Unit 6: Family Letter

Home Link 5-15

NAME DATE TIME

Investigations in Measurement; Decimal Multiplication and Division

In Unit 6 your child will develop strategies for multiplying and dividing decimals, use measurement data to create line plots, and revisit volume concepts. The first three lessons focus on multiplying and dividing decimals by powers of 10. Students first use calculators to multiply and divide decimals by numbers like 10^2, 10^3, and 10^4, looking for patterns in how the decimal point moves in the answer. Then they find rules that describe these patterns and use them to multiply and divide any number by a power of 10. For additional practice students play the game *Exponent Ball*. They also apply their understanding of multiplication and division by powers of 10 to solve measurement conversion problems in the metric system.

In Lessons 6-4 and 6-5 students collect and analyze measurement data reported in fractional units. They make line plots to organize their data and then use the line plots to solve problems. For example, students measure their own height to the nearest half inch and create a class line plot. They observe which height is most common among classmates, calculate the difference between the smallest and largest measurements, and find the combined height of all students in the class. Students solve similar problems about pencil lengths measured to the nearest quarter inch. These problems require students to practice adding and subtracting fractions with unlike denominators. They also discuss ways to identify a typical measurement. For example, students consider how they might describe the "typical height" of a fifth grader in their class, given the heights of everyone in the class. They use an "evening out" process to find a typical measurement and use these evened-out values to compare the typical height of a fifth grader to animals such as a red kangaroo, an emperor penguin, and a chimpanzee. This work prepares students to learn more formal methods of data analysis in future grades.

Lessons 6-6 and 6-7 revisit the concept of volume. Students begin by estimating the volume of Willis Tower, the tallest building in Chicago. They compare different strategies and discuss how the strategies could be more efficient. Students also explore measuring volume by displacement. They place various objects in water and use the changing level of the water to determine the volume of the objects. Students explore the relationship between milliliters and cubic centimeters and think about which units make sense for the items they are measuring.

The final lessons address decimal multiplication and division. Students develop strategies for multiplying and dividing decimals to hundredths. They use estimation to help them recognize reasonable answers and to place the decimal point in products and quotients. They also learn to use related whole-number problems to solve decimal problems and apply these strategies to solving real-world measurement problems. Finally, in Lesson 6-13 students conduct reaction-time experiments, using individual data to estimate the total reaction time of the class. Students add, subtract, multiply, and divide decimals to analyze data, find typical reaction times, and calculate a class estimate.

Vocabulary

Important terms in Unit 6:

base A number that is raised to a power in exponential notation. For example, in 10^3, the base is 10.

calibrate To divide or mark a measuring tool with graduations, such as the degree marks on a thermometer.

data point A single piece of information gathered by counting, measuring, questioning, or observing.

data set A collection of *data points*.

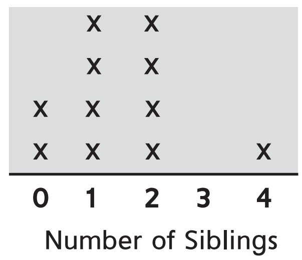
displacement method A way to measure the volume of an object by submerging it in water and then measuring the volume of the water it displaces. The method is especially useful for finding the volume of irregularly shaped objects.

equivalent problems Division problems that have different dividends and divisors but the same quotient. For example, 3.2 ÷ 1.6 and 32 ÷ 16 are equivalent problems because they have the same quotient, 2.

exponent A number used in *exponential notation* to tell how many times the *base* is used as a factor. The exponent is often written as a small, raised number or after a caret. For example, in 10^3, the exponent is 3. An exponent can also be called the *power of a number,* as in "10 to the third power."

exponential notation A way to show repeated multiplication by the same factor. For example, 10^3 is exponential notation for 10 ∗ 10 ∗ 10.

line plot A sketch of data in which check marks, Xs, or other marks above a labeled number line show the frequency of each value.



metric system A measurement system based on the base-10 numeration system. The metric system is used in most countries around the world.

power of 10 A whole number that can be written as a product of 10s. For example, 100 is equal to 10 ∗ 10, or 10^2. 100 is called "the second power of 10" or "10 to the second power."

reaction time The amount of time it takes to react to a stimulus.

scale of a number line The unit interval on a number line or measuring device.

Do-Anytime Activities

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

1. Help your child find decimals in the everyday world. Point out instances where you might multiply or divide decimals, and prompt your child to estimate products and quotients. For example, if a package of 4 paper towel rolls costs $3.68, about how much does each roll cost? How much would 10 packages, or 100 packages, cost?
2. Have your child pick something to measure, such as the length of books. Help him or her measure several examples and record the data to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ inch. Ask your child to make a line plot of the data and use the line plot to solve problems and answer questions, such as: Which is the smallest book? What is the most common book length? What would be the total length if all the books were laid end to end?
3. Have your child show you how to calibrate a 2-liter bottle. Ask him or her to find the volume of various items by displacement.

Building Skills through Games

In Unit 6 your child will play games to practice strategies for multiplying and dividing decimals by powers of 10 and computing with decimals. Detailed instructions for each game are in the *Student Reference Book*. Many of the games can be played at home with materials you may already have; gameboards 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, a coin, and a calculator (optional) to play this game. *Decimal Domination* provides practice with predicting decimal products and multiplying decimals.

Decimal Top-It: Addition* or *Subtraction See *Student Reference Book*, pages 298 and 299. Two players need number cards 0–9 (4 of each), 4 counters, and a calculator (optional) to play either of these games. The games provide practice adding or subtracting decimals.

Doggone Decimal See *Student Reference Book*, page 302. Two players need number cards 0–9 (4 of each), 4 index cards, 4 counters, and a calculator to play this game. *Doggone Decimal* provides practice with rounding decimals and estimating decimal products.

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

Spend and Save See *Student Reference Book*, page 323. Two players need two *Spend and Save* Record Sheets (*Math Masters*, page G27), number cards 0–9 (4 of each), one coin, and one counter to play this game. *Spend and Save* provides practice with adding and subtracting decimals in a money context.

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 6-1

1. 680 **2.** 0.439 **3.** 2.375 **4.** 52,900

5. 0.0132 **6.** 71,800 **7.** 940,000 **8.** 0.00036

9. Sample answer: I moved the decimal point two places to the left because 43.9 is divided by 10 two times, which is the same as shifting the digits two places to the right.

10. $\frac{17}{24}$ **11.** $4\frac{7}{12}$, or $4\frac{14}{24}$

Home Link 6-2

1. 4,500, Forward 40 yd; 0.035, Forward 20 yd; 0.23, Forward 20 yd

2. Sample answer: For 4.5×10^3, I multiplied 4.5 by 10 three times. I moved the decimal point three places to the right to get 4,500. 4,500 is between 4,000 and 39,999 so the ball should move forward 40 yards.

3. 15.0 **4.** 24.29 **5.** 52.59

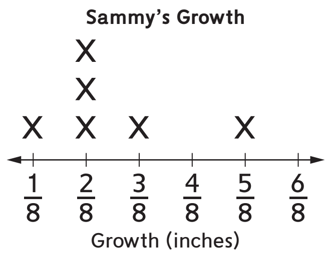
Home Link 6-3

1. 5,600; 300; 0.078; 0.008 **2.** $\div 10^3$

3. 2.235 **4.** 15,200 **5.** $\frac{5}{8}$ **6.** $1\frac{11}{15}$

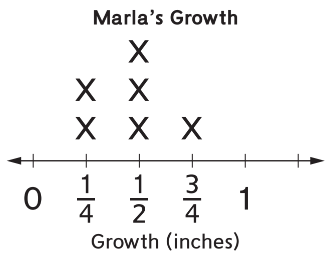
Home Link 6-4

1. a.



b. $\frac{15}{8}$, or $1\frac{7}{8}$

2. a.

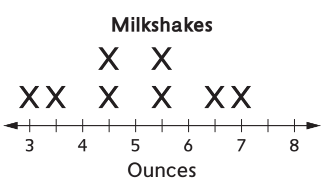


b. $2\frac{3}{4}$ **3** **a.** Marla **b.** $\frac{7}{8}$ in.

c. $2\frac{3}{4} - 1\frac{7}{8} = \frac{7}{8}$

Home Link 6-5

1.



2. a. 40 **b.** 8 **c.** $40 \div 8 = m$ **d.** 5

3. 760 **4.** 0.182 **5.** 0.7795 **6.** 812,300

Home Link 6-6

1. 42,754,496; $37{,}636 * 1{,}136 = 42{,}754{,}496$

2. 1,584,000; $5{,}280 * 20 * 15 = 1{,}584{,}000$

3. 206,400; $4{,}800 * 43 = 206{,}400$

4. $22\frac{2}{3}$ **5.** $10\frac{2}{7}$

Home Link 6-7

1. 500; 500 **2.** 10,000; 10,000 **3.** 200; 200

4. Answers vary.

5. $\frac{7}{16}$ **6.** $\frac{25}{54}$

Home Link 6-8

1. Emma: 6.3 **2.** Kyle: 149.6 **3.** Kyle: 31.5

4. Emma: 7,335 **5.** Kyle: 8.5 **6.** Emma: 0.9

7. 30 R16 **8.** 22 R27

Home Link 6-9

1. 3,861.75 **2.** 1,681.68 **3.** 1.71

4. 24,730.05 **5.** $\frac{1}{45}$ **6.** $\frac{1}{24}$

Home Link 6-10

1. 168 pizzas; Explanations vary.

2. 18 **3.** 40

Home Link 6-11

1. 1.8 **2.** 1.74 **3.** 12 **4.** $5\frac{1}{3}$

Home Link 6-12

1. $72 \div 6 = ?$; 12; 12 **2.** $440 \div 5 = ?$; 88; 88

3. $192 \div 16 = ?$; 12; 12 **4.** 15.82 **5.** 27.91

Home Link 6-13

1. 0.15, 0.16, 0.17, 0.18

2. 0.14, 0.15, 0.15, 0.16, 0.16, 0.17, 0.17, 0.18, 0.18, 0.19

3. 0.05 **4.** 0.165

5. Sample answer: I would say that 0.165 is a typical reaction time. The evened-out time is the best time, since there is not a single time that occurred more than the others.

6. 3.44 **7.** 40.27