RELATED RATES HW #1 NAME: _____

Find the missing value

1) Given $5x^2 - 2y^2 = 13$ find $\frac{dy}{dt}$,

when $x = 3$, $y = 4$, and $\frac{dx}{dt} = -2$.

2) Given $x^2y^3 = 27$ find $\frac{dx}{dt}$,

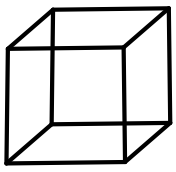
when $x = -1$, $y = 3$, and $\frac{dy}{dt} = 4$.

3) The radius of a sphere is increasing at a rate of 6 ft/min. $\left(V = \frac{4}{3}\pi r^3\right)$ $\left(A = 4\pi r^2\right)$

a) Find the rate of change of the volume when $r = 5$. *b*) How fast is the surface area changing when $r = 5$?

4) All edges of a cube are expanding at a rate of 2 cm/s. How fast is the.....

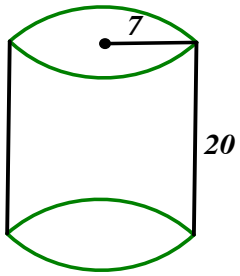
a) volume changing when each edge is 4cm? *b*) surface area changing when each edge is 4cm?



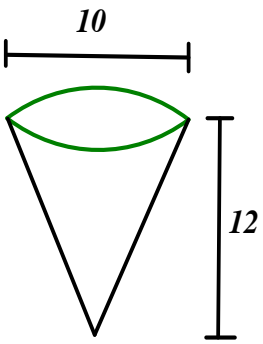
5) Water is spilling onto the ground and forming a circular shape. The radius of the puddle is changing at the rate of 3 inches per second. How fast is the....

a) area of the circle changing when the area is 100π? *b*) circumference changing when the radius is 9 in.?

6) A cylinder with radius 7 ft and height 20 feet is losing water at a rate of 4 ft^3/min. How fast is the height changing when $h = 12$? How fast is the height changing when $h = 7$?



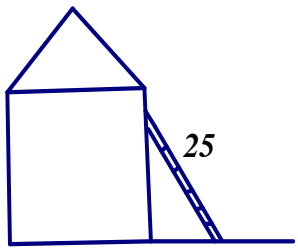
7) A conical tank (with vertex down) is 10 feet across the top and 12 feet deep. If water is flowing into the tank at a rate of 7 ft^3 / min., find the rate of change of the depth of the water when the water is 10 feet deep?



RELATED RATES HW #2 NAME: _____

1) 25 foot ladder is leaning against the wall of a house. The base of the ladder is pulled away at 2 ft. per second.

a) How fast is the ladder sliding down the wall when the base of the ladder is 24 ft. from the wall?



b) How fast is the area of the triangle formed changing at this time?

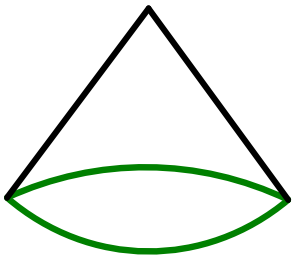
c) How fast is the angle between the ladder and the wall of the house changing at this time?

2) A person 6 ft. tall walks away from a streetlight that is 11 feet above the ground. The person is walking away from the light at a constant rate of 3 feet per second. At what rate, in feet per second,.....

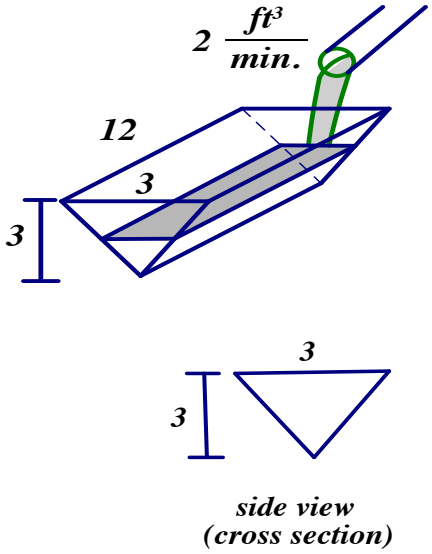
a) is the length of the shadow changing?

b) is the tip of the shadow changing?

3) At a sand and gravel plant, sand is falling off a conveyor and onto a conical pile at a rate of $10\ \text{ft}^3/\text{min}$. The diameter of the base of the cone is approximately three times the altitude. At what rate is the height of the pile changing when the pile is 9 feet high?

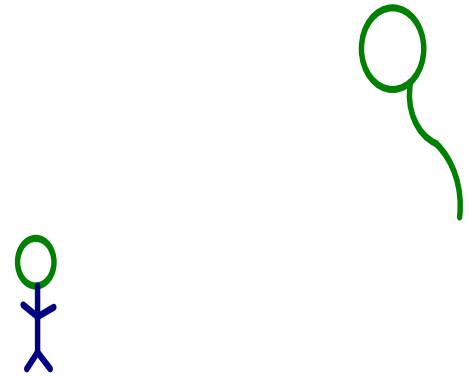


4*a*) A trough is 12 feet long and 3 feet across the top (see the figure). Its ends are isosceles triangles with altitudes of 3 feet. If the water is being pumped into the trough at 2 cubic feet per minute, how fast is the water level rising when the depth is 1 foot?



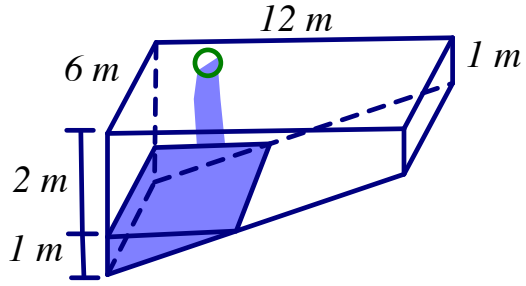
b) How fast is the area of the surface of the water (shaded in figure) changing at this time?

5) A balloon rises at a rate of 6 m/s from a point on the ground 40 meters from an observer. Find the rate of change of the angle of elevation of the balloon from the observer when the balloon is 40 meters above the ground.



6) A swimming pool is 12 meters long, 6 meters wide, 1 meter deep at the shallow end, and 3 meters deep at the deep end. Water is being pumped into the pool at $\frac{1}{4}$ cubic meter per minute, and there is 1 meter of water at the deep end.

a) What percent of the pool is filled?



b) At what rate is the water level rising?