

Mr. Breitsprecher's "Tech Connect" Story Problems: Percents

Please set up a proportion for each example below.

1. Mr. Andrew's property tax is 9% of \$9,100. How much property tax does she pay?
2. Ms. Kirk's automobile, currently worth \$3,000, depreciated \$600 during the year. What percent of the original value was the depreciation?
3. In an eighth grade class of 320 students, 24 students received A's in mathematics. What percent of the class received A's in mathematics?
4. As commission for selling a lot to build a house on, a real estate broker received \$1,500. If this represents 5% of the selling price, what was the selling price?
5. The down payment on a new color inkjet printer set is \$22.50. If this is 15% of the total cost of the set, what is the total cost?
6. During a sale, Sherry's Dress Shoppe offered an 18% discount on every dress in their stock. What would be the cost of a \$25 dress during this sale?
7. If $\frac{1}{2}\%$ of the products manufactured by a company are defective, how many defective pieces would there be in 15,000?
8. Ted hit safely 15 times out of 55 times at bat. What is his batting average?
9. Joan had saved \$16. This was 18% of what she needed to buy a 256 MB flash memory drive for her computer. What was the cost of this "thumb drive"?
10. Jack sold 12 subscriptions to a magazine at \$4.50 per subscription and received 15% commission on each sale. How much more money in commissions must Jack obtain in order to have \$10?

Solving percentage problems is easy if we can set them up as proportions. This organizes information and allows us to set up a "cross-product" or an equation with 1 unknown. Then, we algebraically solve for the unknown. Let's review these terms:

• **Rate (r)** is the number of hundredths parts taken. This is the number followed by the percent sign.

• **Base (b)** is the whole on which the rate operates.

• **Percentage (p)** is the part of the base determined by the rate.

In the example: 5% of 40 = 2, rate (r) = 4%, base (b) = 40, and percentage (p) = 2. **Our proportion is always:**

$$\text{Rate}(r)/100 = \text{Percentage}(p)/\text{base}(b).$$

Therefore, our "cross-product" is always:

$$\text{Rate}(r) * \text{Base}(b) = 100 * \text{Percentage}(p).$$

As long as we are given any 2 values for rate (r), base (b), or percentage (p), we can solve for the third value.

From the story problems that were given, let's set up a spreadsheet to allow us to easily create a formula to find the answers. To make this easiest, let's create 3 sections in our spreadsheet for each of the 3 possible cases when solving these problems.

That way, we will only need to create 1 formula for each type and use Excel's "fill-down" feature to solve the rest. Note: we will set up the spreadsheet around the "cross-product."

Please write the proportion on the handout before starting the spreadsheet so that you can more easily organize your data into our spreadsheet.

Be Sure To Answer The Question!

Please be careful with questions 6, 10, and 10. When we evaluate our algebraic expressions for "cross-products," we get solutions for those equations, **BUT WE MUST BE SURE THAT WE SUPPLY AN ANSWER TO OUR QUESTION!**

6. Our solution is the percentage, we are asked to solve for the price of the dress. Subtract the percentage from original cost (base).

8. Batting averages are not expressed as percentages, they're expressed as decimals. Divide the percentage by 100 to convert to a decimal.

10. When we calculate the percentage, Jack's commission, it is less than \$10. Subtract that percentage from \$10 to get additions commissions.



Creating Our Cross Product Spreadsheet

- Highlight cells A1-I1 and MERGE AND CENTER, using FONT SIZE 14, BOLD the heading: **Percents and Cross Product Spreadsheet, By: Your Name**
- In cell A3, enter the text: **This spreadsheet is set up around the "cross-product" of our proportions: Rate * Base = 100 * Percentage**
- In cell A5, enter the text: **Case 1: Given rate and base, solve for percentage.**
- In row 6, enter the headings shown, 1 heading per cell (first A, then B, then C, and so on).
- In range A7:I10, enter the data shown.
- In range A7:I10, apply a thin border to the top and a double border to the bottom.
- In cell A12, enter the text: **Case 2: Given base and percentage, solve for rate.**
- In row 6, enter the headings shown, 1 heading per cell (first A, then B, then C, and so on).
- In range A14:I16, enter the data shown.
- In range A14:I16, apply a thin border to the top and a double border to the bottom.
- In cell A18, enter the text: **Case 3: Given rate and percentage, solve for base.**
- In row 19, enter the headings shown, 1 heading per cell (first A, then B, then C, and so on).
- In range A14:I16, enter the data shown.
- In range A20:I22, apply a thin border to the top and a double border to the bottom.
- Using the general formulas presented in the **Solutions** heading, create an Excel formula that will use cell references and calculate the unknown variable.
- Use **FILL DOWN**, so the rest of the column in that section has the correct formula. **Repeat steps 15 and 16** for the rest of the spreadsheet.

Percents and Cross Product Spreadsheet, By: YOUR NAME

This spreadsheet is set up around the "cross-product" of our proportions: **Rate * Base = 100 * Percentage**

Case 1: Given rate and base, solve for percentage.

Problem	Rate	Base	100	Percentage	Solution: Rate * Base / 100
1			100	?	
6			100	?	
7			100	?	
10			100	?	

Case 2: Given base and percentage, solve for rate.

Problem	Rate	Base	100	Percentage	Solution: 100 * Percentage / Base
2	?				
3	?				
8	?				

Case 3: Given rate and percentage, solve for base.

Problem	Rate	Base	100	Percentage	Solution: 100 * Percentage / Rate
4		?			
5		?			
9		?			