$$\lim_{x \to \infty} \int_2^3 \frac{1}{dx} dy$$

RELATED RATES

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Please Send Questions and Comments to ingrid.stewart@csn.edu. Thank you!
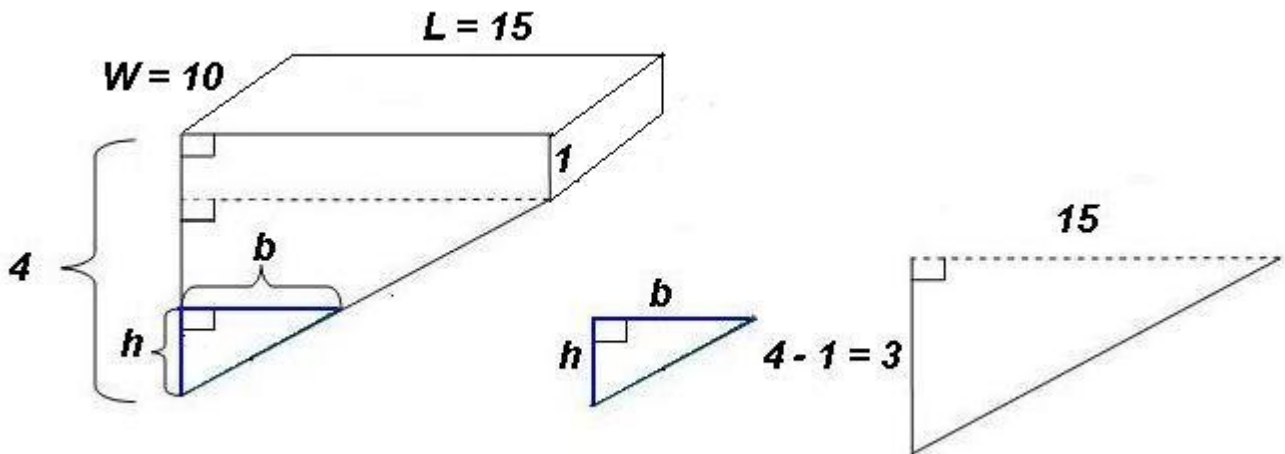
Problem 1:

Air is being pumped into a spherical balloon at a rate of 4 cubic inches per minute. Find the rate of change of the radius when the radius is 3 inches. Round your answer to 3 decimal places.

Problem 2:

A pebble is dropped into a calm pond causing ripples in the form of concentric circles. The radius of the outermost ripple is increasing at a constant rate of 2 feet per second. When the radius is 6 feet, at what rate is the total area of the disturbed water changing? Round your answer to 3 decimal places.
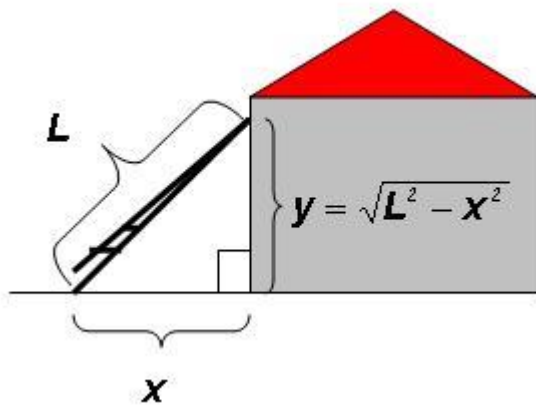
Problem 3:

A rectangular swimming pool is 10 meters wide and 15 meters long. It is 4 meters deep at one end and 1 meter deep at the other end. **See picture below!** If water is pumped into the pool at the rate of 0.4 cubic meters per minute, find the rate of change of the water level when the water is 2 meters high at the deep end of the pool. Round your answer to 3 decimal places.
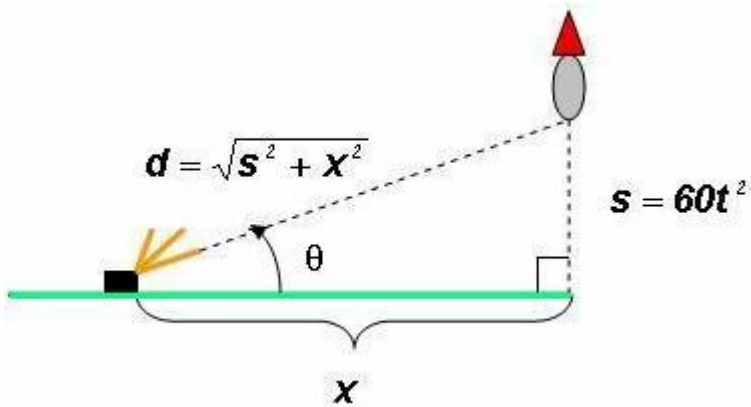

Problem 4:

A ladder 25 meters long leans against a house. **See picture below!** Find the rate at which the top of the ladder is moving toward the ground when the foot of the ladder is 15 meters away from the house and sliding along the ground away from the house at the rate of 2 meters per second.

$$y = \sqrt{L^2 - X^2}$$

Problem 5:

A television camera at ground level is filming the lift-off of a space shuttle that is rising vertically from the ground according to the position equation $s = 60t^2$, where s is measured in feet and t is measured in seconds. The camera is 2,400 feet from the launch pad. **See picture below!** Find the rate of change in the angle of elevation of the camera 10 seconds after lift-off. (Assume the Earth is flat for the purposes of this exercise.) Round your answer to 3 decimal places.

$$d = \sqrt{s^2 + X^2}$$

$$s = 60t^2$$

θ

X

SOLUTIONS
You can find detailed solutions below the link for this problem set!

1. The rate of change of the radius of the balloon is approximately **0.035 inches per minute** when $r = 3$.

2. The rate of change of the area of the disturbed water is approximately **75.398 square feet per second** when $r = 6$.

3. The rate of change of the water level is exactly **0.004 meters per minute** when $h = 2$.

4. The rate of change at which the top of the ladder is moving toward the ground is exactly **1.5 meters per second** when $X = 15$.

5. The rate of change of the angle of elevation is approximately **0.069 radians per second** at $t = 10$.