Name Date Time

STUDY LINK 1•13

Unit 2: Family Letter

Operations with Whole Numbers and Decimals

In Unit 2, your child will revisit operations with whole numbers and decimals from earlier grades and will continue strengthening previously developed number skills. We will work with estimation strategies, mental methods, paper-and-pencil algorithms, and calculator procedures with whole numbers. We will also develop techniques for working with decimal numbers.

In addition to standard and number-and-word notation, we will learn new ways to represent large and small numbers using exponential and scientific notation. Your child will realize that scientific notation, which is used by scientists and mathematicians, is an easier and more efficient way to write large numbers. For example, the distance from the Sun to Pluto is 3,675,000,000 miles. In scientific notation, the same number is expressed as $3.675 * 10^9$.

To use scientific notation, your child will first need to know more about exponential notation, which is a way of representing multiplication of repeated factors. For example, $7 * 7 * 7 * 7$ can be written as 7^4. Similarly, 100,000, or $10 * 10 * 10 * 10 * 10$, is also 10^5.

Unit 2 also reviews multiplication and division of whole numbers. All these strategies will be extended to decimals. The partial-quotient algorithm used in fourth and fifth grade *Everyday Mathematics* to divide whole numbers will also be used to divide decimals to obtain decimal quotients. This algorithm is similar to the traditional long division method, but it is easier to learn and apply. The quotient is built up in steps using "easy" multiples of the divisor. The student doesn't have to get the partial quotient exactly right at each step. The example below demonstrates how to use the partial-quotient algorithm.

Example:

Partial-Quotient Algorithm

12) 3270		Partial Quotients
− 2400	200 ←	200 * 12 = 2,400
870		100 * 12 = 1,200
− 600	50 ←	50 * 12 = 600
270	↙	20 * 12 = 240
− 240	20	10 * 12 = 120
30		5 * 12 = 60
− 24	2 ←	2 * 12 = 24
6	272	
↑ Remainder	↑ Quotient	

The partial-quotient algorithm is discussed on pages 22 and 23 in the *Student Reference Book.*

Please keep this Family Letter for reference as your child works through Unit 2.

Vocabulary

Important terms in Unit 2:

dividend In division, the number that is being divided. For example, in 35 ÷ 5 = 7, the dividend is 35.

dividend / divisor = quotient

$\frac{\text{dividend}}{\text{divisor}}$ = quotient

divisor In division, the number that divides another number (the *dividend*). For example, in 35 / 5 = 7, the divisor is 5.

exponent A small, raised number used in *exponential notation* to tell how many times the base is used as a *factor*. For example, in 5^3, the base is 5, the exponent is 3, and $5^3 = 5 * 5 * 5$. Same as *power*.

exponential notation A way of representing repeated multiplication by the same factor. For example, 2^3 is exponential notation for 2 * 2 * 2. The *exponent* 3 tells how many times the base 2 is used as a factor.

factor (1) Each of two or more numbers in a product. For example, in 6 * 0.5, 6 and 0.5 are factors. Compare to *factor of a counting number* n. (2) To represent a number as a product of factors. For example, factor 21 by rewriting as 7 * 3.

number-and-word notation A notation consisting of the significant digits of a number and words for the place value. For example, 27 billion is number-and-word notation for 27,000,000,000.

power Same as *exponent*.

power of 10 (1) In *Everyday Mathematics,* a number that can be written in the form 10^a, where *a* is a counting number. That is, the numbers $10 = 10^1$, $100 = 10^2$, $1000 = 10^3$, and so on, that can be written using only 10s as factors. Same as positive power of 10. (2) More generally, a number that can be written in the form 10^a, where *a* is an integer. That is, all the positive and negative powers of 10 together, along with $10^0 = 1$.

precise Exact or accurate.

precise measures The smaller the scale of a measuring tool, the more *precise* a measurement can be. For example, a measurement to the nearest inch is more precise than a measurement to the nearest foot. A ruler with $\frac{1}{16}$-inch markings can be more precise than a ruler with only $\frac{1}{4}$-inch markings, depending on the skill of the person doing the measuring.

precise calculations The more accurate measures or other data are, the more *precise* any calculations using those numbers can be.

quotient The result of dividing one number by another number. For example, in 10 / 5= 2, the quotient is 2.

remainder An amount left over when one number is divided by another number. For example, in 16 / 3 → 5 R1, the quotient is 5 and the remainder R is 1.

scientific notation A way of writing a number as the product of a *power of 10* and a number that is at least 1 and less than 10. Scientific notation allows you to write large and small numbers with only a few symbols. For example, in scientific notation, 4,300,000 is $4.3 * 10^6$, and 0.00001 is 1×10^{-5}. Scientific calculators display numbers in scientific notation. Compare to *standard notation* and expanded notation.

standard notation Our most common way of representing whole numbers, integers, and decimals. Standard notation is base-ten place-value numeration. For example, standard notation for three hundred fifty-six is 356. Same as decimal notation.

Do-Anytime Activities

Consider using the suggested real-life applications and games that not only promote your child's understanding of Unit 2 concepts, but also are easy, fun, and rewarding to do at home.

1. Encourage your child to incorporate math vocabulary in everyday speech. Help your child recognize the everyday uses of fractions and decimals in science, statistics, business, sports, print and television journalism, and so on.
2. Have your child help you measure ingredients when cooking or baking at home. This will usually involve working with fractional amounts. Furthermore, your child could assist you with adjusting the amounts for doubling a recipe or making multiple servings.
3. Extend your child's thinking about fractions and decimals to making connections with percents. By using money as a reference, you could help your child recognize that one-tenth is equal to $\frac{10}{100}$ or 10%, one-quarter is the same as 0.25, $\frac{25}{100}$, or 25%, and so on.
4. Ask your child to use mental math skills to help you calculate tips. For example, if the subtotal is $25.00 and the tip you intend to pay is 15%, have your child first find 10% of $25 ($2.50) and then find 5% of $25 by taking half the 10% amount ($2.50 / 2 = $1.25). Add $2.50 and $1.25 to get the tip amount of $3.75.

Building Skills through Games

Several math games develop and reinforce whole number and decimal concepts in Unit 2. Detailed game instructions for all sixth-grade games are provided in the *Student Reference Book.* Encourage your child to play the following games with you at home.

Scientific Notation Toss See *Student Reference Book*, page 331.
Two players can play this game using a pair of 6-sided dice. Winning the game depends on creating the largest number possible using scientific notation. *Advanced Scientific Notation Toss*, mentioned at the bottom of page 331, adds more excitement to the original game.

Doggone Decimal See *Student Reference Book*, page 310.
In this game, two players compete to collect the greatest number of cards. You will need number cards, 4 index cards, 2 counters or coins, and a calculator. The skill practiced here is estimating products of whole and decimal numbers.

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 the unit's Study Links.

Study Link 2•1

1. a. 2 **b.** 5 **c.** 1 **d.** 6 **e.** 8 **f.** 0

2. a. 430,000 **b.** 90,105,000 **c.** 170,000,065 **d.** 9,500,243,000

3. a. (3 * 100,000) + (2 * 10,000) + (1 * 1,000)

4. a. 1,000 **b.** 1,000,000 **c.** 1,000,000,000

5. a. 48 million miles **b.** 25.7 million miles

6. a. 44,300,000,000 **b.** 6,500,000,000,000 **c.** 900,000 **d.** 70

7. 416,300 **8.** 230,000 **9.** 1,900,000

10. 7,000,000

Study Link 2•2

1. 38.469 **2.** 1.3406 **3.** eight-tenths

4. ninety-five hundredths **5.** five-hundredths

7. four and eight hundred two ten-thousandths

11. (1 * 0.01) + (3 * 0.001)

12. (1 * 100) + (9 * 1) + (3 * 0.1) + (5 * 0.01) + (2 * 0.001) + (7 * 0.0001)

13. 8.630 **14.** 0.368 **15.** *D* **16.** *A*

17. *C* **18.** *B* **19.** 0.63 **20.** 0.0168

21. 0.7402 **22.** 45.009 **23.** 0.5801

Study Link 2•3

1. 0.297 minutes **2.** 5.815 meters

3. 1.339 mph **4.** 1.38 goals

7. $0.71 **8.** 0.85 **9.** 1.5 **10.** $6.75

Study Link 2•4

1. 0.0049 **2.** 0.078 **3.** 3.0 **4.** 0.07

5. 150.0 **6.** 190 **7.** 3,760 **8.** 0.0428

9. a. 100 **b.** 10^{100} **10.** 0.000000001

11. 10^7 **12.** $5.25 **13.** $6.02 **14.** $9.11

Study Link 2•5

1. 2,001 **2.** 1,288 **3.** 11,904

4. a. 20.01 **b.** 20.01 **c.** 200.1

5. a. 1,190.4 **b.** 11.904 **c.** 11.904

7. $5.00 **8.** $11.00 **9.** 34.5 **10.** 0.07

Study Link 2•6

1. 24.3 **2.** 11.48 **3.** 0.827 **4.** 756.3

5. 18.012 **6.** 29.82 **7.** 49.92 **8.** 10.241

9. 76.7 miles; 11.8 * 6.5 = 76.7

12. $16.00 **13.** $11.00 **14.** 96 **15.** 24

Study Link 2•7

6. → 66 R6; $66\frac{6}{8}$ **7.** → 65 R1; $65\frac{1}{15}$ **8.** = 49

9. →18 R15; $18\frac{15}{46}$ **10.** → 158 R20; $158\frac{20}{38}$

11. →126 R42; $126\frac{42}{44}$

12. $3.98 **13.** $11.84 **14.** $74.94 **15.** $499.95

Study Link 2•8

1. Sample estimate: 2; Answer: 2.47

2. Sample estimate: 20; Answer: 19.7

5. 2.83 **6.** $7.20 **7.** 1.99 **8.** 4.22

Study Link 2•9

1. 12,400 **3.** 0.000008 **5.** $1.1802 * 10^{10}$

6. 0.00016 **7.** $4.3 * 10^{-3}$ **8.** 2,835,000

9. $>$ **10.** $=$ **11.** $<$ **12.** $>$

13. 10 is raised to a negative power.

14. 7,624 **15.** 3.71 **16.** 900 **17.** 200

Study Link 2•10

1. 49 **3.** 64 **5.** 0.00001

7. 3^9 **9.** 11^{-3} **14.** $8^5 = 32,768$

Study Link 2•11

1. $3.6 * 10^{-3}$ **3.** $8 * 10^4$ **5.** 50,000

7. 48,100,000 **9.** $1 * 10^{-3}$; 0.001 **11.** $3.9 * 10^3$

13. $5.2 * 10^{-1}$ **16.** 6,763 − 3,929 = 2,834

17. 71,146 – 4,876 = 66,270