October 12, 2026

National Farmer's Day

Today in History:

Columbus reaches the New World (1492)

Al Gore wins Nobel Peace Prize (2007)

Number of the Day: 27

27 = 3 x 3 x 3.

27 is the largest number that is the sum of the digits of its cube:

$\mathbf{27}^3$ = 19683; 1 + 9 + 6 + 8 + 3 = **27**.

Fun Fact:

A group of giraffes is called a tower.

Quote of the Day:

"People say nothing is impossible, but I do nothing every day."

— Winnie-the-Pooh

Today's Weather:

Cloudy skies early, warm. High 77^o

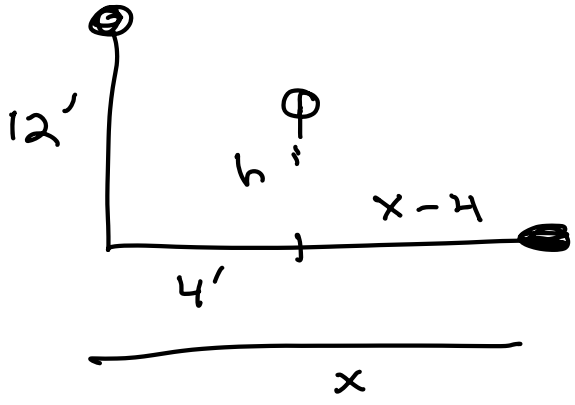
Math 121

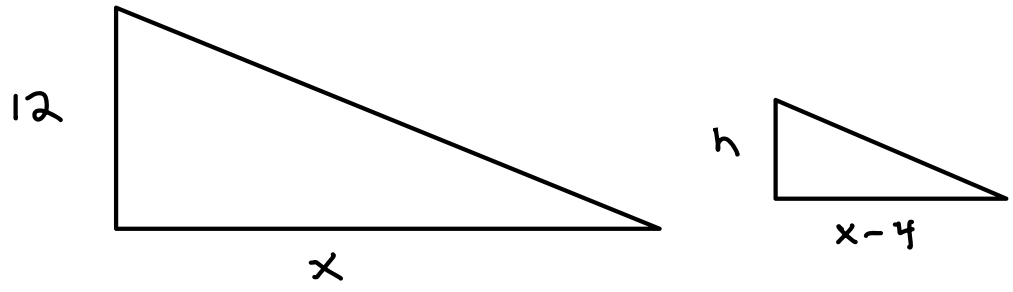
Quiz #25

Pick up Blue Book.

F 2021

5b





$$\frac{x}{12} = \frac{x-4}{h}$$

$$\rightarrow xh = 12(x-4) \qquad x \cdot 8 = 12(x-4)$$

$$xh = 12x - 48 \qquad x = 12$$

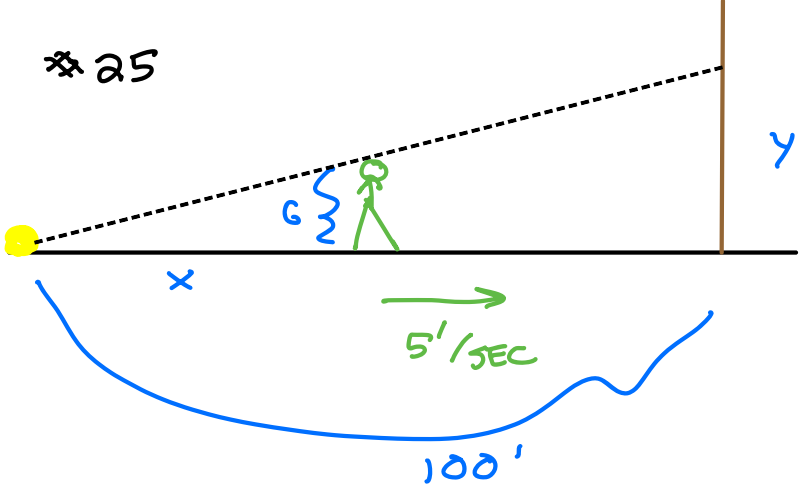
$$x\frac{dh}{dt} + h\frac{dx}{dt} = 12\frac{dx}{dt}$$

$$\frac{dh}{dt} = -16$$

$$12(-16) + 8\frac{dx}{dt} = 12\frac{dx}{dt}$$

$$\frac{dx}{dt} = -48 \text{ ft/sec}$$

mPOD #25



$$\frac{x}{6} = \frac{100}{y} \qquad xy = 600$$

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

$x = 50$

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

$50y = 600$

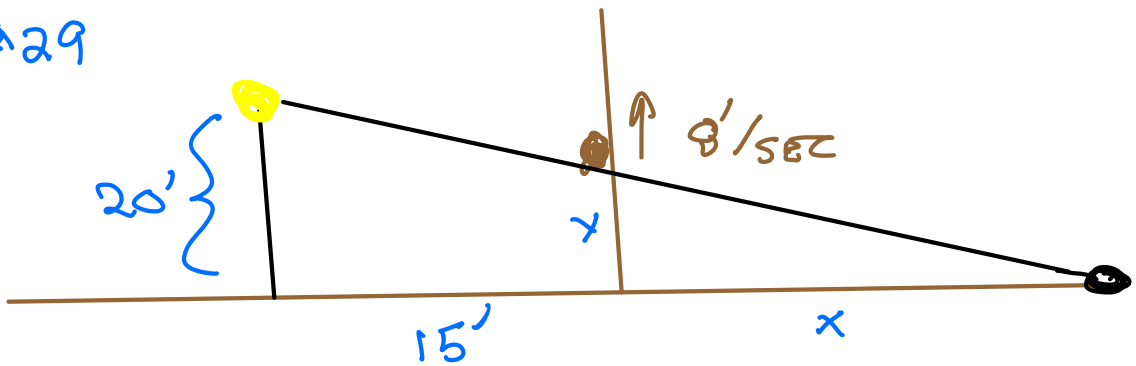
$y = 12$

$$50\frac{dy}{dt} + 12 \cdot 5 = 0$$

$$\frac{dy}{dt} = -\frac{60}{50} = -1.2 \text{ f/s}$$

T2 R1

#29



$$\frac{x}{y} = \frac{x+15}{20} \qquad 20x = y(x+15)$$

$$20x = yx + 15y$$

$$20\frac{dx}{dt} = y\frac{dx}{dt} + x\frac{dy}{dt} + 15\frac{dy}{dt}$$

$\frac{dy}{dt} = 8 \qquad y = 18$

$x = ?$ $\qquad 20x = 18x + 15(18)$

$2x = 270 \qquad x = 135$

$$20\frac{dx}{dt} = 18\frac{dx}{dt} + 135(8) + 15(8)$$

$$\frac{dx}{dt} = 600\ ft/sec$$

F 2024

3d

$$y = x^{\tan x}$$

$$\ln y = \ln x^{\tan x} = \tan x \ln x$$

$$\frac{1}{y}\frac{dy}{dx} = (\tan x)\left(\frac{1}{x}\right) + \sec^2 x \ln x$$

$$\frac{dy}{dx} = y\left[\frac{\tan x}{x} + \sec^2 x \ln x\right]$$

$$\frac{dy}{dx} = x^{\tan x}\left[\frac{\tan x}{x} + \sec^2 x \ln x\right]$$

F 2024
4b

$$x^2 + xy + y^2 = 27$$

$$2x + x\frac{dy}{dx} + y + 2y\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{-2x - y}{x + 2y}$$

(ii) $\frac{dy}{dx} = 0$ $\quad \frac{-2x - y}{x + 2y} = 0$

$-2x - y = 0$ $\quad y = -2x$

$$x^2 + x(-2x) + (-2x)^2 = 27$$

$$x^2 - 2x^2 + 4x^2 = 27$$

$$3x^2 = 27$$

$$x = \pm 3$$

$x = 3$
$y = -6$

$x = -3$
$y = 6$

T2 R1

*4

$$f(x) = \frac{1}{(x-1)^2}$$

$$f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h\to 0} \frac{\frac{1}{(x+h-1)^2} - \frac{1}{(x-1)^2}}{h}$$

$$= \lim_{h\to 0} \frac{(x-1)^2 - (x+h-1)^2}{h\,(x+h-1)^2(x-1)^2}$$

$$= \lim_{h\to 0} \frac{x^2 - 2x + 1 - (x^2 + 2xh + h^2 - 2x - 2h + 1)}{h\,(x+h-1)^2(x-1)^2}$$

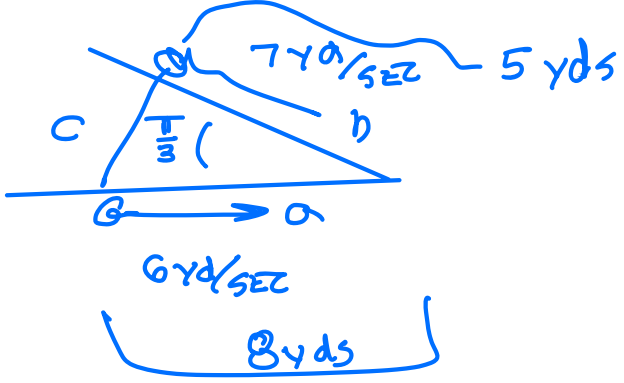
$$= \lim_{h\to 0} \frac{-2xh - h^2 + 2h}{h\,(x+h-1)^2(x-1)^2}$$

$$= \frac{-2x+2}{(x-1)^4} = \frac{-2(x-1)}{(x-1)^{4\,3}} = \frac{-2}{(x-1)^3}$$

CHECK $f(x) = \frac{1}{(x-1)^2} = (x-1)^{-2}$

$$f'(x) = -2(x-1)^{-3} = \frac{-2}{(x-1)^3}$$

F2025
4b



$$c^2 = a^2 + b^2 - 2ab\cos\theta$$

$$2c\frac{dc}{dt} = 2a\frac{da}{dt} + 2b\frac{db}{dt} - 2\cos\left(\frac{\pi}{3}\right)\left(a\frac{db}{dt} + b\frac{da}{dt}\right)$$

$$7\frac{dc}{dt} = (8)(6) + (5)(7) - \frac{1}{2}(8(5) + 7(6))$$

$$c^2 = a^2 + b^2 - 2ab\cos\left(\frac{\pi}{3}\right)$$

$$c = 7$$

F2025
5b ii

$f'(1) = 0$ $\quad g(x)$

$$(g \circ f)'(1) = 0$$

$$g'(f(1)) \cdot f'(1) = g'(f(1)) \cdot 0 = 0$$

T2R1
#14

$$f(x) = x\,e^{x^3} + \sqrt{x}$$

$$f'(x) = x\,e^{x^3}(3x^2) + e^{x^3} + \frac{1}{2}x^{-\frac{1}{2}}$$

T2R1
#21

$$f(x) = (\sin^2 x)^x$$

$$\ln f(x) = \ln(\sin^2 x)^x = x\ln(\sin^2 x)$$

$$= 2x\ln\sin x$$

$$\frac{1}{f(x)} \cdot f'(x) = 2x \frac{\cos x}{\sin x} + 2 \ln(\sin x)$$

$$f'(x) = (\sin^2 x)^x \left[2x \frac{\cos x}{\sin x} + 2 \ln(\sin x) \right]$$