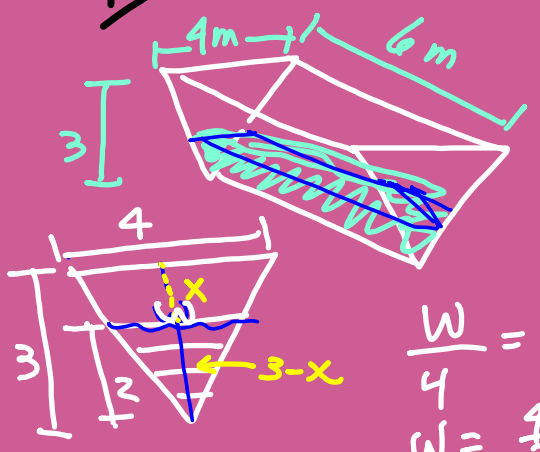
15



$$W = \int \rho \; A(x) \; \text{depth} \; dx$$
$$\ell \cdot w$$

$$= \int_1^3 9810 \cdot 6 \cdot \frac{4}{3}(3-x)\, x \, dx$$

$$= 261{,}600 \text{ J}$$

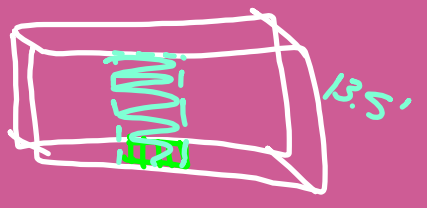
$$\frac{W}{4} = \frac{3-x}{3}$$

$$W = \frac{4}{3}(3-x)$$

FLUID FORCE

Fluid – any substance the conforms to its container.

$$\text{Force} = \rho \cdot A \cdot h$$



Drain 2'x3'

$$\frac{lb}{ft^3} \quad ft \cdot ft \cdot ft$$

$$= 62.4 \cdot (2 \cdot 3) \cdot 13.5$$

$$= 5054.4 \text{ lb.}$$

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{5054.4 \text{ lb}}{6 \text{ ft}^2} = 842.4 \frac{lb}{ft^2}$$

psi = pounds per in^2

$\frac{N}{m^2}$

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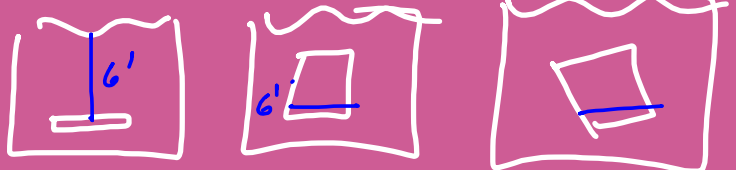
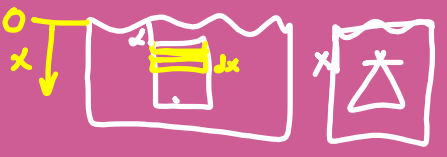
Pascal's Principle – the force at the same depth is constant regardless of the position of the object

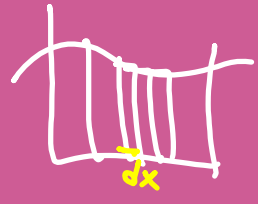




$$F = \rho \cdot A \cdot h$$

$$\rho \; l(x)\, dx \; h(x)$$

$$\int \rho \, l(x) \, h(x) \, dx$$



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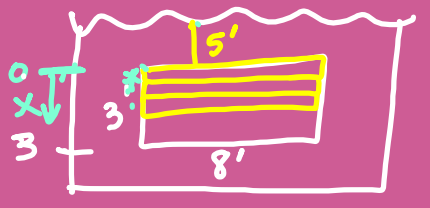
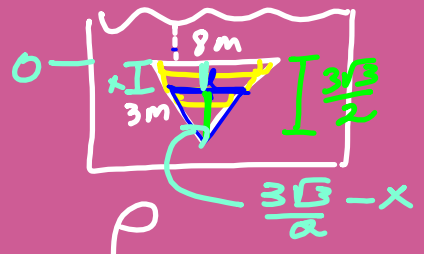
$$\int \rho\, l(x)\, h(x)\, dx$$



$$\int_0^3 (62.4)\, 8 \cdot (x+5)\, dx = 9734.4 \text{ lb.}$$

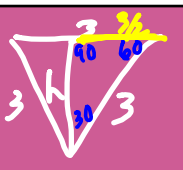


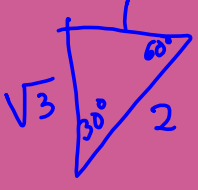
Equilateral Δ

$\frac{l}{3} = \frac{\frac{3\sqrt{3}}{2} - x}{\frac{3\sqrt{3}}{2}}$. $\frac{3}{2}\sqrt{3}$

$l = \frac{2}{3\sqrt{3}}\left(\frac{3\sqrt{3}}{2} - x\right)$

$l = \frac{2}{\sqrt{3}}\left(\frac{3\sqrt{3}}{2} - x\right)$





$$\int_0^{\frac{3\sqrt{3}}{2}} \rho\, l(x)\, h(x)\, dx$$

$$\int_0^{\frac{3\sqrt{3}}{2}} 9810 \cdot \frac{2}{\sqrt{3}}\left(\frac{3\sqrt{3}}{2} - x\right)(x+8)\, dx$$

$\approx$ 339,230 N

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