlight is 15 ft, what is the rate at which the person's shadow is lengthening? A) 1.5 ft/sec B) 2.667 ft/sec C) 3.75 ft/sec D) 6 ft/sec E) 10 ft/sec
5.	The volume of a certain cone for which the sum of its radius, r, and height is constant given by $V = \frac{1}{3}\pi r^2(10 - r)$. The rate of change of the radius of the cone with respect to time is 6. In terms of r, what is the rate of change of the volume of the cone with respect to time? A) $40\pi r - 6\pi r^2$ B) $\frac{20}{3}\pi r - \pi r^2$ C) $-24\pi r$ D) $6\pi r$ E) $16\pi r - \frac{4}{3}\pi r^2$

Related Rates 5n1 Name:_____



As shown in the figure above, water is draining from a conical tank with height 12 feet and diameter 8 feet into a cylindrical tank that has a base with area 400 π square feet. The depth h, in feet, of the water in the conical tank is changing at the rate of (h – 12) feet per minute. (The volume V of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.)

(a) Write an expression for the volume of water in the conical tank as a function of h.

(b) At what rate is the volume of water in the conical tank changing when h = 3 ? Indicate units of measure.

(c) Let y be the depth, in feet, of the water in the cylindrical tank. At what rate is y changing when h = 3 ? Indicate units of measure.