October 9, 2026

International Beer and Pizza Day

Today in History:

Henry VI of England restored to the throne (1470)

Last flight of the Lockheed SR-71 (1999)

Number of the Day: 617

617 is prime

$\mathbf{617^2 = 105^2 + 608^2}$

Fun Fact:

The first alarm clock could only ring at 4 a.m.

Quote of the Day:

"Hope sees the invisible, feels the intangible, and achieves the impossible."

- Helen Keller

Today's Weather:

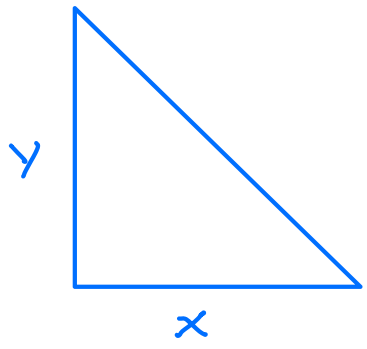
Generally sunny, high near 70^o

Math 121

Quiz #24

The base of a right triangle is increasing at a rate of 2 m/sec, while the height increases at 3 m/sec.

At what rate is the area increasing when the base is 4 m and the height is 5 m?



$$A = \frac{1}{2} x y$$

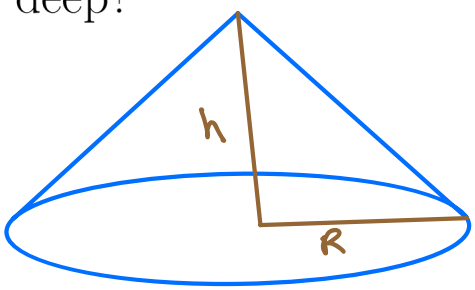
$$\frac{dA}{dt} = \frac{1}{2}\left[x \frac{dy}{dt} + y \frac{dx}{dt}\right]$$

$x = 4 \quad \frac{dx}{dt} = 2 \quad y = 5 \quad \frac{dy}{dt} = 3$

$$\frac{dA}{dt} = \frac{1}{2}\left[4(3) + 5(2)\right] = \frac{1}{2}\left[22\right]$$

$$\frac{dA}{dt} = 11 \text{ m}^2/\text{s}$$

Sand being dumped from a funnel forms a conical pile whose height is always one-third the diameter of the base. If the sand is being dumped at a rate of 2 cubic meters per minute, how fast is the pile rising when it is 1 meter deep?



$V = \frac{1}{3}\pi R^2 h$

$h = \frac{1}{3} D$

$h = \frac{1}{3} 2R = \frac{2}{3} R$

$R = \frac{3}{2} h$

$\frac{dV}{dt} = 2$ $\quad \frac{dh}{dt} = ?$

$h = 1$

$V = \frac{1}{3}\pi \left(\frac{3}{2} h\right)^2 h$

$V = \frac{1}{3}\pi \frac{9}{4} h^2 \cdot h$

$V = \frac{3}{4}\pi h^3$

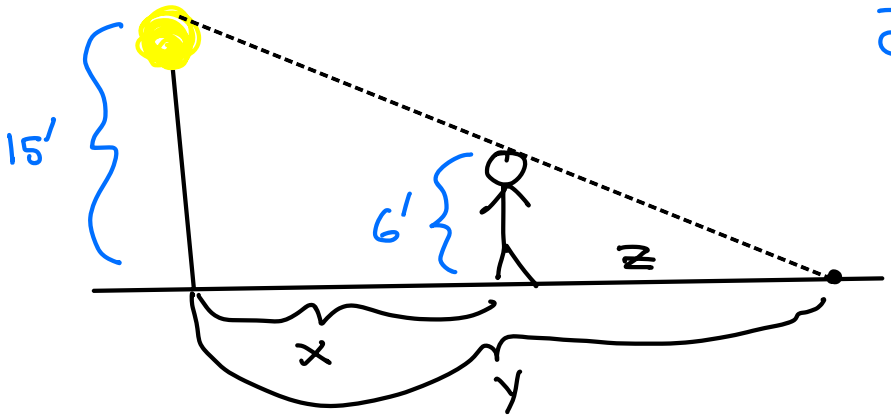
$\frac{dV}{dt} = \frac{9}{4}\pi h^2 \frac{dh}{dt}$

$2 = \frac{9}{4}\pi (1)^2 \frac{dh}{dt}$

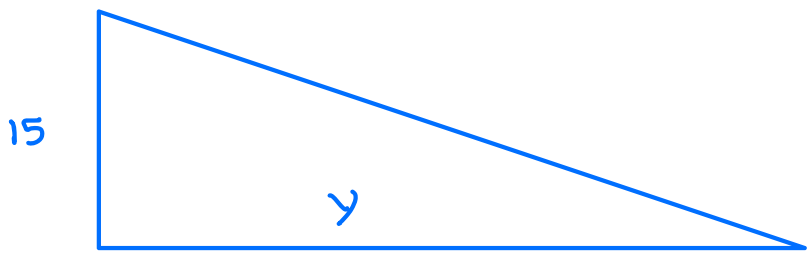
$\frac{8}{9\pi} = \frac{dh}{dt}$

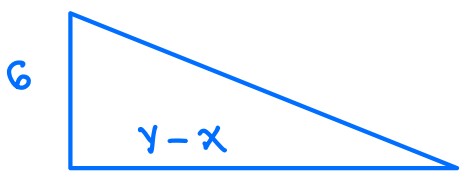
A man 6 ft tall walks away from a street light 15 ft high at a rate of 3 ft/sec. How fast is the end of his shadow moving when he is 30 ft from the light pole? How fast is his shadow lengthening?

$\frac{dx}{dt} = 3$



$x + z = y$





$\frac{y}{15} = \frac{y-x}{6}$

$6y = 15(y-x)$

$6y = 15y - 15x$

$15x = 9y$

$5x = 3y$

$5\frac{dx}{dt} = 3\frac{dy}{dt}$

$5(3) = 3\frac{dy}{dt}$

$\frac{dy}{dt} = 5'/\text{SEC}$

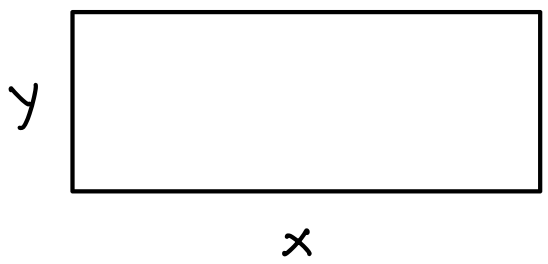
$x + z = y$

$\frac{dx}{dt} + \frac{dz}{dt} = \frac{dy}{dt}$

$(3) + \frac{dz}{dt} = 5$

$\frac{dz}{dt} = 2'/s$

Two parallel sides of a rectangle are being lengthened at the rate of 2 in/sec., while the other two sides are shortened in such a way that the figure remains a rectangle with constant area $A = 50\text{in}^2$. What is the rate of change of the perimeter P when the length of an increasing side is 5 in?



$xy = 50$

$x\frac{dy}{dt} + y\frac{dx}{dt} = 0$

$x = 5 \quad \frac{dx}{dt} = 2$

$y = 10 \quad \frac{dy}{dt} =$

$$(5)\frac{dy}{dt} + 10(2) = 0$$

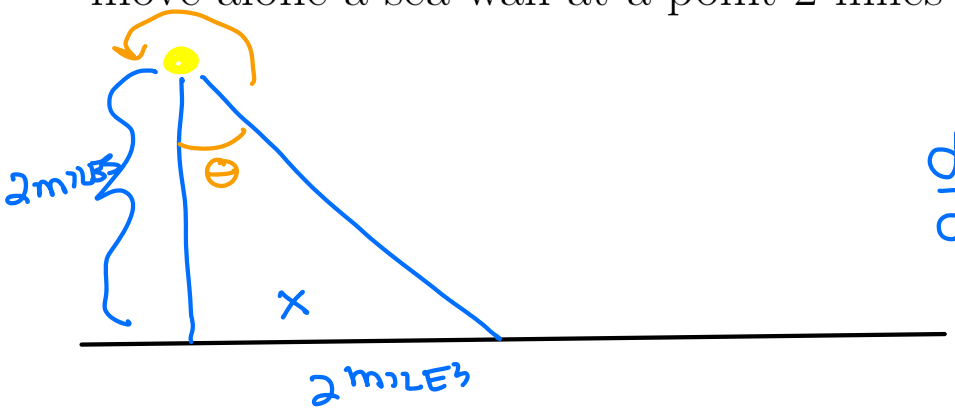
$$\frac{dy}{dt} = -4$$

$$P = 2x + 2y$$

$$\frac{dP}{dt} = 2\frac{dx}{dt} + 2\frac{dy}{dt}$$

$$= 2(2) + 2(-4) = -4 \text{ IN/SEC}$$

A lighthouse is 2 miles off a straight shore. Its light makes 3 revolutions per minute. How fast does the beam move alone a sea wall at a point 2 miles down the coast.

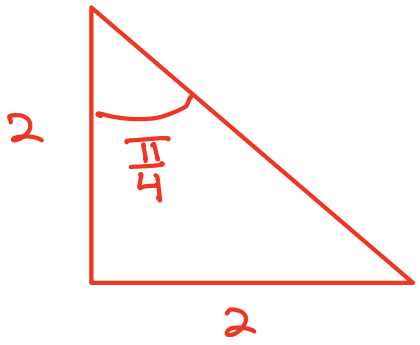


$\frac{dx}{dt} = ?$

$$\tan\theta = \frac{x}{2}$$

$$\sec^2\theta \frac{d\theta}{dt} = \frac{1}{2}\boxed{\frac{dx}{dt}}$$

$$\frac{d\theta}{dt} = \frac{3 \cancel{REV}}{MIN} \quad \frac{2\pi \text{ RAD}}{\cancel{REV}} = \frac{6\pi \text{ RAD}}{MIN}$$



$$\sec^2\left(\frac{\pi}{4}\right)\left(\frac{6\pi \text{ RAD}}{MIN}\right) = \frac{1}{2}\frac{dx}{dt}$$

$$\sec^2\frac{\pi}{4} = \frac{1}{\cos^2\left(\frac{\pi}{4}\right)} = \frac{1}{\left(\frac{\sqrt{2}}{2}\right)^2} = \frac{1}{\frac{2}{4}} = 2$$

$$(2)(6\pi) = \frac{1}{2}\frac{dx}{dt}$$

$$\frac{dx}{dt} = 24\pi \text{ MILE}/MIN$$