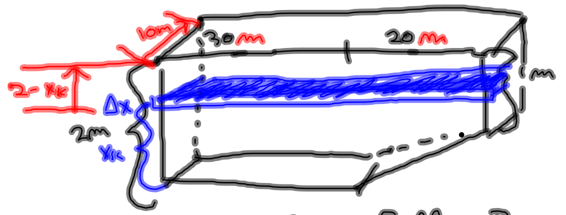


x_k = distance from the bottom

Pool is full. Pump the water out of the top or over the side

The k^{th} slice has to be moved $2 - x_k$ m

The mass of that slice is volume times density

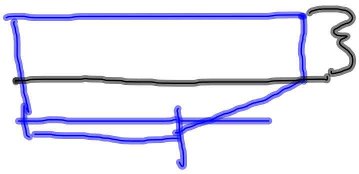
$= (\text{volume})\left(1000\ \frac{kg}{m^3}\right)$

The force on that slice is $(\text{Volume})\left(1000 \frac{kg}{m^3}\right)\left(9.8 \frac{m}{s^2}\right)$

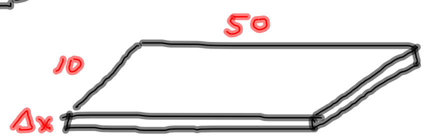
Work done on that slice is

$$\left((\text{Volume})(1000)(9.8)\ \frac{kg}{m^2 \cdot s^2}\right)(2 - x_k)$$

Finding the volume

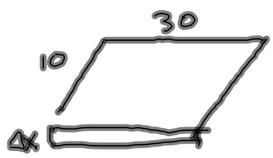


Easy from $x = 1$ to $x = 2$



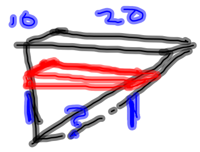
For $x \in [0,1]$, we need to think.

$500\Delta x$ = Volume for $x \in [1,2]$



FOR THE DEEP END

$V = 300\Delta x$



Still rectangles, but the long dimension varies from 0 to 20 as x varies from 0 to 1

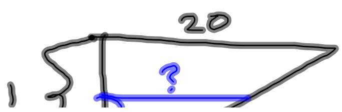
$$\boxed{V = 10 \cdot \Delta x \cdot ? = 10 \cdot 20x \cdot \Delta x}$$
$$= 200x\Delta x$$

$(x_1, y_1) = (x_1, ?_1) = (0,0)$

$(x_2, y_2) = (x_2, ?_2) = (1,20)$

$? = y = 20x$

Similar triangles to get to that $20x$:



$\frac{20}{1} = \frac{?}{x}$

$$\left((\text{Volume})(1000)(9.8)\frac{\text{kg}}{\text{m}^2\cdot\text{s}^2}\right)(2-x_k)$$

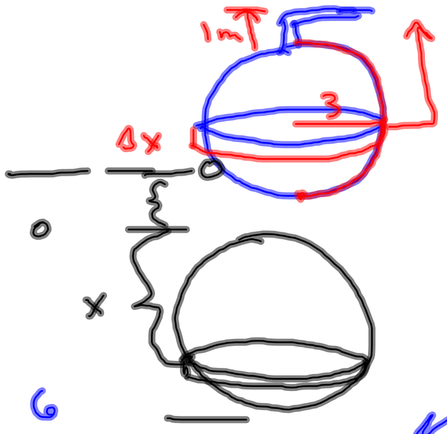
$$= \left(\text{Volume of deep end} + \text{Volume of weird end}\right)\cdot 9800\,(2-x_k)\,\frac{\text{kg}}{\text{m}^2\cdot\text{s}^2}$$

$$= (300\,\Delta x + 200\,x\,\Delta x)(9800)(2-x) \quad \text{for } x \in [0,1]$$

Now, for $x \in [1,2]$: $V = 500\,\Delta x$, so we have

$$(500\,\Delta x)(9800)(2-x)$$

$$\text{WORK} = 9800\left[\int_0^1 (300+200x)(2-x)\,dx + \int_1^2 500(2-x)\,dx\right]$$



Volume of the k^{th} disk of water is

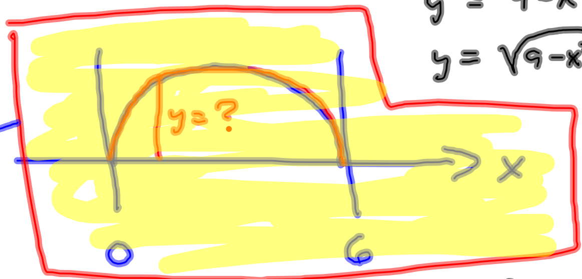
$\pi y^2 \Delta x$

$x \in [0,6]$

$x^2+y^2=3^2$

$y^2=9-x^2$

$y=\sqrt{9-x^2}$



Pic Good

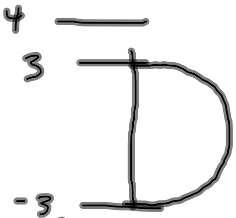
So $\pi y^2 \Delta x = \pi\left(\sqrt{9-x^2}\right)^2 \Delta x$

= Volume of a representative disk of water.

$W = F \times D$

$= (\text{Vol})(\text{Density})(\text{Grav.}) \times (x+1)$

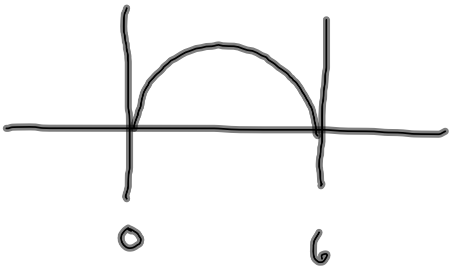
$= \pi(9-x^2)(1000)(9.8)(x+1)\Delta x$



$$= \int_0^6 \pi \boxed{(9-x^2)}(1000)(9.8)(x+1)\,dx$$

$\int_{-3}^{3} \cdots (4-x)$

Not in agreement with pic



$(x-3)^2+y^2=9$ is the eq'n, so

$y=\sqrt{9-(x-3)^2}$

So it's $(9-(x-3)^2)$ in place of $9-x^2$.

$$= \int_0^6 \pi(9-(x-3)^2)(1000)(9.8)(x+1)\,dx$$

$$? = \int_{-3}^{3} \pi(9-x^2)(9800)(4-x)\,dx$$

$$\pi \cdot \int_0^6 9800 \cdot \left(9-(x-3)^2\right) \cdot (x+1)\,dx$$

$$1411200\,\pi$$

$$\pi \cdot \int_{-3}^{3} 9800 \cdot \left(9-x^2\right) \cdot (4-x)\,dx$$

$$1411200\,\pi$$