Percent of Increase and Decrease

Say a stock used to be worth $3 a share. Now it's $6. What's the percent of increase?

We know the increase is $3. Now, we need to decide between the following two problems:

The increase $3 is what percent of the original price $3? The answer would be 100% increase.

Or, the increase $3 is what percent of the new price $6? The answer would be 50% increase.

By common sense, if the stock goes from $3 per share to $6 per share, that's a 100% increase.

From this simple example, we learned that when we calculate the percent of increase, we need to ask: The increase is what percent of the **ORIGINAL** value.

[**Example 1**] A pre-school used to have 20 students. Now it has 25 students. What's the percent of increase in the number of students?

[**Solution**] The increase is 25-20=5 students. We need to find 5 is what percent of the **original** value 20. Let *x* be the percent of increase. We have:

$$5 = x \cdot 20$$
$$5 = 20x$$
$$\frac{5}{20} = \frac{20x}{20}$$
$$0.25 = x$$
$$25\% = x$$

Solution: The percent of increase in the number of students is 25%.

[**Example 2**] A pre-school used to have 25 students. Now it has 20 students. What's the percent of decrease in the number of students?

[**Solution**] The increase is 25-20=5 students. We need to find 5 is what percent of the **original** value 25. Let *x* be the percent of decrease. We have:

$$5 = x \cdot 25$$
$$5 = 25x$$
$$\frac{5}{25} = \frac{25x}{25}$$
$$0.2 = x$$
$$20\% = x$$

Solution: The percent of decrease in the number of students is 20%.

If the number goes from 20 to 25 (Example 2), that a 25% increase.

If the number goes from 25 to 20 (Example 3), that a 20% decrease.

Sometimes common sense just doesn't work! :) Example 3 also works against common sense.

[**Example 3**] Tom makes $12 per hour at a pizza chain. He recently got a 5% salary increase. Later, the whole chain's employees got a 5% salary decrease due to the recession. Tom thought his salary would go back to $12 per hour, but it didn't! What's Tom's new salary?

[**Solution**] Tom used to make $12 per hour, and he got a 5% salary increase. To find the amount of increase, we ask: What is 5% of $12? By the Percent Formula, we have:

$$x = 0.05 \cdot 12 = 0.6$$

The increase was $0.60, so Tom's salary became $12.60 after the increase.

Later, he got a 5% salary decrease. We need to find: What is 5% of $12.60? This time, we have:

$$x = 0.05 \cdot 12.6 = 0.63$$

Solution: Since the decrease was $0.63, Tom's new salary is $12.6-$0.63=$11.97 per hour.

Why didn't Tom's salary go back to $12 after a 5% increase and a 5% decrease? This is because the 5% decrease was based on a bigger number—$12.60, compared to the 5% increase based on a smaller number—$12.00.

The following examples ask you to find the original value after a percent of increase or decrease. The key is to realize: The original value is represented by 100%. This is because when we talk about a percent of increase/decrease, we assume the **original** value was the 100%.

[**Example 4**] After a 20% price cut, a hat sells for $40. What's the original price?

[**Solution**] After a 20% price cut, the new price, $40, is 80% of the original price. To find the original price, the question becomes: $40 is 80% of what?

Using the Percent Formula to write an equation, we have:

$$40 = 0.8x$$
$$\frac{40}{0.8} = \frac{0.8x}{0.8}$$
$$50 = x$$

Solution: The original price was $50.

[**Example 5**] After a 20% price increase, a hat sells for $48. What's the original price?

[**Solution**] After a 20% price increase, the new price, $48, is 120% of the original price. To find the original price, the question becomes: $48 is 120% of what?

Using the Percent Formula to write an equation, we have:

$$48 = 1.2x$$
$$\frac{48}{1.2} = \frac{1.2x}{1.2}$$
$$40 = x$$

Solution: The original price was $40.