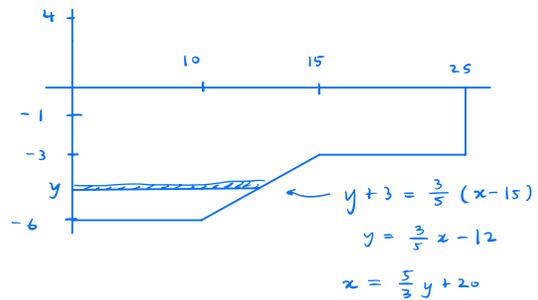
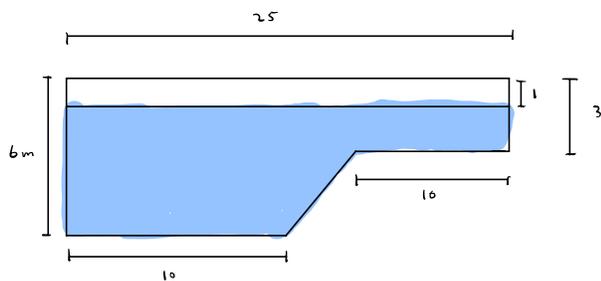


Example A rectangular tank 20 meters wide is buried with top at ground level. Contains fluid with density 5.2 kg per cubic meter, up to level 1 meter below ground level. Find work to pump 4 meters above ground level. Cross section is shown below.



If $-6 \leq y \leq -3$, work to lift slice at y is

$$\underbrace{5.2 \left((20) \left(\frac{5}{3}y + 20 \right) \Delta y \right)}_{F = (\text{density})(\text{volume})(\text{acc.})} \underbrace{(9.8)}_d (4-y)$$

If $-3 \leq y \leq -1$, work to lift slice at y is

$$\underbrace{5.2 \left((20)(25) \Delta y \right)}_{F = (\text{density})(\text{volume})(\text{acc.})} \underbrace{(9.8)}_d (4-y)$$

$$\begin{aligned} \text{Total work} &= \int_{-6}^{-3} (5.2)(9.8)(20) \left(\frac{5}{3}y + 20 \right) (4-y) dy \\ &\quad + \int_{-3}^{-1} (5.2)(9.8)(20)(25)(4-y) dy \end{aligned}$$