October 10, 2025

World Mental Health Day

Today in History:

Panama Canal Completed (1913)

Porky and Bess opens on Broadway (1935)

Number of the Day: 813

813 = 3 x 271

813 is a divisor of 99,999 and 9,999,999,999

Fun Fact:

In Florida, failure to tell your neigbor his house is on fire is against the law.

Quote of the Day:

"You can't help respecting anybody who can spell TUESDAY, even if he doesn't spell it right; but spelling isn't everything. There are days when spelling Tuesday simply doesn't count."

- A.A. Milne

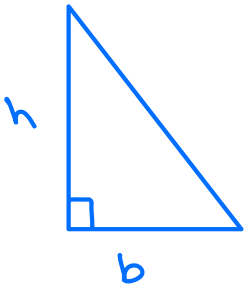
Today's Weather:

Sunny, high 67^{o}

Math 121

Quiz #24

The base of a right triangle is increasing at a rate of 5 m/sec, while the height increases at 2 m/sec. At what rate is the area increasing when the base is 3 m and the height is 4 m?



$$A = \frac{1}{2} b h$$

$$\frac{dA}{dt} = \frac{1}{2}\left[b \frac{dh}{dt} + h \frac{db}{dt} \right]$$

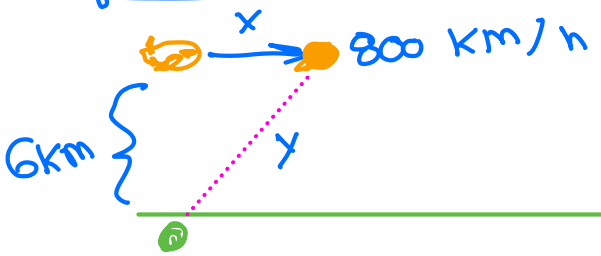
$b = 3$ $\quad \frac{db}{dt} = 5$

$h = 4$ $\quad \frac{dh}{dt} = 2$

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

$$= \frac{1}{2}\left[26 \right] = 13 \text{ m}^2/\text{SEC}.$$

Pg 203



$$x^2 + 6^2 = y^2$$

$$2x \frac{dx}{dt} = 2y \frac{dy}{dt}$$

$$\frac{dx}{dt} = 800$$

$$x = \frac{800\,km}{HR}\ \frac{1\,HR}{60\,min}\cdot\frac{1}{2}\,min = \frac{800}{120} = 6.66$$

$$x^2 + 6^2 = y^2 \qquad (6.66)^2 + 6^2 = y^2$$

$$y = 8.97$$

$$x\,\frac{dx}{dt} = y\,\frac{dy}{dt}$$

$$(6.66)(800) = 8.97\,\frac{dy}{dt}$$

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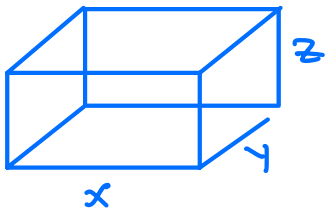
mpod 23 #1



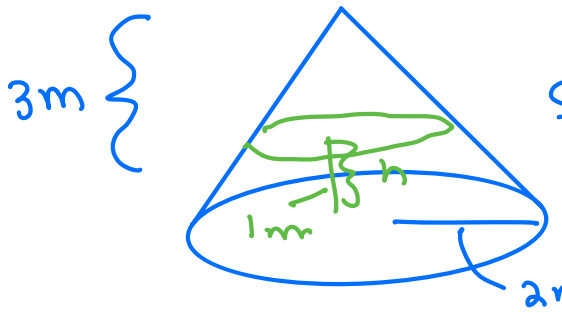
$$V = xyz$$

$$\frac{dV}{dt} = \frac{dx}{dt}yz + \frac{dy}{dt}xz + \frac{dz}{dt}xy$$

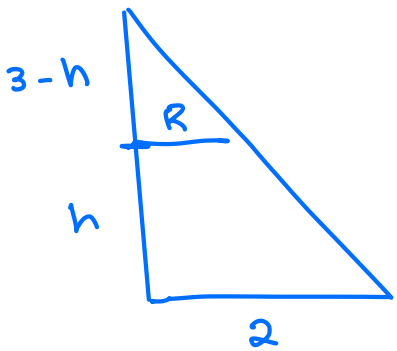
$$(5)(10)(10) + (7)(10)(10) + (2)(10)(10) = 1400\,cm^3/min$$

Pg 202

*9



$\frac{dV}{dt} = 2 m^3/min$



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

$$R = \frac{2}{3}(3-h)$$

$$V = V_{WHOLE} - V_{TOP}$$

$$= \frac{1}{3}\pi(2^2)(3) - \frac{1}{3}\pi R^2 h$$

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

$$V = 4\pi - \frac{4}{27}\pi (3-h)^3$$

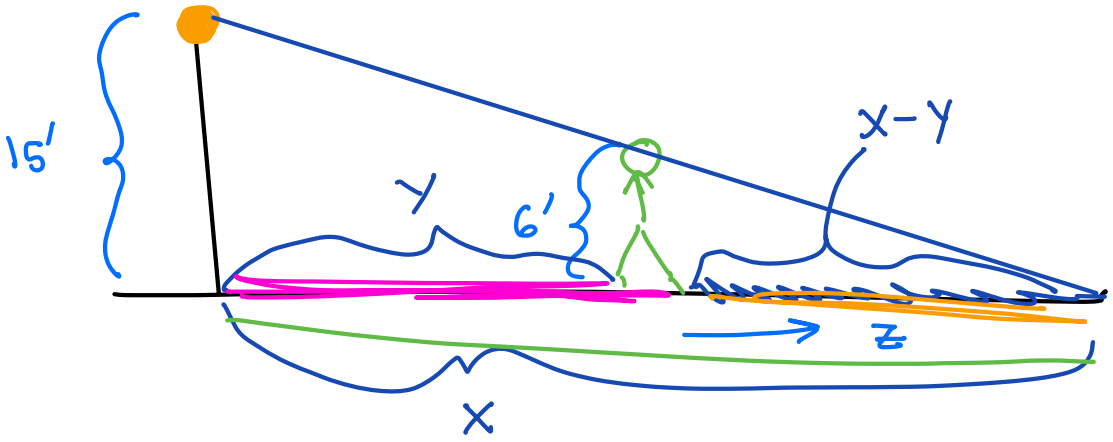
$$\frac{dV}{dt} = +\frac{4}{9}\pi (3-h)^2 \left(\frac{dh}{dt}\right)$$

WHEN $h=1$

$$2 = \frac{4\pi}{9}(3-1)^2 \frac{dh}{dt}$$

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

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?



$$\frac{x-y}{6} = \frac{x}{15} \qquad 15(x-y) = 6x$$

$$15x - 15y = 6x$$

$$9x = 15y$$

$$9\frac{dx}{dt} = 15\frac{dy}{dt} \qquad \frac{dy}{dt} = 3$$

$$9\frac{dx}{dt} = 15 \cdot 3$$

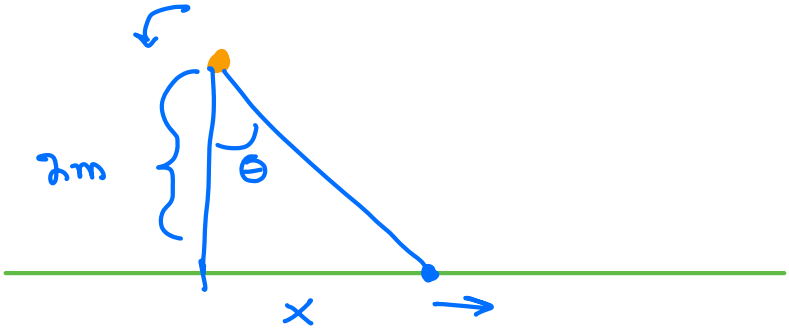
$$\frac{dx}{dt} = \frac{45}{9} = 5$$

$$(y + z = x)$$

$$\frac{dy}{dt} + \frac{dz}{dt} = \frac{dx}{dt} \qquad 3 + \frac{dz}{dt} = 5$$

$$\frac{dz}{dt} = 2$$

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.



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

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

$x = 2$ $\quad \tan\theta = \frac{2}{2} = 1 \quad \theta = \frac{\pi}{4}$

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

$$(2)\left(\frac{d\theta}{dt}\right) = \frac{1}{2}\frac{dx}{dt}$$

$\frac{d\theta}{dt}$: RADIANS/MIN

$$\frac{3\ \text{REV}}{\text{MIN}} \cdot \frac{2\pi\ \text{RAD}}{\text{REV}} = 6\pi\ \text{RAD/MIN}$$

$$2(6\pi) = \frac{1}{2}\frac{dx}{dt} \qquad \frac{dx}{dt} = 24\pi\ \text{MI/MIN}$$