STUDY LINK 7·12 | **Unit 8: Family Letter**

Fractions and Ratios

In Unit 4, your child reviewed equivalent fractions. In this unit, we will apply this knowledge to compute with fractions and mixed numbers. Students will learn that the key to fraction computation with unlike denominators is to find common denominators.

Unit 8 also introduces fraction multiplication. Students will use folded paper to represent fractions of a whole. Then the class will study fraction multiplication using area models, which are diagrams that show a *whole* divided into parts. This concept building will lead to a rule for multiplying fractions:

$$\frac{a}{b} * \frac{c}{d} = \frac{a * c}{b * d}$$

Example: $\frac{2}{5} * \frac{3}{4} = \frac{2 * 3}{5 * 4} = \frac{6}{20}$, or $\frac{3}{10}$

For mixed-number multiplication, students will rename the mixed numbers as fractions, then use the rule to multiply. Finally they rename the product as a mixed number.

Example: $2\frac{1}{2} * 1\frac{2}{3} = \frac{5}{2} * \frac{5}{3} = \frac{5 * 5}{2 * 3} = \frac{25}{6} = 4\frac{1}{6}$

Your child might want to use partial products to solve this problem:

$2\frac{1}{2} * 1\frac{2}{3}$ can be thought of as $(2 + \frac{1}{2}) * (1 + \frac{2}{3})$. There are 4 partial products, as indicated by arrows:

$$2 * 1 = 2$$
$$2 * \frac{2}{3} = \frac{4}{3}$$
$(2+\frac{1}{2}) * (1+\frac{2}{3})$ $\qquad \frac{1}{2} * 1 = \frac{1}{2}$
$$\frac{1}{2} * \frac{2}{3} = \frac{2}{6}$$

Add the partial products: $2 + \frac{4}{3} + \frac{1}{2} + \frac{2}{6} = 2 + \frac{8}{6} + \frac{3}{6} + \frac{2}{6} = 2 + \frac{13}{6} = 4\frac{1}{6}$

Your child will play several games such as, *Build-It* and *Fraction Action, Fraction Friction,* to practice sorting fractions and adding fractions with unlike denominators.

Finally, as part of the American Tour, students will explore data related to population distribution and household sizes.

Please keep this Family Letter for reference as your child works through Unit 8.

Vocabulary

Important terms in Unit 8:

area model A model for multiplication problems in which the length and width of a rectangle represent the factors and the area represents the product.

discount The amount by which a price of an item is reduced in a sale, usually given as a fraction or percent of the original price, or as a "percent off." For example, a $4 item on sale for $3 is discounted to 75% or $\frac{3}{4}$ of its original price. A $10.00 item at 10% off costs $9.00, or $\frac{1}{10}$ less than the usual price.

majority A number or amount that is more than half of a total number or amount.

quick common denominator The product of the denominators of two or more fractions. For example, the quick common denominator of $\frac{3}{4}$ and $\frac{5}{6}$ is 4 ∗ 6 = 24. In general, the quick common denominator of $\frac{a}{b}$ and $\frac{c}{d}$ is b ∗ d.

unit fraction A fraction whose numerator is 1. For example, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{8}$, and $\frac{1}{20}$ are unit fractions. Unit fractions are especially useful in converting between measurement systems. For example, because 1 foot = 12 inches you can multiply a number of inches by $\frac{1}{12}$ to convert to feet.

unit percent One percent (1%).

Building Skills through Games

In Unit 8, your child will practice skills with fractions and other numbers by playing the following games. For detailed instructions of most games, see the *Student Reference Book.*

Build-It See *Student Reference Book,* p. 300. This game for partners requires a deck of 16 *Build-It* fraction cards. This game provides practice in comparing and ordering fractions.

Factor Captor See *Student Reference Book,* p. 306. Partners play this game with a calculator and paper and pencil. This game provides practice finding factors of a number.

Mixed-Number Spin See *Student Reference Book,* p. 322. Partners use a spinner to randomly select fractions and mixed numbers, used to complete number sentences. This game provides practice in adding and subtracting fractions and mixed numbers.

Frac-Tac-Toe See *Student Reference Book,* p. 274–276. This game for partners requires a deck of number cards 0–10 and a gameboard similar to a bingo card. The game provides practice converting between fractions, decimals, and percents.

Fraction Action, Fraction Friction See *Student Reference Book,* p. 312. This game for partners requires a set of 16 *Fraction Action, Fraction Friction* cards. The game provides practice adding fractions with unlike denominators.

Name That Number See *Student Reference Book,* p. 325. Partners play a card game. This game provides practice in using order of operations to write number sentences.

Do-Anytime Activities

To work with your child on the key concepts, try these rewarding activities.

1. Ask your child to measure the lengths of two objects using a ruler. Then ask him or her to calculate the sum and difference of their lengths.

2. Ask your child to explain how to use the fraction operation keys on his or her calculator. For example, ask your child to show you how to enter fractions and mixed numbers, simplify fractions, and convert between fractions and decimals.

3. Help your child identify advertisements in signs, newspapers, and magazines that use percents. Help your child find the sale price of an item that is discounted by a certain percent. For example, a $40 shirt reduced by 25% costs $30.

As You Help Your Child with Homework

As your child brings assignments home, you might want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

Study Link 8·1

1. $\frac{3}{6}$ 2. $\frac{2}{3}$ 3. $\frac{5}{6}$

4. $\frac{19}{20}$ 5. $\frac{9}{17}$ 6. $\frac{4}{7}$

7. Sample answer: The quick common denominator is $21 * 17$, or 357. $\frac{11}{21} = \frac{11 * 17}{21 * 17} = \frac{187}{357}$, and $\frac{9}{17} = \frac{9 * 21}{17 * 21} = \frac{189}{357}$. So $\frac{9}{17}$ is greater.

8. 0.75   9. $0.\overline{6}$ 10. 0.625

11. 0.7   12. 0.55   13. 0.84

14. Sample answer: $\frac{1}{8}$ is half of $\frac{1}{4}$ $\left(\frac{0.25}{2} = 0.125\right)$. $\frac{5}{8} = \frac{4}{8} + \frac{1}{8} = 0.5 + 0.125$, or 0.625.

15. >   16. =   17. >

18. >   19. >   20. >

21. Sample answer: $\frac{6}{7} + \frac{1}{7} = 1$. $\frac{1}{8}$ is less than $\frac{1}{7}$, so $\frac{6}{7} + \frac{1}{8}$ is less than 1.

Study Link 8·2

2. 2   3. $10\frac{2}{3}$ 5. $5\frac{1}{2}$

7. 6   9. 14   11. $5\frac{1}{4}$

13. $9\frac{3}{8}$ 15. $8\frac{1}{4}$

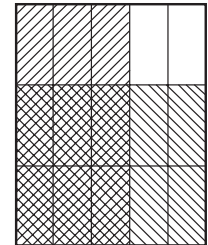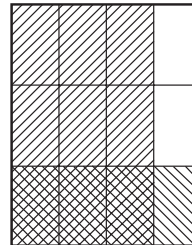## Study Link 8·3

1. 11   3. 10   6. $6\frac{5}{3}$

7. $2\frac{1}{2}$ 9. $2\frac{1}{5}$ 11. $5\frac{4}{9}$

13. $2\frac{1}{4}$ 15. $\frac{1}{2}$

Study Link 8·4

1. $\frac{4}{5}$; $\frac{155}{200}$ 2. $< \frac{1}{2}$ 3. $> \frac{1}{2}$

4. $= \frac{1}{2}$ 5. $< \frac{1}{2}$

6. $\dfrac{\boxed{6}}{\boxed{1}} + \dfrac{\langle 5 \rangle}{\boxed{6}} = \frac{41}{6} = 6\frac{5}{6}$

Study Link 8·5

1. $\frac{3}{12}$, or $\frac{1}{4}$ 2. $\frac{6}{15}$, or $\frac{2}{5}$

5. Nina: $\frac{1}{2}$; Phillip: $\frac{1}{6}$; Ezra: $\frac{1}{6}$; Benjamin: $\frac{1}{6}$

219

Study Link 8·6

1. $\frac{1}{3} * \frac{2}{5} = \frac{2}{15}$

3. $\frac{7}{8} * \frac{1}{3} = \frac{7}{24}$

5. $\frac{10}{18}$, or $\frac{5}{9}$

7. $\frac{12}{25}$

9. $\frac{5}{63}$

11. 9; 3

Study Link 8·7

7.

Rule $\triangle = \square * 4$	in ($\square$)	out ($\triangle$)
	$\frac{2}{3}$	$\frac{8}{3}$, or $2\frac{2}{3}$
	$\frac{4}{5}$	$\frac{16}{5}$, or $3\frac{1}{5}$
	$\frac{8}{9}$	$\frac{32}{9}$, or $3\frac{5}{9}$
	$\frac{5}{4}$	$\frac{20}{4}$, or 5
	$\frac{7}{3}$	$\frac{28}{3}$, or $9\frac{1}{3}$

8.

Rule $\triangle = \square * \frac{1}{4}$	in ($\square$)	out ($\triangle$)
	2	$\frac{1}{2}$
	3	$\frac{3}{4}$
	$\frac{5}{6}$	$\frac{5}{24}$
	$\frac{2}{3}$	$\frac{1}{6}$

Study Link 8·8

1. a. $\frac{46}{24}$, or $1\frac{11}{12}$ **b.** $\frac{10}{40}$, or $\frac{1}{4}$

c. $\frac{85}{24}$, or $3\frac{13}{24}$ **d.** $\frac{175}{24}$, or $7\frac{7}{24}$

e. $\frac{296}{60}$, or $4\frac{14}{15}$ **f.** $\frac{364}{40}$, or $9\frac{1}{10}$

2. a. $8\frac{5}{9}$ **b.** $5\frac{1}{2}$ **c.** $2\frac{1}{12}$

3. a. 5 **b.** $5\frac{5}{8}$

Study Link 8·9

1. $\frac{45}{100}$; 0.45; 45%

$\frac{3}{10}$; 0.3; 30%

$\frac{2}{10}$; 0.2; 20%

$\frac{15}{100}$; 0.15; 15%

2. Calculated discounts: $100.00; $1,600.00; $7.84; $0.75; $8.70; $5.28; $810.00; $385.00

Study Link 8·10

1. 4;20   **3.** 1,200 miles

5. 16 min.   **6.** yes

Study Link 8·11

Sample answers for Problems 1–4:

1. $\frac{14}{16}, \frac{28}{32}, \frac{35}{40}$ **2.** $\frac{6}{8}, \frac{9}{12}, \frac{12}{16}$

3. $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}$ **4.** $\frac{4}{6}, \frac{6}{9}, \frac{8}{12}$

5. $\frac{3}{8}$ **6.** $\frac{5}{9}$

7. $\frac{7}{9}$ **8.** $\frac{7}{12}$

9. Sample answer: I changed $\frac{4}{10}$ and $\frac{7}{12}$ to fractions with a common denominator. $\frac{4}{10} = \frac{24}{60}$ and $\frac{7}{12} = \frac{35}{60}$. Because $\frac{1}{2} = \frac{30}{60}$, $\frac{7}{12}$ is $\frac{5}{60}$ away from $\frac{1}{2}$, and $\frac{4}{10}$ is $\frac{6}{60}$ away from $\frac{1}{2}$. So, $\frac{7}{12}$ is closer to $\frac{1}{2}$.

11. $\frac{11}{18}$ **13.** $\frac{17}{24}$

14. $\frac{3}{10}$ **15.** $3\frac{1}{3}$

Study Link 8·12

1. 5   **2.** 22

3. $3\frac{4}{5}$ **5.** $1\frac{5}{9}$

7. $8\frac{5}{12}$ **9.** $11\frac{1}{4}$

11. $4\frac{1}{2}$ **13.** $\frac{15}{2}$, or $7\frac{1}{2}$