

# Unit 4 Family Support Materials

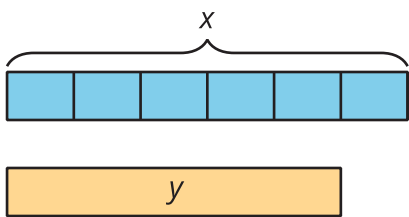
## Proportional Relationships and Percentages

### Section A: Proportional Relationships with Fractions

This week your student is learning about proportional relationships that involve fractions and decimals. For example, a baker decides to start using  $\frac{1}{6}$  less than the amount of sugar called for in each recipe. If the recipe calls for 2 cups of sugar, the baker will leave out  $\frac{1}{6} \cdot 2$ , or  $\frac{1}{3}$ , cup of sugar. That means the baker will use only  $2 - \frac{1}{3}$ , or  $1\frac{2}{3}$ , cups of sugar.

| amount of sugar in the recipe ( $x$ ) | amount of sugar the baker uses ( $y$ ) |
|---------------------------------------|----------------------------------------|
| 1 cup                                 | $\frac{5}{6}$ cup                      |
| $1\frac{1}{2}$ cups                   | $1\frac{1}{4}$ cups                    |
| 2 cups                                | $1\frac{2}{3}$ cups                    |

The amount of sugar the baker actually uses,  $y$ , is proportional to the amount of sugar called for in the recipe,  $x$ . The constant of proportionality is  $\frac{5}{6}$ .



$$y = x - \frac{1}{6}x$$

$$y = (1 - \frac{1}{6})x$$

$$y = \frac{5}{6}x$$

Another way to write this equation is  $y = 0.\overline{83}x$ . The line above the 3 tells us that if we use **long division** to divide  $5 \div 6$ , we will keep getting the answer 3 over and over. This is an example of a **repeating decimal**.

**Here is a task to try with your student:**

The baker also decides to start using  $\frac{1}{6}$  more than the amount of liquid called for in each recipe.

- How much of each ingredient will the baker use if the recipe calls for:
  - $1\frac{1}{2}$  cups of milk?



- b. 3 tablespoons of oil?
2. What is the constant of proportionality for the relationship between the amount of liquid called for in the recipe and the amount this baker uses?

Solution:

1. a.  $1\frac{3}{4}$  cups, because  $\frac{1}{6} \cdot 1\frac{1}{2} = \frac{1}{4}$  and  $1\frac{1}{2} + \frac{1}{4} = 1\frac{3}{4}$   
b.  $3\frac{1}{2}$  tablespoons, because  $(1 + \frac{1}{6}) \cdot 3 = 3\frac{1}{2}$
2.  $\frac{7}{6}$  or  $1.1\overline{6}$ . (Equivalent forms of these numbers are also acceptable solutions.)

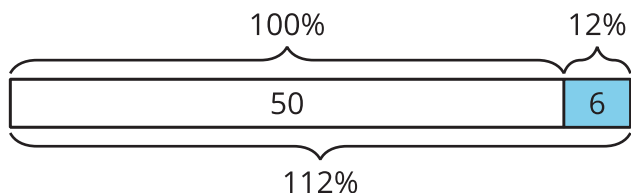


## Section B: Percent Increase and Decrease

This week, your student is learning to describe increases and decreases as a percentage of the starting amount. For example, two different school clubs can gain the same number of students but have different **percent increases**.

The cooking club has 50 students. Then they gain 6 students.

This is a 12% increase, because  $6 \div 50 = 0.12$ .

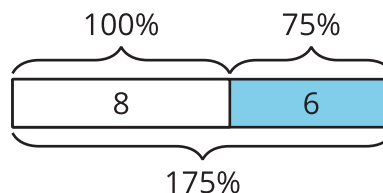


They now have 56 students, which is 112% of the starting amount.

$$1.12 \cdot 50 = 56$$

The computer club has 8 students. Then they gain 6 students.

This is a 75% increase, because  $6 \div 8 = 0.75$ .



They now have 14 students, which is 175% of the starting amount.

$$1.75 \cdot 8 = 14$$

### Here is a task to try with your student:

The photography club has 20 students. Then the number of students increases by 35%. How many students are in the photography club now?

Solution:

27 students. Possible strategies:

- The club gains 7 new students, because  $0.35 \cdot 20 = 7$ . The club now has 27 students, because  $20 + 7 = 27$ .
- The club now has 135% as many students as they started with, because  $100 + 35 = 135$ . That means they have 27 students, because  $1.35 \cdot 20 = 27$ .

## Section C: Applying Percentages

This week, your student is learning about real-world situations that use percent increase and percent decrease, such as tax, interest, markup, and discounts.

For example, the price tag on a jacket says \$24. The customer must also pay a sales tax equal to 7.5% of the price. What is the total cost of the jacket, including tax?

$$24 \cdot 1.075 = 25.80$$

The customer will pay 107.5% of the price listed on the tag, so the total cost will be \$25.80.

We can also find the percentage. For example, a backpack originally costs \$22.50, but it is on sale for \$18.99. The discount is what percentage of the original price?

$$22.50x = 18.99$$

$$x = 18.99 \div 22.50$$

$$x = 0.844$$

The sale price is 84.4% of the original price. The discount is  $(100 - 84.4)\%$ , or 15.6%, of the original price.

### Here is a task to try with your student:

A restaurant bill is \$18.75. If you pay \$22, the tip that you leave for the server is what percentage of the bill?

Solution:

17. $\bar{3}\%$ . Possible strategy: You pay 117. $\bar{3}\%$  of the bill, because  $22 \div 18.75 = 1.17\bar{3}$ . You leave a 17. $\bar{3}\%$  tip, because  $117.\bar{3} - 100 = 17.\bar{3}$ .

