Unit 7: Family Letter

Home Link 6-14

NAME DATE TIME

Multiplication of Mixed Numbers; Geometry; Graphs

At the beginning of Unit 7 students apply and extend their knowledge of multiplication to learn two strategies for multiplying mixed numbers. In Lesson 7-1 they review the idea that factors in a multiplication problem can be broken into smaller parts to make the multiplication easier. They apply this strategy to the multiplication of mixed numbers, using area models to illustrate the calculation, as shown at the right below.

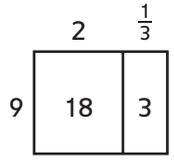
For example, to solve $2\frac{1}{3} * 9$, they think:

$2\frac{1}{3} = 2 + \frac{1}{3}$

I can multiply each part of $2\frac{1}{3}$ by 9 and add the partial products.

$2 * 9 = 18$ and $\frac{1}{3} * 9 = \frac{9}{3} = 3$

$18 + 3 = 21$, so $2\frac{1}{3} * 9 = 21$



Area model for $2\frac{1}{3} * 9$

In Lesson 7-2 students review the fraction multiplication algorithm they learned earlier in the year: to multiply two fractions, multiply the numerators and then multiply the denominators. They convert mixed numbers to fractions greater than 1 and then use the algorithm to multiply the mixed numbers. For example, to solve $1\frac{1}{2} * 3\frac{3}{4}$, they think:

$1\frac{1}{2}$ is the same as $\frac{3}{2}$. *$3\frac{3}{4}$ is the same as $\frac{15}{4}$.* $\frac{3}{2} * \frac{15}{4} = \frac{(3 * 15)}{(2 * 4)} = \frac{45}{8} = 5\frac{5}{8}$.

So $1\frac{1}{2} * 3\frac{3}{4} = \frac{45}{8}$, or $5\frac{5}{8}$.

In Lesson 7-3 students apply these strategies for mixed-number multiplication to find areas of rectangles with fractional side lengths using the formula $A = l \times w$. In Lesson 7-4 they review strategies for dividing fractions and discuss how it can be useful to rewrite division problems with common denominators.

In the middle of the unit students review properties of triangles, quadrilaterals, and other polygons, including attributes such as same-length sides, parallel sides, and right angles. They use attributes to sort and classify shapes. In Lessons 7-5 through 7-8 students explore a new classification system called a *hierarchy*. Hierarchies organize objects into categories and subcategories. Subcategories get more specific as you move down a hierarchy. An example of a hierarchy of polygons is shown at the right.

Polygons
↓
Polygons with a right angle
↓
Polygons with a right angle and at least one pair of parallel sides

In the last part of Unit 7 students continue exploring line plots and coordinate grids. They use line plots to organize and interpret fractional measurement data. They create graphs on coordinate grids to visualize numerical patterns and represent real-world problems. For example, in Lesson 7-13 students use a graph to explore patterns in the eruption length and wait time between eruptions of the geyser Old Faithful.

Vocabulary

Important terms in Unit 7:

adjacent Next to each other. For example, adjacent sides of a *polygon* are two sides that share a vertex.

attribute A characteristic or *property* of an object or common characteristic of a set of objects. For example, one attribute of all *squares* is that they have four sides of the same length. Same as *property*.

category A group or class defined by a feature or *attribute*. Objects can be sorted into categories. For example, "triangles" is a category of *polygons,* defined by the attribute of having three sides.

formula A general *rule* for finding the value of something. A formula is usually written as an equation with variables.

hierarchy of shapes A classification system in which shapes are organized into *categories* and *subcategories*. For each category, every defining *attribute* of a shape in that category is also a defining attribute of all shapes in its subcategories. A hierarchy is often shown in a diagram with the most general category at the top and lines or arrows connecting categories to their subcategories. See page 247 for an example.

kite A *quadrilateral* that has two non-overlapping pairs of *adjacent* equal-length sides.

parallelogram A *trapezoid* that has two pairs of parallel sides.

partial products Intermediate products found when the factors in a multiplication problem are broken into easier parts. See page 247 for an example using a whole number and a mixed number.

polygon A closed 2-dimensional figure with straight sides that meet only at their endpoints, such as a triangle or square.

property Same as *attribute*.

quadrilateral A *polygon* with four sides.

rectangle A *parallelogram* with four right angles.

rhombus A *parallelogram* with four sides of the same length.

rule A statement that expresses a pattern and can be used to continue the pattern. For example, in the *sequence* 2, 4, 6, 8, 10, . . . , the rule *+ 2* can be used to generate subsequent numbers.

sequence An ordered list of numbers, often with an underlying *rule* that can be used to generate subsequent numbers in the list.

square A *rectangle* with four sides of the same length. All squares are both rectangles and *rhombuses*.

subcategory A more specific *category* contained entirely within a given category. Subcategories are usually defined by an *attribute* shared by some, but not all, of the members of the larger category. For example, right triangles are a subcategory of the category of triangles because all right triangles are triangles but not all triangles have a right angle.

trapezoid A *quadrilateral* with at least one pair of parallel sides.

unit fraction A fraction with a numerator of 1.

Do-Anytime Activities

To work with your child on the key concepts in this unit, try some of these activities.

1. Have your child measure the length and width of rectangular objects to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ inch and multiply the dimensions to find the area of the objects in square inches.
2. Point out a group or category of objects. Have your child name a subcategory and describe the attribute needed to fit into the subcategory. For example, given the category "Trees on this street," your child might notice that some, but not all, of the trees are maple trees and choose "Maple trees on this street" as the subcategory.
3. Have your child measure a set of objects (such as the pens and pencils in a desk drawer) to the nearest $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{8}$ inch and organize the data on a line plot.
4. Look in newspapers or magazines for real-world examples of rules, tables, or graphs. Discuss any patterns you see in the data and what each representation shows you about the data.

Building Skills through Games

As your child builds new skills in Unit 7, he or she will also play games and complete activities to maintain skills and understandings from previous units. The games listed below will help reinforce new concepts and maintain past learning. Detailed instructions for each game are in the *Student Reference Book*. Many of these games can be played at home with materials you likely already have; gameboards and card decks can be copied for home use.

Decimal Domination See *Student Reference Book*, page 295. Two players need number cards 0–9 (4 of each), 4 counters (2 per player), and a coin to play this game. *Decimal Domination* provides practice with multiplying decimals.

Exponent Ball See *Student Reference Book*, pages 303–304. Two players need number cards 1–4 (4 of each), two 6-sided dice, a counter, and the *Exponent Ball* gameboard from *Math Masters*, page G28 to play this game. *Exponent Ball* provides practice with multiplying and dividing decimals by powers of 10.

Fraction Top-It: Addition See *Student Reference Book*, page 309. Two players need fraction cards with denominators of 2, 3, 4, 5, 6, 8, 10, and 12. *Fraction Top-It: Addition* provides practice with adding and comparing fractions with unlike denominators.

Property Pandemonium See *Student Reference Book*, page 320. Two players need the *Property Pandemonium* Card Deck and Record Sheet from *Math Masters*, pages G32 and G33 to play. *Property Pandemonium* provides practice with naming and classifying quadrilaterals.

Spoon Scramble See *Student Reference Book*, page 324. Four players need the *Spoon Scramble* cards from *Math Masters*, page G30 and three spoons to play. *Spoon Scramble* provides practice with multiplying fractions and multiplying and dividing by powers of 10.

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 Home Links.

Home Link 7-1

1. $20\frac{15}{8}$, or $21\frac{7}{8}$ **2.** $7\frac{25}{15}$, or $8\frac{10}{15}$

4. $\frac{31}{24}$, or $1\frac{7}{24}$ **5.** $\frac{13}{16}$

Home Link 7-2

1. $\frac{48}{5}$, or $9\frac{3}{5}$ **2.** $\frac{99}{12}$, or $8\frac{3}{12}$ **3.** $\frac{35}{12}$, or $2\frac{11}{12}$

4. $\frac{11}{8}$, or $1\frac{3}{8}$ **5.** $\frac{2}{12}$, or $\frac{1}{6}$ **6.** $\frac{17}{24}$

Home Link 7-3

1. $65\frac{1}{4}$ in.^{2} **2a.** 900 tiles **2b.** 225 ft^2

3a. $9\frac{5}{8}$ ft^2 **3b.** 154 squares

4. $7\frac{19}{24}$ **5.** $3\frac{8}{18}$

Home Link 7-4

1. 15 **2.** 32 **3.** $\frac{1}{24}$ **4.** $\frac{1}{30}$

6. $2\frac{3}{4}$ **7.** $1\frac{13}{24}$

Home Link 7-5

1a. Yes. **1b.** No. **1c.** No.

Home Link 7-6

2a. Yes.

2b. Parallelograms, rhombuses, rectangles, and squares

3. $\frac{1}{32}$ **4.** $\frac{1}{30}$ **5.** $\frac{1}{12}$ **6.** $\frac{1}{60}$

Home Link 7-7

2. 27 **3.** 20 **4.** 20 **5.** 48

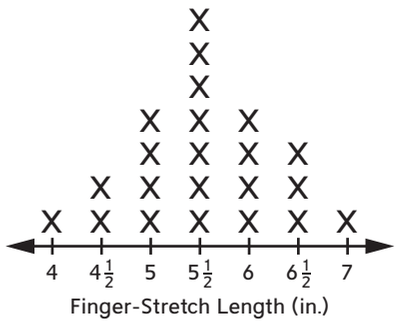
Home Link 7-8

3. 6,800 **4.** 0.00127

5. 10^4 **6.** 10^2

Home Link 7-9

1.



2. $19\frac{1}{2}$ **3.** $38\frac{1}{2}$ **4.** 122

5. $\frac{21}{15}$, or $1\frac{6}{15}$ **6.** $\frac{493}{24}$, or $20\frac{13}{24}$

Home Link 7-10

1a. in (*x*): 2; 4; 6; 8; 10 out (*y*): 8; 6; 4; 2; 0

1b. Sample answer: Subtract *in* from 10 to get *out*. **1c.** (2, 8); (4, 6); (6, 4); (8, 2); (10, 0)

3. 35.8 **4.** 168.96

Home Link 7-11

1a. 2.50; 7.50; 6; 25.00

1b. (1, 2.50); (3, 7.50); (6, 15.00); (10, 25.00)

1d. $20.00 **1e.** No. **2.** 1,837.85 **3.** 1,028.28

Home Link 7-12

1a. Ami (*y*): 12; 18; 30; Derek (*y*): 22; 32; 37

2. Ami **3.** 136 **4.** 36; $792 \div 22 = 36$

Home Link 7-13

1. in (*x*): 2; 3; 4; 5; out (*y*): 17; 23; 29; 35

2. *in* number $* 6 + 5 =$ *out* number

3. (0, 5); (1, 11); (2, 17); (3, 23); (4, 29); (5, 35)

5a. 53 **5b.** 10 **6.** $\frac{128}{15}$, or $8\frac{8}{15}$

7. $\frac{204}{2}$, or 102 **8.** $\frac{324}{7}$, or $46\frac{2}{7}$