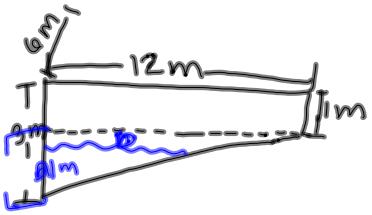


$\frac{1}{4}\frac{m^3}{min}$

a) what percent is filled?

$V_{water} = \frac{1}{2}bhw = \frac{1}{2}(6)(1)(6)$

$V_{water} = 18\ m^3$

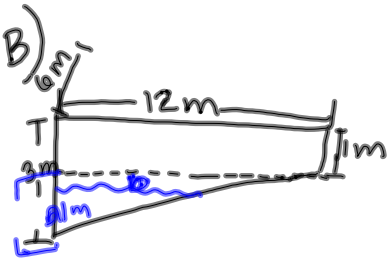
$V_{pool} = \frac{1}{2}(2)(12)(6) + 1(12)(6)$

$72 + 72$

$V_{pool} = 144\ m^3$

$\%_{filled} = \frac{18}{144} = .125 = 12.5\%$

B)



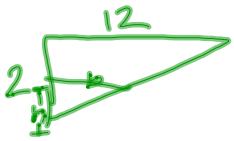
$\frac{dV}{dt} = \frac{1}{4}\frac{m^3}{min}$

$\frac{dh}{dt} = ?$ @ $h = 1m$

$V = \frac{1}{2}bhw$ (6)

$V = 3bh$

$V = 18h^2$



$\frac{2}{12} = \frac{h}{b}$

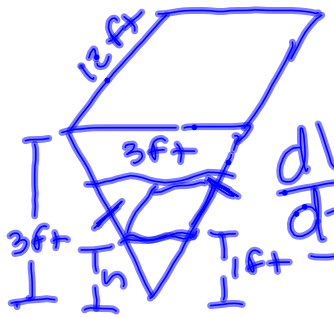
$2b = 12h$

$b = 6h$

$\frac{dV}{dt} = 32h\frac{dh}{dt}$

$\frac{1}{4} = 32(1)\frac{dh}{dt}$

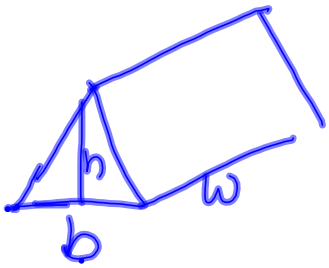
$\boxed{\frac{dh}{dt} = \frac{1}{128}\ m/min}$



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

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

Volume to height



$V = \frac{1}{2} b h w$

$w = 12$

$V = 6bh$

$b = h$

$V = 6h^2$

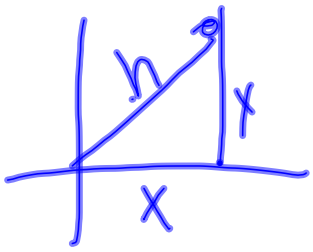
$\frac{dV}{dt} = 12h \frac{dh}{dt}$

$2 = 12(1)\frac{dh}{dt}$

$$\boxed{\frac{dh}{dt} = \frac{1}{6} \text{ ft/min}}$$

11)

$y = x^2 + 1 \quad \frac{dx}{dt} = 2$



$h = \sqrt{x^2 + y^2}$

$h = \sqrt{x^2 + (x^2+1)^2}$

$h = \sqrt{x^2 + x^4 + 2x^2 + 1}$

$h^2 = x^4 + 3x^2 + 1$

$2h\frac{dh}{dt} = 4x^3\frac{dx}{dt} + 6x\frac{dx}{dt}$

$\frac{dh}{dt} = \frac{8x^3 + 12x}{2h} = \frac{4x^3 + 6x}{h}$

$$\boxed{\frac{4x^3 + 6x}{\sqrt{x^4 + 3x^2 + 1}}}$$