

Multidigit Operations

In Unit 9, children make sense of and solve problems involving multiplication and division, units of mass, geometry, and elapsed time. They play a new multiplication game that encourages automaticity with all multiplication facts, which is an end-of-year goal. Using mental math and area models, children apply basic fact strategies to solve multiplication and division number stories with larger factors. They revisit the Length-of-Day Project and calculate elapsed time.

In Unit 9, your child will:

- Use multiplication-fact knowledge while playing *Product Pile-Up*.
- Make sense of number stories and solve them by multiplying and dividing with multiples of 10.
- Use mental arithmetic to multiply problems involving larger factors.
- Solve multidigit multiplication problems using area models.
- Analyze bar graphs that show the class length-of-day data.
- Calculate the length of day for locations around the world.

Sunrise and Sunset Data for June 21, 2016



Please keep this Family Letter for reference as your child works through Unit 9.

Vocabulary

Important terms in Unit 9:

basic multiplication and division facts

Multiplication facts with whole-number factors between 0 and 10 and the corresponding division facts, except there can be no division by 0.

For example, $4 \times 6 = 24$ and $24 \div 6 = 4$ are basic facts.

break-apart strategy A multiplication strategy in which one or both factors are broken into two or more smaller parts, resulting in easier-to-solve multiplication problems. Partitioning a rectangular area model is a way to represent this strategy.

$$\begin{array}{c}
 \begin{array}{|c|c|}
 \hline
 & \begin{array}{c} 10 \\ \hline 9 \times 10 = 90 \end{array} \\
 \hline
 \end{array}
 &
 \begin{array}{|c|}
 \hline
 \begin{array}{c} 6 \\ \hline 9 \times 6 = 54 \end{array} \\
 \hline
 \end{array} \\
 \hline
 \end{array}$$

$$90 + 54 = 144$$

$$9 \times 16 = 144$$

A rectangular area model can be used to model the break-apart strategy.

decompose To separate a number into smaller numbers. For example, 16 can be decomposed into 10 and 6. Children decompose factors when using the break-apart strategy.

elapsed time The amount of time that has passed from one point to the next. For example, the elapsed time between 12:45 P.M. and 1:30 P.M. is 45 minutes.

extended fact Variations of basic arithmetic facts involving multiples of 10, 100, and so on. For example, the extended fact $40 \times 5 = 200$ is related to the basic fact $4 \times 5 = 20$.

length of day Total number of hours and minutes between sunrise and sunset.

multiplication/division diagram A diagram for modeling situations with equal-size groups. The diagram has a number of groups, a number in each group, and a total number.

| number of birds | grams per bird | grams in all |
|-----------------|----------------|--------------|
| 6 | 20 | ? |

Do-Anytime Activities

The following activities provide practice for concepts taught in this unit and previous units.

1. Continue to work toward automaticity with all multiplication facts using Fact Triangles or by playing games such as *Product Pile-Up*, *Multiplication Top-It*, and *Salute!*
2. Practice using basic facts to solve extended multiplication and division facts, such as using $3 \times 7 = 21$ to solve $3 \times 70 = 210$, or $18 \div 6 = 3$ to solve $180 \div 6 = 30$.
3. Calculate how long daily activities take. For example: *Shawna arrives at school at 8:45 A.M. and leaves at 3:00 P.M. How many hours and minutes is she at school? Your dentist appointment is at 3:15 P.M. It takes 20 minutes to drive to the dentist. If we leave at 2:45 P.M., will we arrive on time?*

Building Skills through Games

Product Pile-Up Players are dealt eight number cards. They take turns selecting two cards and multiplying the numbers to generate a product that is greater than the product of the last two cards played. The winner is the first player to

run out of cards or the player with the fewest cards when there are no more cards to draw. For detailed instructions, see the *Student Reference Book*.

As You Help Your Child with Homework

As your child brings home assignments, you may 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 9-1

Exit

6 × 7 8 × 7 8 × 6 5 × 9 7 × 6 9 × 3

10 × 9 9 × 9 8 × 5 7 4 × 8 8 × 5 7 × 5

8 × 8 7 × 4 8 × 8 6 × 4 5 × 5 6 × 6 8 × 4

6 × 9 8 × 5 7 × 9 9 × 6 7 × 3 4 × 7 4 × 6

9 × 3 4 × 9 7 × 8 9 × 9 2 × 2 8 × 3 8 × 9

9 × 5 7 × 7 6 × 4 4 × 4 5 × 4 4 × 2

6 × 7 5 × 5 2 × 8 2 × 4 5 × 2 4 × 2 5 × 9

5 × 8 7 × 2 2 × 9 4 × 4 2 × 3 8 × 2 3 × 3

4 × 4 4 × 8 7 × 4 3 × 4 3 × 4 5 × 3 8 × 7

6 × 6 3 × 7 10 × 8 5 × 5 8 × 4 7 × 3 5 × 10

Home Link 9-2

1.

| number of flamingos | mass of 1 flamingo in kg | total mass in kg |
|---------------------|--------------------------|------------------|
| 40 | 2 | ? |

Sample answer: $2 \times 40 = ?$; 80 kg

2.

| number of bluebirds | mass of 1 bluebird in g | total mass in g |
|---------------------|-------------------------|-----------------|
| 9 | ? | 270 |

Sample answer: $9 \times ? = 270$; 30 g

Unit 9: Family Letter, *continued*

3. Sample answer: I thought of $9 \times$ what number is 270. I know $9 \times 3 = 27$, so $9 \times 30 = 270$. One bluebird has a mass of about 30 g.

Home Link 9-3

1. Sample answer: I broke apart 12 into 6 and 6. I know $6 \times 9 = 54$, so I can double that to get 12×9 . So $12 \times 9 = 54 + 54 = 108$; 108 kilograms
2. Sample answers: I broke apart 7 into 4 and 3. I know $25 \times 4 = 100$ and $25 \times 3 = 75$. So $7 \times 25 = 100 + 75 = 175$; I used the break-apart strategy and thought $25 \times 7 = 20 \times 7 + 5 \times 7 = 140 + 35 = 175$. So $25 \times 7 = 175$; 175 grams
3. Answers vary.

Home Link 9-4

1. 50, 60, 20, 75 2. 240 3. 210
4. 480 5. 720

Home Link 9-5

1. 210 Sample sketches:

| | |
|--|------------------------------|
| $\overbrace{\hspace{10em}}^{42}$ | |
| $\overbrace{\hspace{5em}}^{40}$ | $\overbrace{\hspace{5em}}^2$ |
| $5 \times 40 = 200$ | $5 \times 2 = 10$ |
| $\begin{array}{r} 200 \\ + 10 \\ \hline 210 \end{array}$ | |

2. 324

| | |
|--|------------------------------|
| $\overbrace{\hspace{10em}}^{54}$ | |
| $\overbrace{\hspace{5em}}^{50}$ | $\overbrace{\hspace{5em}}^4$ |
| $6 \times 50 = 300$ | $6 \times 4 = 24$ |
| $\begin{array}{r} 300 \\ + 24 \\ \hline 324 \end{array}$ | |

3. Answers vary.

Home Link 9-6

1. 15; Sample answer: I knew that the number of cartons had to be more than 10 because $10 \times 12 = 120$ and the class needed 180 eggs. So I tried 12×12 on the calculator, but that was only 144. So I tried 12×13 , 12×14 , and 12×15 . $12 \times 15 = 180$, so 15 is the number of cartons they need.
2. Sample answer: 1, 8, 0, $-$, 12, =, =, =, =, =, =, =, =, =, =, =, =, =, =; I had to push the = key 15 times to reach 0, so the number of cartons is 15.

Home Link 9-7

1. San Francisco: 9 hours 33 minutes;
Minneapolis: 8 hours 46 minutes;
Miami: 10 hours 32 minutes
2. Miami
3. Minneapolis

Congratulations! By completing *Third Grade Everyday Mathematics* your child has accomplished a great deal. Thank you for all of your support.

This Family Letter is provided for you as a resource throughout your child's school vacation. It includes a list of Do-Anytime Activities, game directions, titles of mathematics-related books, and a sneak preview of what your child will be learning in *Fourth Grade Everyday Mathematics*.

Enjoy your summer!



Do-Anytime Activities

The following activities are for you and your child to do together during the summer to help review concepts your child learned in third grade. These activities build on the skills from this year and help prepare your child for *Fourth Grade Everyday Mathematics*.

1. Pose number stories with single-digit numbers or multiples of 10 that can be solved using multiplication and division. Examples: *I have 12 crackers to share equally among you and your two sisters. How many crackers will you each get? $12 \div 3 = 4$ crackers. 30 children can ride in one bus. How many can ride in 3 buses? $30 \times 3 = 90$ children.*
2. Have your child review and practice multiplication and division facts. Your child can use Fact Triangles or play a multiplication game (as described on page 324 of this letter).
3. Pose simple fraction stories for your child to solve and encourage him or her to draw pictures to show his or her thinking. Examples: *The pizza is the whole. If you eat $\frac{1}{4}$ of the pizza and your sister eats $\frac{1}{2}$ of the pizza, who eats more? How do you know? My sister eats more because 1 out of 2 parts is larger than 1 out of 4 parts of the same pizza.*
4. Have your child practice reading analog clocks to the nearest minute.
5. Encourage your child to identify and describe geometric shapes that can be seen in the world. Example: *The window is a rectangle and a parallelogram because it has four sides and two sets of parallel sides.*
6. Examine food and drink labels to prompt discussions about mass and liquid volume units in the real world, such as milliliters, liters, grams, and kilograms. At the grocery store, look for items that have a mass of about 1 gram (blueberry) or 1 kilogram (pineapple).
7. Measure real-world objects or distances to the nearest inch, $\frac{1}{2}$ inch, and $\frac{1}{4}$ inch. Talk about when you need to make more precise measurements. Example: Hold a watermelon-seed spitting contest and measure the distances the seeds travel.
8. Find the areas and perimeters of rooms at home. Have your child estimate which room could have the largest area and largest perimeter (they might not be the same).
9. Practice multidigit addition and subtraction.
10. Practice extended facts using basic facts for multiplication and division. Example: If you know $3 \times 3 = 9$, then it helps you know that $3 \times 30 = 90$.

Building Skills through Games

Multiplication Top-It

| | |
|---------------------------|--------------------------------|
| Materials | Number cards 0–10* (4 of each) |
| Players | 2 to 4 |
| Skill | Multiplication facts 0 to 10 |
| Object of the Game | To collect the most cards |

Directions

Shuffle the cards and place them facedown in a pile. Each player turns over 2 cards and calls out the product of the numbers. The player with the largest product wins the round and takes all the cards. In case of a tie for the largest product, each tied player turns over 2 more cards and calls out the product of the numbers. The player with the largest product then takes all the cards from both plays. The game ends when there are not enough cards left for each player to have another turn. The player with the most cards wins.

Variation: Extended Multiplication Top-It

Turn over 2 cards and make the second card a multiple of 10. For example, if you turn over 2 and 4, the 4 becomes 40. Multiply the single digit by the multiple of 10.

Name That Number

| | |
|---------------------------|---|
| Materials | Number cards 0–20* (4 of each card 0–10, and 1 of each card 11–20) |
| Players | 2 to 4 (the game is more interesting when played by 3 or 4 players) |
| Skill | Finding equivalent names for numbers |
| Object of the Game | To collect the most cards |

Directions

1. Shuffle the deck and place 5 cards number-side up on the table. Leave the rest of the deck number-side down. Then turn over the top card of the deck and lay it down next to the deck. The number on this card is the target number.
2. Players take turns. When it is your turn, try to name the target number by adding, subtracting, multiplying, or dividing the numbers on 2 or more of the 5 cards that are number-side up. A card may be used only once for each turn. If you can name the target number, take the target number card and the cards you used to name it. Then replace all the cards you took by drawing from the top of the deck. If you cannot name the target number, your turn is over. Turn over the top card of the deck and lay it down on the target-number pile. The number on this card becomes the new target number to be named.
3. Play continues until all of the cards in the deck have been turned over. The player who has taken the most cards wins.

Salute!

| | |
|---------------------------|--|
| Materials | Number cards 1–10* (4 of each) |
| Players | 3 |
| Skill | Practicing multiplication and division facts |
| Object of the Game | To solve for a missing factor |

Directions

One person begins as the Dealer. The Dealer gives one card to each of the other two Players. Without looking at their cards, the Players hold them on their foreheads with the numbers facing out. The Dealer looks at both cards and says the product of the two numbers. Each Player looks at the other Player's card. They use the number they see and the product said by the Dealer to figure out the number on their card (the missing factor). They say that number out loud. Once both Players have said their numbers, they can look at their own cards to check their answers. Rotate roles clockwise and repeat the game. Play continues until everyone has been the Dealer five times.

*The number cards used in some games can be made from index cards or from a regular deck of playing cards. (Use jacks for zeros, aces for ones, and other face cards for teen numbers.)

Product Pile-Up

| | |
|---------------------------|---|
| Materials | Number cards 1–10 (4 of each) |
| Players | 3 |
| Skill | Practicing multiplication facts 1 to 10 |
| Object of the Game | To play all of your cards |

Directions

1. Take turns being the dealer. Shuffle and deal 8 cards to each player. Place the rest of the deck number-side down.
2. The player to the left of the dealer begins. This player selects 2 cards from his or her hand, places them number-side up on the table, multiplies the numbers, and says the product aloud.
3. Play continues with each player playing 2 cards with a product *greater than* the product of the last 2 cards played. If a player states an incorrect product, other players may suggest a helper fact or strategy to help find the correct product.
4. If a player is not able to play 2 cards with a greater product, the player draws 2 cards from the deck.
 - If the player is now able to make a greater product, those cards are played and the game continues. If the player still cannot make a greater product, the player keeps the cards and says "Pass." The game continues to the next person.
 - If all players must pass, the player who laid down the last 2 cards starts a new round beginning with Step 2 above.
5. The winner is the first player to run out of cards, or the player with the fewest cards when there are no more cards to draw.

Vacation Reading with a Mathematical Twist

Books can contribute to children's learning by presenting mathematics in a combination of real-world and imaginary contexts. The titles below were recommended by teachers who use *Everyday Mathematics*. Visit your local library and check out these mathematics-related books with your child.

Geometry

A Cloak for the Dreamer by Aileen Friedman

Fractals, Googols, and Other Mathematical Tales
by Theoni Pappas

Measurement

How Tall, How Short, How Far Away by David Adler

Math Curse by Jon Scieszka

Measuring on Penny by Loren Leedy

Numeration

Fraction Fun by David Adler

How Much Is a Million? by David Schwartz

Operations

The Grapes of Math by Gregory Tang

The King's Chessboard by David Birch

The I Hate Mathematics! Book by Marilyn Burns

A Remainder of One by Elinor J. Pinczes

Anno's Mysterious Multiplying Jar by Masaichiro
Anno and Mitsumasa Anno

Patterns, Functions, and Algebra

Eight Hands Round: A Patchwork Alphabet
by Ann Whitford Paul

A Million Fish . . . More or Less by Patricia C.
McKissack

Reference Frames

Pigs on a Blanket by Amy Axelrod

Three Days on a River in a Red Canoe
by Vera B. Williams

Looking Ahead: *Fourth Grade Everyday Mathematics*

Next year your child will:

- Solve multistep problems involving the four operations.
- Explore multiples, factors, and prime and composite numbers.
- Explore multidigit multiplication and division methods.
- Add and subtract fractions with like denominators and multiply fractions by whole numbers.
- Read, write, compare, and order fractions and decimals.
- Convert between metric and U.S. customary units of measure.
- Apply formulas to find the area and the perimeter of rectangles.
- Identify geometric properties in a variety of shapes.
- Collect and interpret data.
- Identify lines of symmetry and symmetric shapes.
- Explore partial quotients for division.
- Solve number stories involving different units of measurement.

Again, thank you for your support this year. Have fun continuing your child's mathematical adventures throughout the vacation!