



SAT Math questions can be difficult in several different ways: some questions will be difficult for students because they hinge on knowing an advanced mathematical fact or concept, but many others pose a different challenge. Very often, students will encounter a question that they find challenging even though the problem is based on knowledge they gained years earlier. In these cases, the difficulty arises from how the information is presented; rather than being given a direct problem involving one simple step, students are faced with a more convoluted word problem, often with several steps that must be followed precisely to find the correct answer. On top of this, these questions are mostly multiple choice, so if a student does not pay close enough attention to the problem or is not careful in executing each step, they will frequently arrive at a wrong answer that will appear alongside the correct one. Having arrived at an answer and seeing that answer appear as one of the choices, students may feel very confident that they got the right answer when, in fact, they are unfortunately wrong. Consider this example:

Charlene owns a stationary store. When reviewing her finances, she discovered that her store's profits in February were 40% greater than those in January due to an increase in card sales. However, this increase was followed in March by a decrease of 20% from the previous month's profits. Charlene's profits in March were what percent of her profits in January?

- A) 48%
- B) 112%
- C) 120%
- D) 168%

Although the content of this question is not advanced – it is based entirely on finding and using percentages – many students will make mistakes that lead to wrong answers. For instance, if the student misreads the question and applies both percentages as decreases, they will arrive at answer (A); if they do the opposite and apply both percentages as increases, they will arrive at answer (D); however, the most likely wrong answer is a misapplication of percentages that leads to choice (C):

$$100\% + 40\% - 20\% = 120\%$$

Since each step involves taking a percentage of the result of the previous step, the actual calculations will be slightly more complicated than this. The best way to see this and to solve the problem in the easiest way is to choose a convenient starting value for Charlene's profits in January: let's say her profits were \$100. That may not be enough to keep her doors open, but it is an easy number to use when applying percents! Then we just need to follow the directions in the question:

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January's profits: \$100

40% of January's profits: \$40

February's profits:  $\$100 + \$40 = \$140$

20% of February's profits:  $(0.2)(\$140) = \$28$

March's profits:  $\$140 - \$28 = \$112$

Our question then becomes this: \$112 is what percent of \$100? That would simply be 112%! By reading carefully and diligently working through each step in the problem, the correct answer is easy to find. However, carelessness and haste can easily lead to wrong answers and lower scores.

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