Decimal Concepts; Coordinate Grids

In Unit 4 students extend their understanding of the base-ten place-value system to include decimals. In Lessons 4-1 to 4-5 they use familiar patterns in the place-value chart to examine relationships among digits to the right of the decimal point in the tenths, hundredths, and thousandths places. Students practice reading and writing decimals in words and numerals, they represent decimals on grids and on number lines, and they use place-value understanding to compare and order decimals. They further develop their understanding of *how* and *why* we round numbers by investigating real-world situations in which rounding decimals would be appropriate and necessary.

In Lessons 4-6 and 4-7 students are introduced to the first quadrant of the coordinate grid. They play a game, *Hidden Treasure,* to practice plotting points and to think about distances between points on the grid. In Lessons 4-8 through 4-10 students apply their knowledge of the coordinate grid system. They connect points to form shapes and study how operations on coordinates change the shapes. They also express data sets as lists of ordered pairs, plot the points on a coordinate grid, and use the graph to extend the patterns and solve problems.

Example: *The table below shows Kit's age and his brother Tommy's age at different points in their lives.*

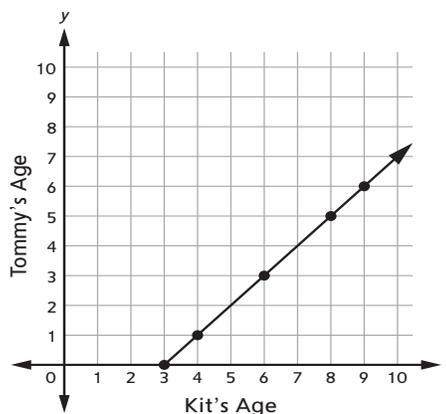| Kit's Age (x)	Tommy's Age (y)
3	0
4	1
6	3
8	5
9	6

Ordered pairs:

(3, 0)

(4, 1)

(6, 3)

(8, 5)

(9, 6)

What is Tommy's age when Kit's age is 10?

Tommy's age is 7.

In Lessons 4-11 through 4-14 students deepen their understanding of decimals as they build on concepts from earlier in the unit to add and subtract decimals using a variety of strategies and models. They review and apply whole-number algorithms for addition and subtraction to include decimal addition and subtraction.

Please keep this Family Letter for reference as your child works through Unit 4.

Vocabulary

Important terms in Unit 4:

algorithm A set of step-by-step instructions for doing something, such as carrying out a computation or solving a problem.

axis of a coordinate grid (plural: axes) Either of the two number lines that intersect, usually at right angles, to form a coordinate grid.

column addition An addition algorithm in which the addends' digits are first added in each place-value column separately, and then 10-for-1 trades are made until each column has only one digit. Lines may be drawn to separate the place-value columns.

coordinate grid A reference frame for locating points in a plane using *ordered pairs* of numbers, or *coordinates*. A coordinate grid is formed by two number lines that intersect at their zero points and form right angles.

coordinates The numbers in an *ordered pair*.

counting-up subtraction A subtraction strategy in which a difference is found by counting or adding up from the smaller number to the larger number.

decimal (1) In *Everyday Mathematics*, a number written in standard base-10 notation containing a decimal point, such as 2.54. (2) Any number written in standard base-10 notation.

hundredths The second place to the right of the decimal point, representing $\frac{1}{100}$s.

ordered pair Two numbers that are used to locate a point on a rectangular coordinate grid. The first number gives the position in the direction of the horizontal axis, while the second number

gives the position in the direction of the vertical axis. The numbers in an ordered pair are called coordinates. Ordered pairs are usually written in parentheses: (5, 3).

origin The point (0, 0) where the two axes of a coordinate grid meet.

partial-sums addition An addition algorithm in which separate sums are computed for each place value of the numbers and then added to get a final sum.

rounding Adjusting a number to make it easier to interpret or work with, or to make it better reflect the level of precision of the data.

tenths The first place to the right of the decimal point, representing $\frac{1}{10}$s.

thousandths The third place to the right of the decimal point, representing $\frac{1}{1,000}$s.

trade-first subtraction A subtraction algorithm in which all necessary trades between places in the numbers are made before any subtractions are carried out. Some people favor this algorithm because they can concentrate on one thing at a time.

U.S. traditional addition An addition method in which computation starts at the right, digits are added column by column, and numbers are carried to the next larger place as necessary.

U.S. traditional subtraction A subtraction method in which computation starts at the right, subtractions are made column by column, and trades are made as necessary.

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 real world. For example, amounts of money are almost always written in dollars and cents and include decimal points to separate whole dollars from cents.

2. Think of simple real-world decimal addition and subtraction problems and have your child solve them. For example: *This package of meat weighs 2.09 pounds. This package weighs 2.54 pounds. What's the difference in their weights?*

3. Practice using maps that contain a grid with your child. Have him or her use the grid and index to find different locations on the map.

Building Skills through Games

In Unit 4 your child will play games to practice working with decimal place values, and to compare, add, and subtract decimals. He or she will also plot points on a coordinate grid. 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 can be copied for home use.

Decimal Top-It See *Student Reference Book,* pages 296 and 297. Two to four players need a copy of a place-value mat from *Math Masters,* page TA25; number cards 0–9 (4 of each); and a 6-sided die for this game. *Decimal Top-It* provides practice comparing decimals through thousandths.

Hidden Treasure See *Student Reference Book,* page 311. Two players need copies of the gameboard from *Math Masters,* page G26, two pencils, and one red pen or crayon for this game. *Hidden Treasure* provides practice plotting ordered pairs.

Over and Up Squares See *Student Reference Book,* page 317. Two players need a copy of the gameboard from *Math Masters,* page G25; two 6-sided dice; and two different colored pencils for this game. *Over and Up Squares* provides practice plotting ordered pairs.

Spend and Save See *Student Reference Book,* page 323. Two players need copies of the record sheet from *Math Masters,* page G27; number cards 0–9 (4 of each); one coin; and one counter for this game. *Spend and Save* provides practice adding and subtracting money amounts with decimals.

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 4-1
1. two and five hundred ninety-eight thousandths
2. twenty-one hundredths
3. one and six thousandths
4a. 3.9 **b.** 0.9 **5a.** 0.39 **b.** 0.09
6a. 0.639 **b.** 0.009 **7.** 0.853 **8.** 6.241
9. 67,432 **10.** 38,232

Home Link 4-2
1.–2. Answers vary. **3.** 21 R7 **4.** 205 R14

Home Link 4-3
1.–4. Answers vary. **5.** 9.570 **6.** 3.624
7. 0.589 **8.** 2.371 **9.** 6 **10.** 8

Home Link 4-4

1. $<, >, <, <, >$ **2.** Charity

3a. 0.378   0.547   0.72   0.804   0.9

3b. 0.098   0.59   0.6   0.860   0.92

4a. 0.92   **b.** Answers vary.

Home Link 4-5

1.

29.94   *30.13*   30.38   30.72   31.05

29.9   30.0   30.1   30.2   30.3   30.4   30.5   30.6   30.7   30.8   30.9   31.0   31.1
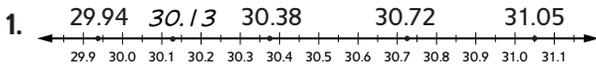
2. 0.2; 0.8; 8.1; 10.0; 23.6; 61.8; 100.8; 115.8; 122.0; 132.8

3. 8,000   **4.** 2,300,000   **5.** 10^2 **6.** 10^3

Home Link 4-6

2a. (15, 11)   **b.** (12,6)   **c.** (17, 7)   **d.** (8, 9)

4. 7.053   **5.** 4.159

Home Link 4-7

1. Put X by first and third expressions.

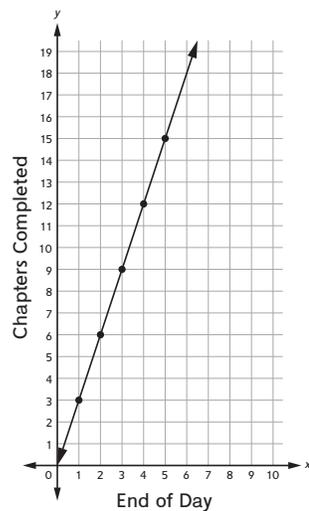**2.** Sample answer: $(0 * 1) + (6 * 0.1) + (0 * 0.01) + (5 * 0.001)$

Home Link 4-8

3. $>$ **4.** $<$ **5.** $=$ **6.** $<$ **7.** $=$ **8.** $>$

Home Link 4-9

Ordered pairs: (1, 3); (2, 6); (3, 9); (4, 12); (5, 15)
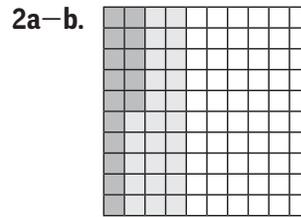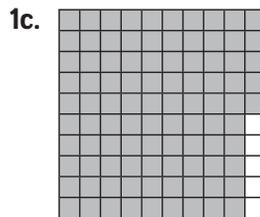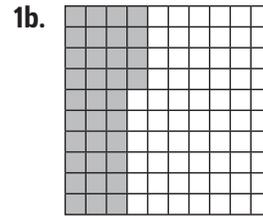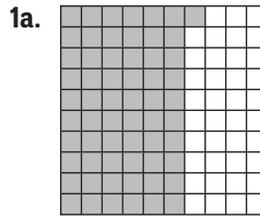

1. Between days 1 and 2   **2.** 10 or 11

3. Sometime on the sixth day

5. 0.55   **6.** 3.97   **7.** 84.10   **8.** 0.01

Home Link 4-10

Sample answers: **6.** $\frac{7}{2}$ **7.** $2\frac{7}{4}$ **8.** $8\frac{1}{3}$ **9.** $\frac{20}{3}$

Home Link 4-11

1a.   **1b.**

1c.   **2a–b.**

1d. $0.61 + 0.34 = 0.95$ **2c.** $0.4 - 0.15 = 0.25$

3. 837   **4.** 17,248   **5.** 72,512

Home Link 4-12

1. 11.7   **2.** 9.16   **3.** 19.05   **4.** 28.95

5. 54.66   **6.** 6   **7.** $\frac{11}{2}$, or $5\frac{1}{2}$ **8.** $\frac{11}{5}$, or $2\frac{1}{5}$

Home Link 4-13

1. 6.7   **2.** 4.75   **3.** 10.92   **4.** 0.84   **5.** 1.63

6. 0.09   **7.** 0.9   **8.** 9   **9.** 0.009   **10.** 90   **11.** 0.09

Home Link 4-14

1. $3.48   **2.** $2.63   **3.** $0.50   **4.** $1.76

5. $47\frac{13}{17}$ **6.** Answers vary.