Dimensional Analysis HW 2: Establishing Unit Rules

Here, we'll extend our work with units from class and establish some rules that we can rely on when dealing with units later. In any question that has a (w), make sure to show how the units divide off.

- 1. (1 point) (w) If a car is traveling at an average speed of 50 MPH for 3 hours, how far will it go?
- 2. (1 point) (w) Suppose that the car from 1 continues its journey for another 2 hours, but averages 70 MPH for those additional hours. What's the average speed of this car over the whole 5-hour trip?
- 3. I was chatting with my brother-in-law in 2019, and he told me that houses in his neighborhood have a value of \$125/square foot.
 - a. (1 point) (w) How much should a 2000 square foot house cost?
 - b. (1 point) (w) How much house could you get for \$300,000?
 - c. (2 points) (w) Suppose you want to cover all those square feet in part b with bamboo flooring that costs \$3.99/square foot. But! You'll have to make cuts of the end pieces, so, to be safe, you order 10% more flooring than the area of the floor. How much would you spend on all that rad flooring?

Garden mulch is often sold in "yards". However, it's not just a "yard" that is measured; it's a *cubic* yard (that is, a cube that measures 1 yard wide, 1 yard long, and 1 yard high).

4. (1 point) How many cubic feet are in a cubic yard? Google it up!

Do a little Googling and find the number of cubic feet in the cargo box of a Ford F-150 pickup truck (the "cargo box" is the spot filled with mulch in the image below).



5. (1 point) That's about how many cubic yards?

"Mulch" contains a lot of air, so it's pretty light (only about 600 pounds per cubic yard). I did a quick check of the safe hauling capacities for an F-150, and that load of mulch would be light enough to haul safely.

6. (2 points) (w) What if someone with an F-150 wanted to fill their cargo box with gravel for a home project? What would you tell them? Support your answer with math and good explanations! And Google up what you need!