**Practice with Percents & Rates**

Show your work or explain your thinking.  There may be a few different methods that work.

1.  If the population of Eugene is 163,000 in 2015, and it grows by 5% over the next ten years, what will the population be in 2025?

    163,000*(0.05) = 8150  This is the amount of increase.
    163,000 + 8150 = 171,150  In 2025, Eugene's population will be 171,150.

    Here is a shortcut way:  163,000*(1.05) = 171,150.  This works because if we increase by 5%, we will have 105% (100% was what we already had, plus 5% extra.)

2.  In your own words, explain the process for increasing a quantity by 5%.

    You take 5% of the quantity.  (0.05 times original quantity = amount of increase).  Then increase the original quantity by that amount.  The shortcut is 1.05*original amount.

3.  How do you increase a quantity by 50%?  Explain.

    You take 50% of the quantity.  (0.50 times original quantity = amount of increase).  Then increase the original quantity by that amount.  You will end up with one and a half times the original amount.

4.  Is it possible to increase a quantity by 100%?  Explain.

    Yes, it's possible!  you take 100% of the quantity.  (1.00 times original quantity = amount of increase).  Then increase the original quantity by that amount.  You will end up with twice the original amount.

5.  Eugene's population was 145,000 in 2005 (and 163,000 in 2015). What percent did Eugene's population increase from from 2005 to 2015?

    The population increased by 18,000 from 2005 to 2015.  We always compare the amount of increase to the original amount. 18,000 is what percent of 145,000?  Here is a proportion we can solve to answer the question:

    $$\frac{18,000}{145,000} = \frac{x}{100}$$

    When you solve this proportion (with cross-multiplying) you get $x \approx 12$ (rounded).  So Eugene had a 12 percent increase in population between 2005 and 2015.

    note:  Another way some of you may have used is just 18,000 divided by 145,000 = 0.1241…  Then you move the decimal place over 2 places.  That is the same as multiplying by 100.  So you are doing the same process as the proportion, but in a slightly different order.

6. If you have two quantities, how do you find the percent increase? Explain.

Explaining a process in your own words may be challenging, but it will get easier with time. You are increasing your mathematical vocabulary when you do this!

First, find the amount of the increase by subtracting the two quantities. Then take the amount of the increase and divide by the original amount. Finally, multiply that number by 100% to get the percent increase.

Another way is to set up a proportion with this structure: amount of increase/original amount = x / 100 and then cross-multiply to solve for x.

7. An 8-foot pressure treated 2x10 board costs $14.49. How much will it cost to buy 158 feet of the board?

If I need 158 feet of board, then I need 158 divided by 8 = # boards. since I get 19.75, I can round up to 20 boards needed. then 20 times 14.49 = 289.8. Since this is money I should always show two decimal places. Also please write your answer in a sentence. I will spend $289.80 on the boards.

8. Last time I bought concrete, I spent $1159 for 7.5 cubic yards. This time I'm going to need 18 cubic yards. How much should I be prepared to spend?

I am assuming that the price of the concrete is proportional to the amount of concrete (is this a reasonable assumption?). So set up a proportion with this structure: price of concrete/amount = other price/other amount.

In this case: $1159/7.5yards = $x / 18yards. (Note: concrete contractors often say "yards" when they mean cubic yards.) Solving this proportion yields x = 2781.6. So 18 yards of concrete will likely cost $2781.60. (Another note: since this will require two trucks instead of one, I may have to pay an additional surcharge for delivery.)

9. A 40 ounce bag of coffee beans costs $23. What is the cost per pound?

When a question asks for the cost per pound, it's giving you a hint. Take the total cost and divide by the number of pounds. "per" in this case means to divide.

The only problem is that we aren't given the number of pounds. Use the fact that 16 ounces = 1 pound. You could use dimensional anaysis to convert:

$\frac{40 \ ounces}{1} \cdot \frac{1 \ pound}{16 \ ounces}$ = 2.5 pounds. This makes sense because 16 ounces + 16 ounces + 8 ounces = 40 ounces :)

$23 divided by 2.5 pounds gives $9.20 per pound. The coffee costs $9.20 per pound.

Note: Different methods of solving are ok, but I do need you to always:

- Show your method
- Write your answer with a sentence and include appropriate units