MORE PROBLEMS INVOLVING PERCENT INCREASE AND DECREASE

- Want more practice with percents and related concepts?
  Changing Decimals to Percents
  Changing Percents to Decimals
  Writing Expressions Involving Percent Increase and Decrease
  Calculating Percent Increase and Decrease
  Problems Involving Percent Increase and Decrease

(more mathematical cats)

Here, you will practice solving more problems involving percent increase and decrease.

You may use a calculator for these exercises.

EXAMPLES:

Question:
Suppose the price of an item increases by 19%, and then decreases by 30%.
What is the resulting percent increase or decrease?

Solution:
$(0.7)(1.19)x = 0.83x = (1 - 0.17)x$;
17% decrease
Why?

As discussed in Problems Involving Percent Increase and Decrease,
a price x changes to $1.19x$ after the 19% increase.
After the subsequent 30% decrease, only 70% of this remains:
$(1 - 0.3)(1.19x) = (0.7)(1.19)x = 0.83x$

The price started at x. It ended at $0.83x$.
So, the overall change was a decrease (note that $0.83 < 1$).

How ***much*** of a decrease was there in going from $x = 1x$ to $0.83x$?
Answer: $1x - 0.83x = 0.17x$
That is, 17% of x was 'lost' in the process.
The combined effect of the back-to-back increase/decrease was a 17% decrease.

Question:
Suppose the price of an item decreases by 40%, and then increases by 40%.
What is the resulting percent increase or decrease?
Solution:
$(1 + 0.4)(1 - 0.4)x = (1.4)(0.6)x = 0.84x = (1 - 0.16)x$;
16% decrease

Pause for a moment and appreciate the power in renaming an expression!
There are four names for the same expression given above, and each has its strength:

$(1 + 0.4)(1 - 0.4)x$	this name makes it clear that we're doing a 40% decrease (the $1 - 0.4$) and a 40% increase (the $1 + 0.4$)
$(1.4)(0.6)x$	this name is a whole lot easier to plug into a calculator
$0.84x$	this name, as compared to the original $1x$, shows that the overall effect was a decrease
$(1 - 0.16)x$	this name shows that it was a 16% decrease

Question:
Suppose the price of an item increases by 50%, and then decreases by 50%.
What is the resulting percent increase or decrease?
Solution:
$(1 - 0.5)(1 + 0.5)x = (0.5)(1.5)x = 0.75x = (1 - 0.25)x$;
25% decrease

Question:
Suppose the price of an item increases by 30%, and then decreases by 10%.
What is the resulting percent increase or decrease?
Solution:
$(1 - 0.1)(1 + 0.3)x = (0.9)(1.3)x = 1.17x = (1 + 0.17)x$;
17% increase

Question:
Suppose the price of an item increases by 50%, and then increases by 50% again.
What is the resulting percent increase or decrease?
Solution:
$(1 + 0.5)(1 + 0.5)x = (1.5)(1.5)x = 2.25x = (1 + 1.25)x$;
125% increase

Question:

Suppose an item costs $50.

The price increases by 20%, and then decreases by 70%.

What is the resulting percent increase or decrease?

Solution:

There are two good approaches. You choose!

First approach:

Compute new price, then compute percent change:

new price is: $(0.3)(1.2)(\$50) = \$18$

It was an overall decrease.

The <u>percent decrease</u> is:

$$\frac{50 - 18}{50} = 0.64 = 64\%$$

Second approach:

You don't need the original price at all! Just denote it by x:

$(0.3)(1.2)x = 0.36x = (1 - 0.64)x\,;$

64% decrease