CLASS NOTES 2: UNIT ARITHMETIC

Today, we'll start looking at another way to use and think about fractions that involve units.

Always remember the meaning of the word "per" in mathematics. When you hear "per" while doing unit mathematics, think "fraction":

- The "per" becomes a fraction bar (often, it's written ***as*** a fraction bar);
- The unit before the "per" is the numerator unit;
- The unit after the "per" is the denominator unit.

So, in the unit "dollars per pound", the unit fraction would be $\frac{\textbf{dollars}}{\textbf{pound}}$. This is often, as we've seen, called a **rate**.

For any rate expressed as a unit fraction, the understanding is that there is only 1 of whatever the unit in the denominator is. So, for example, "miles per gallon" implies "some number of miles per ***one*** gallon", and "dollars per month" implies dollars over only ***one*** month.

The numerator, however, will most likely be a number other than 1 (you can probably tell that; those units are plural in the unit fractions above). Let's look at some simple examples to get the gist, and then move onto some more realistic ones!

1. If something costs **$24** per **12 ounces**, how much does it cost **per ounce**?

2. If a city encountered **45 crimes** over the course of **30 days**, how many crimes, on average, did it experience **per day**?

3. You drive a distance of **100 miles** in **2 hours**. What's your average speed, in **miles per hour**?

4. There are ***exactly* 2.54 centimeters in 1 inch**. How many centimeters in a **foot**?

5. A scooter gets an average of about **90 miles per gallon**. How many miles, on average, could you drive with it on **4 gallons of gas**?

6. Why did some of those say "on average" up there?

(Here's a video check-in to make sure we're on the same page!)

A Subaru Outback has a gas tank that holds **18.5** gallons of fuel. According to the manual, the Subaru ***should*** get an average of **25 miles per gallon** (MPG) with "city" driving.

7. If your Subaru averages **25 MPG** city, how many miles should you be able to drive on the full tank of gas?

8. That Subaru is also supposed to get about **32 MPG** "highway". How many miles should you be able to drive on the full tank of gas on the highway?

9. A 2000 Chevy Tahoe had mileage **67162** at one fill-up. At the next fill-up, **24.6** gallons of gas were added to the tank, and the odometer now read **67540**. On average, how many miles per gallon did Tahoe get between those fill-ups?

10. If the 2000 Chevy Tahoe is supposed to get between **14** and **18 MPG**, does this one seem OK?

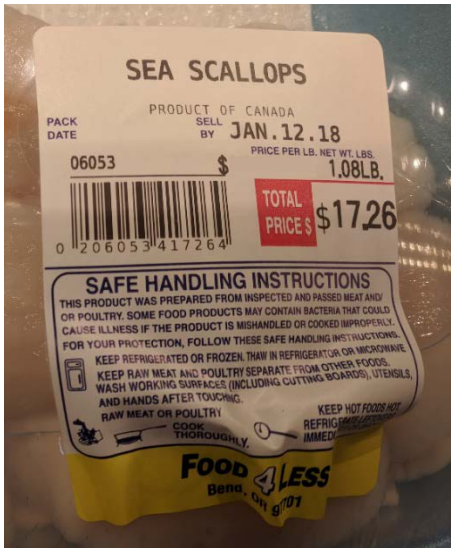
11. Let's go back to the Subaru…how many *gallons* does the Subaru use per *mile* in the city?

12. Do the same calculation with the Subaru, but with "highway" driving.

(Here's a video check-in to make sure we're on the same page!)

Onto the grocery store!

13. Find the unit price (in dollars per pound) of the scallops.



14. How much do the salmon fillets weigh?

15. Find the *total* price of this container of chicken.

(Here's one last video check-in to make sure we're on the same page!)