

Problem 2.9

This is another problem where we have to do some unit conversion and figure out what the problem statement is telling us to do.

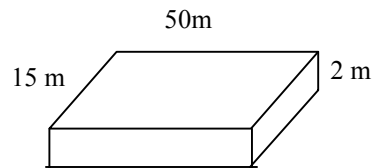
Problem statement: A waste treatment pond is 50 m long and 15 m wide, and has an average depth of 2 m. The density of the waste is $85.3 \text{ lb}_m/\text{ft}^3$. Calculate the weight of the pond contents in lb_f .

Solution: I **read the problem** to get a general idea what it was all about.

I **read the problem** again and the following data was given:

a pond is 50 m long and 15 m wide and has a depth of 2 m. Density of a waste is $85.3 \text{ lb}_m/\text{ft}^3$.

I **drew a sketch**:



Calculate weight of the pond in lb_f .

I calculated the total volume of the pond:

$$L = 50 \text{ m}$$

$$W = 15 \text{ m}$$

$$D = 2 \text{ m}$$

$$V = LWD = (50)(15)(2) = 1500 \text{ m}^3$$

I converted this to ft^3 :

$$1500 \text{ m}^3 (35.3145 \text{ ft}^3/\text{m}^3) = 52971.75 \text{ ft}^3.$$

Then, I multiplied this volume by the density of the waste in order to get rid of ft^3 :

$$(85.3 \text{ lb}_m/\text{ft}^3)(52971.75 \text{ ft}^3) = 4518490.27 \text{ lb}_m.$$

Finally, I do another unit conversion because there are $1 \text{ lb}_m / 1 \text{ lb}_f$:

$$\text{Weight of water} = 4518490.27 \text{ lb}_f.$$