SECTION 6.2 Exploring Percents

Percents are a powerful tool that enables us to compare amounts and to describe change.

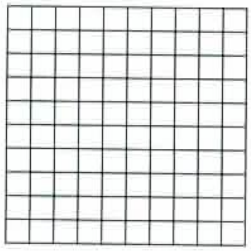
EXPLORATION 6.5 Percents

Sales

John sees that the local department store is having a sale. He goes to the store and finds that all televisions are 25% off.

1. Describe in words what that means.
2. Let's say he is interested in a particular television that normally sells for \$400. If it is priced at 25% off, how much will he pay for it?
3. There are two common ways in which students solve this problem.
   - Ann: 25% of \$400 is \$100. \$400 − \$100 = \$300. John pays \$300.
   - Bela: 75% of \$400 is \$300. John pays \$300.

   Ann doesn't understand what Bela did. How can you help her? You may, if you wish, use a grid like the one at the right.



4. Let's say that Joe gets a 5% raise and that he presently makes \$8.00 per hour. One way to determine his new wage is to find 5% of 8.00 and then add that to 8.00. Using the ideas generated above, can you figure out how to determine his new wage with only one calculation? Describe the method.

Percent Decrease and Increase

Joshua is confused. He works for the Adamson Printing Company. Last year the economy was in such bad shape that all employees agreed to take a 20% cut in pay. However, this year the economy had improved so much that the company agreed to give everyone a 20% raise. Before the pay cut, Joshua was making \$30,000 a year.

5. Explain why the 20% raise does not "undo" the 20% pay cut.
6. What raise would undo the 20% pay cut?
7. Determine a general formula that will tell you what percent increase will undo an x percent decrease.

Changes in Rates

In New Hampshire, where I live, there was a tremendous amount of controversy over the Seabrook nuclear power plant. The construction of the plant was held up many times. Eventually the company that made the reactor went bankrupt. It was bought out

by another utility company. Part of the deal made to ensure that the new company would make a profit was that it could increase rates by *at least* 5.5% each year for 7 years.

8. Bill and Betty Olsen figured that their average monthly electric bill last year was $83.21.
   a. If they use, on average, the same amount of electricity over the next 7 years, and their bill increases exactly 5.5% each year, what can they expect their monthly utility bill to be at the end of 7 years?
   b. Meet with your partner(s) and discuss answers and solutions. If you think you would change your method in order to do a similar problem, describe how and why the new method works.
   c. Jarrad used the following method:

      $83.21 \times 0.055 = 4.57655$

      $83.21 + 4.58 = 87.79$

      $87.79 \times 0.055 = \text{etc.}$

      Do you think Jarrad's method is valid? Why or why not?
      If not, what suggestions would you give to Jarrad? Justify your suggestions.
9. Last year the Olsens' combined income was $42,310. If their income increases by 5.5% each year, what will their income be at the end of 7 years?

EXPLORATION 6.7 Reducing, Enlarging, and Percents

PART 1: A broken copy machine[2]

Most copy machines allow you either to enlarge or to reduce a copy. Some machines let you determine the exact amount of enlargement or reduction. Other machines have buttons for the changes that are most commonly made. Let's say a copy machine has buttons that will enable you to make the following changes to a copy: 10%, 50%, 100%, and 200%. For example, the 10% button means that the size of the copy will be 10% of the size of the original, whereas the 200% button will make a copy that is 200% (double) of the size of the original. The 100% button is what you push when you want a copy that is the same as your original.

1. Let's say the buttons on the machine were as shown below.

   a. How could you make a copy that was 25% of the size of the original?
   b. How could you make a copy that was 3 times the size of the original?
   c. Suppose the 100% button was broken. How could you make a copy of the original that was the same size?

2. Suppose these were the buttons on a machine, and the 100% button was broken. How could you make a copy of the original that was the same size?

3. Suppose these were the buttons on a machine, and the 100% button was broken.

   a. Explain why it is now impossible to make a copy of the original that is the same size.
   b. How close can you get to the original size?

[2]Text adapted from "The 100% Solution." Scott Kim © 1999. Reprinted with permission of *Discover Magazine*.