

Reflections and Symmetry

In this unit, your child will take another look at geometry, with an emphasis on symmetry. Many objects in nature are symmetrical: flowers, insects, and the human body, to name just a few. Symmetry is all around—in buildings, furniture, clothing, and paintings.

The class will focus on reflectional symmetry, also called line symmetry or mirror symmetry, in which half of a figure is the mirror image of the other half. Encourage your child to look for symmetrical objects, and if possible, to collect pictures of symmetrical objects from magazines and newspapers. For example, the right half of the printed letter T is the mirror image of the left half. If you have a small hand mirror, have your child check letters, numbers, and other objects to see whether they have line symmetry. The class will use a device called a transparent mirror, which is pictured below. Students will use it to see and trace the mirror image of an object.

Geometry is not only the study of figures (such as lines, rectangles, and circles), but also the study of transformations or “motions” of figures. These motions include reflections (flips), rotations (turns), and translations (slides). Your child will use these motions to create pictures like the ones below, called frieze patterns.

Students will also work with positive and negative numbers, looking at them as reflections of each other across zero on a number line. They will develop skills of adding positive and negative numbers by thinking in terms of credits and debits for a new company, and they will practice these skills in the Credits/Debits Game.

Please keep this Family Letter for reference as your child works through Unit 10.
Vocabulary

Important terms in Unit 10:

**frieze pattern** A geometric design in a long strip in which an element is repeated over and over. The element may be rotated, translated, and reflected. Frieze patterns are often found on the walls of buildings, on the borders of rugs and tiled floors, and on clothing.

**image** The reflection of an object that you see when you look in the mirror. Also a figure that is produced by a transformation (reflection, translation, or rotation) of another figure. See preimage.

**line of reflection** A line halfway between a figure (preimage) and its reflected image. In a reflection, a figure is “flipped over” the line of reflection.

**line of symmetry** A line drawn through a figure that divides the figure into two parts that are mirror images of each other. The two parts look alike, but face in opposite directions.

**negative number** A number that is less than zero; a number to the left of zero on a horizontal number line or below zero on a vertical number line. The symbol “−” may be used to write a negative number. For example, “negative 5” is usually written as −5.

**preimage** A geometric figure that is somehow changed (by a reflection, a rotation, or a translation, for example) to produce another figure. See image.

**reflection (flip)** The “flipping” of a figure over a line (the line of reflection) so that its image is the mirror image of the original (preimage).

**rotation (turn)** A movement of a figure around a fixed point, or axis; a “turn.”

**symmetric** Having the same size and shape on either side of a line, or looking the same when turned by some amount less than 360°.

**transformation** Something done to a geometric figure that produces a new figure. The most common transformations are translations (slides), reflections (flips), and rotations (turns).

**translation** A movement of a figure along a straight line; a “slide.” In a translation, each point of the figure slides the same distance in the same direction.
Do-Anytime Activities

To work with your child on concepts taught in this unit, try these interesting and rewarding activities:

1. Have your child look for frieze patterns on buildings, rugs, floors, and clothing. If possible, have your child bring pictures to school or make sketches of friezes that he or she sees.

2. Encourage your child to study the mathematical qualities of the patterns of musical notes and rhythms. Composers of even the simplest of tunes use reflections and translations of notes and chords (groups of notes).

3. Encourage your child to incorporate transformation vocabulary—**symmetric, reflected, rotated, and translated**—into his or her everyday vocabulary.

Building Skills through Games

In this unit, your child will play the following games to develop his or her understanding of addition and subtraction of positive and negative numbers, practice estimating and measuring angles, practice plotting ordered pairs in the first quadrant of a coordinate grid, and identify properties of polygons. For detailed instructions, see the Student Reference Book.

**Angle Tangle** See Student Reference Book, page 230. Two players need a protractor, straightedge, and several sheets of blank paper to play this game. This game provides practice estimating and measuring angle sizes.

**Credits/Debits Game** See Student Reference Book, page 238. Playing the Credits/Debits Game offers students practice adding and subtracting positive and negative numbers.

**Over and Up Squares** See Student Reference Book, page 257. Two players need a gameboard and record sheet, 2 different-colored pencils, and 2 six-sided dice to play this game. Playing this game provides practice plotting ordered pairs and developing a winning game strategy.

**Polygon Pair-Up** See Student Reference Book, page 258. To play this game, two players need a deck of polygon cards, a deck of property cards, and paper and pencils for sketching. Playing this game provides students with practice identifying properties of polygons.
A Reflected Image

There is a simple design in the box in the middle of this page. It is the preimage.

Hold this page in front of a mirror, with the printed side facing the mirror. On a blank piece of paper, sketch what the design looks like in the mirror—the image.

Compare your sketch (image) with the design on the Study Link page (preimage). Bring both the preimage and image to school tomorrow.

Practice

1. 10% of 130 = ______
2. ______ = 25% of 32
3. ______ = 15% of 120
4. 70% of 490 = ______
For each preimage and image, draw the line of reflection.

1. preimage  image
2. image
3. preimage  image

For each preimage, use your Geometry Template to draw the image on the other side of the line of reflection.

4. preimage
5. preimage

6.
7. Create one of your own. preimage
Reflections

Shade squares to create the reflected image of each preimage.

1. 

2. 

3. 

4. 

Practice

5. 54 \times 6 = \underline{\hspace{2cm}}

6. 29 \times 36 = \underline{\hspace{2cm}}

7. \underline{\hspace{2cm}} = 45 \times 45

8. \underline{\hspace{2cm}} = 837 \times 63
1. Print the 26 capital letters of the alphabet below.

2. The capital letter A has a vertical line of symmetry.
   The capital letter B has a horizontal line of symmetry.
   Use the letters of the alphabet to complete the Venn diagram.

3. The word BED has a horizontal line of symmetry.
   The word HIT has a vertical line of symmetry.
   Use capital letters to list words that have horizontal or vertical line symmetry.

   horizontal
   vertical

   ____________  ____________  ____________  ____________

   ____________  ____________  ____________  ____________

   ____________  ____________  ____________  ____________

   ____________  ____________  ____________  ____________

   ____________  ____________  ____________  ____________

4. \(86 \div 9 = \) ____________  
5. ____________ = 68 / 4

6. \(6 \div 742 = \) ____________  
7. ____________ = 855 / 7
1. Continue each pattern. Then tell if you continued the pattern by using a reflection, rotation, or translation of the original design.

   a. 

   b. 

   c. 

2. Make up your own pattern.

Practice

3. 50% of $25.00 =

4. 25% of $10.00 =

5. ________ = 40% of $150.00

6. ________ = 20% of $250.00
Write < or > to make a true number sentence.

1. $3 \quad \_\_\_ \quad 14$
2. $-7 \quad \_\_\_ \quad 7$
3. $19 \quad \_\_\_ \quad 20$
4. $-8 \quad \_\_\_ \quad -10$

List the numbers in order from least to greatest.

5. $5, -8, \frac{1}{2}, -\frac{1}{4}, 1.7, -3.4$

   ___ least ___ ___ ___ ___ ___ greatest

6. $-43, 22, \frac{14}{7}, 5, -3, 0$

   ___ least ___ ___ ___ ___ ___ greatest

7. Name four positive numbers less than 2.

   ___ ___ ___ ___

8. Name four negative numbers greater than $-3$.

   ___ ___ ___ ___

Use the number line to help you solve Problems 9–11.

9. a. $4 + 9 = \quad \_\_\_\_\_\_$ b. $4 + (-9) = \quad \_\_\_\_\_\_$ c. $(-4) + (-9) = \quad \_\_\_\_\_\_$

10. a. $5 + 3 = \quad \_\_\_\_\_\_$ b. $(-5) + 3 = \quad \_\_\_\_\_\_$ c. $(-5) + (-3) = \quad \_\_\_\_\_\_$

11. a. _____ = $2 + 13$ b. _____ = $(-2) + 13$ c. _____ = $(-2) + (-13)$

   ***Practice***

12. $1.02 + 12.88 = \quad \_\_\_\_\_\_$
13. $7.26 - 1.94 = \quad \_\_\_\_\_\_$

14. _____ + $5.84 = 8.75$
15. $3.38 - _____ = 2.62$
Think about each skill listed below. Assess your own progress by checking the most appropriate box.

<table>
<thead>
<tr>
<th>Skills</th>
<th>I can do this on my own and explain how to do it.</th>
<th>I can do this on my own.</th>
<th>I can do this if I get help or look at an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Give fraction, decimal, and percent equivalencies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Add positive and negative numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Use a mirror to draw reflections (flips).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Identify shapes with line symmetry, and draw lines of symmetry.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Identify and describe translations (slides).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Identify and describe rotations (turns).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3-D Shapes, Weight, Volume, and Capacity

Our next unit introduces several new topics, as well as reviewing some of the work with geometric solids from previous grades and some of the main ideas your child has been studying this past year.

We begin with a lesson on weight and mass, focusing on grams and ounces. Students handle and weigh a variety of objects, trying to develop “weight sense” so that they can estimate weights effectively. The class participates in creating a Gram & Ounce Museum by displaying everyday objects labeled with their weights.

As part of a review of the properties of 3-dimensional shapes (prisms, pyramids, cylinders, and cones), your child will construct models of geometric solids using straws and paper patterns. They will use these models as they discuss vocabulary such as face, edge, and vertex and compare features of geometric solids.

By experimenting with cubes, the class will develop and apply a formula for finding the volumes of rectangular prisms (solids that look like boxes).

We will consider units of capacity (cups, pints, quarts, gallons, liters, milliliters) and the relationships among them. The class participates in creating a Liter & Milliliter Museum by displaying everyday objects labeled with their capacities.

Your child will also explore subtraction of positive and negative numbers by playing a variation of the Credits/Debits Game introduced in Unit 10.

In Lesson 11-1, a pan balance is used to measure weight in grams.

Please keep this Family Letter for reference as your child works through Unit 11.
Vocabulary

Important terms in Unit 11:

capacity  (1) The amount of space occupied by a 3-dimensional shape. Same as volume. (2) Less formally, the amount a container can hold. Capacity is often measured in units such as quarts, gallons, cups, or liters. (3) The maximum weight a scale can measure.

cone  A 3-dimensional shape that has a circular base, a curved surface, and one vertex, which is called the apex. The points on the curved surface of a cone are on straight lines connecting the apex and the circumference of the base.

cubic unit  A unit used in measuring volume, such as a cubic centimeter or a cubic foot.

curved surface  A 2-dimensional surface that is rounded rather than flat. Spheres, cylinders, and cones each have one curved surface.

cylinder  A 3-dimensional shape that has two circular or elliptical bases that are parallel and congruent and are connected by a curved surface. A can is shaped like a cylinder.

dimension  A measure along one direction of an object, typically length, width, or height. For example, the dimensions of a box might be 24 cm by 20 cm by 10 cm.

formula  A general rule for finding the value of something. A formula is often written using letters, called variables, that stand for the quantities involved.

geometric solid  The surface or surfaces that make up a 3-dimensional shape, such as a prism, cylinder, cone, or sphere. Despite its name, a geometric solid is hollow; it does not contain the points in its interior.

prism  A 3-dimensional shape with two parallel and congruent polygonal regions for bases and lateral faces formed by all the line segments with endpoints on corresponding edges of the bases. The lateral faces are all parallelograms.

pyramid  A 3-dimensional shape with a polygonal region for a base, a point (apex) not in the plane of the base, and all of the line segments with one endpoint at the apex and the other on an edge of the base. All faces except the base are triangular.

3-dimensional (3-D) shape  A shape whose points are not all in a single plane. Examples include prisms, pyramids, and spheres, all of which have length, width, and height.

volume  The amount of space occupied by a 3-dimensional shape. Same as capacity. The amount a container can hold. Volume is often measured in cubic units, such as cm³, cubic inches, or cubic feet.

weight  A measure of the force of gravity on an object. Weight is measured in metric units such as grams, kilograms, and milligrams and in U.S. customary units such as pounds and ounces.
Do-Anytime Activities

To work with your child on the concepts taught in this unit, try these interesting and rewarding activities:

1. Have your child compile a list of the world’s heaviest objects or things. For example, which animal has the heaviest baby? What is the world’s heaviest human-made structure? What is the greatest amount of weight ever hoisted by a person?

2. Have your child compile a portfolio of 3-dimensional shapes. Images can be taken from newspapers, magazines, photographs, and so on.

3. Encourage your child to create his or her own mnemonics and/or sayings for converting between units of capacity and weight. One such example is the old English saying “A pint’s a pound the world around.” (1 pint = 16 oz = 1 lb)

Building Skills through Games

In Unit 11, your child will play the following games. For detailed instructions, see the Student Reference Book.

**Chances Are** See Student Reference Book, page 236.
This game is for 2 players and requires one deck of *Chances Are* Event Cards and one deck of *Chances Are* Probability Cards. The game develops skill in using probability terms to describe the likelihood of events.

**Credits/Debits Game** See Student Reference Book, page 238.
This is a game for 2 players. Game materials include 1 complete deck of number cards and a recording sheet. The *Credits/Debits Game* helps students practice addition of positive and negative integers.

**Credits/Debits Game (Advanced Version)** See Student Reference Book, page 239.
This game is similar to the *Credits/Debits Game* and helps students practice addition and subtraction of positive and negative integers.
The World’s Largest Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Weight</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>3 pounds 11 ounces</td>
<td>October 1997</td>
<td>Linton, England</td>
</tr>
<tr>
<td>Bowl of pasta</td>
<td>7,355 pounds</td>
<td>February 2004</td>
<td>Hartford, New York</td>
</tr>
<tr>
<td>Chocolate bar</td>
<td>5,026 pounds</td>
<td>March 2000</td>
<td>Turin, Italy</td>
</tr>
<tr>
<td>Garlic</td>
<td>2 pounds 10 ounces</td>
<td>1985</td>
<td>Eureka, California</td>
</tr>
<tr>
<td>Gingerbread man</td>
<td>372.13 pounds</td>
<td>November 2003</td>
<td>Vancouver, Canada</td>
</tr>
<tr>
<td>Hamburger</td>
<td>6,040 pounds</td>
<td>September 1999</td>
<td>Sac, Montana</td>
</tr>
<tr>
<td>Ice cream sundae</td>
<td>22.59 tons</td>
<td>July 1988</td>
<td>Alberta, Canada</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>1,337 pounds</td>
<td>October 2002</td>
<td>Topsfield, Massachusetts</td>
</tr>
<tr>
<td>Taco</td>
<td>1,654 pounds</td>
<td>March 2003</td>
<td>Mexicali, Mexico</td>
</tr>
</tbody>
</table>

Source: www.guinnessworldrecords.com

Use the information in the table to solve the following problems.

1. The largest apple weighed __________ ounces.

2. A typical hamburger weighs about 4 ounces. The largest hamburger weighed _____ ounces.

3. Which 2 foods together weigh about a ton? ________________ and ________________

4. A kilogram is a little more than 2 pounds. Which 4 foods each weigh more than 1,000 kilograms?

5. On the back of this page, use data from the table to write and solve your own problem.

Practice

6. \(-75 + 25 = \) __________

7. \(\) __________ = \(-45 + (-30)\)

8. \(\) __________ = \(-60 + 60\)

9. \(55 + (-25) = \) __________
1. The pictures below show objects that are shaped approximately like geometric solids. Identify each object as one of the following: cylinder, cone, sphere, triangular prism, square pyramid, or rectangular prism.

   a. Type: ______________
   
   b. Type: ______________
   
   c. Type: ______________
   
   d. Type: ______________
   
   e. Type: ______________
   
   f. Type: ______________

2. Mark Xs on the vertices of the rectangular prism.

3. How many edges does the tetrahedron have? _______ edges

Practice

4. Circle the numbers that are multiples of 7. 132 7,000 63 560 834 91

5. Circle the numbers that are multiples of 12. 24 120 38 600 100 75
Geometry Riddles

Answer the following riddles.

1. I am a geometric solid.
   I have two surfaces.
   One of my surfaces is formed by a circle.
   The other surface is curved.
   What am I? ________________

2. I am a geometric solid.
   I have one square base.
   I have four triangular faces.
   Some Egyptian pharaohs were buried in tombs shaped like me.
   What am I? ________________

3. I am a polyhedron.
   I am a prism.
   My two bases are hexagons.
   My other faces are rectangles.
   What am I? ________________

4. I am a polyhedron.
   All of my faces are the same.
   All of my faces are equilateral triangles.
   I have eight faces.
   What am I? ________________

Try This

5. Write your own geometry riddle.
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

Practice

6. \(-20 + 30 = \) _____________
7. \(\) ______________ = \(-35 + (-35)\)
8. \(\) ______________ = \(10 + (-25)\)
9. \(\) ______________ = \(0 + (-100)\)
10. \(-15 + (-40) = \) _____________
11. \(\) ______________ = \(-300 + (-100)\)
Volume

Cut out the pattern below and tape it together to form an open box.

1. Find and record two items in your home that have volumes equal to about \( \frac{1}{2} \) of the volume of the open box.

2. Find and record two items in your home that have about the same volume as the open box.

3. Find and record two items in your home that have volumes equal to about 2 times the volume of the open box.

Practice

4. \( 96 \div 4 = \) \_

5. \( 86 \div 5 = \) \_

6. \( \frac{232}{8} = \) \_

7. \( 4\overline{358} = \) \_

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1. Find the volume of each stack of centimeter cubes.

   a. 
   
   Volume = ______ cm³

   b. 
   
   Volume = ______ cm³

2. Calculate the volume of each rectangular prism.

   a. 
   
   Number model: ____________________________
   
   Volume = ______ cm³

   b. 
   
   Number model: ____________________________
   
   Volume = ______ cm³

3. What is the total number of cubes needed to completely fill each box?

   a. 
   
   ______ cubes

   b. 
   
   ______ cubes

Practice

4. $-65 + 16 = ______$

5. ______ $= -21 + (-19)$

6. ______ $= 84 + (-55)$

7. $-16 + 89 = ______$
Add or subtract.

1. \(-40 + (-70) = \) ____________
2. \(12 - 20 = \) ____________
3. ____________ = \(-14 - (-6)\)
4. ____________ \(\div 10 - (-5)\)
5. \(15 + (-1) = \) ____________
6. \(-12 - 7 = \) ____________
7. ____________ = \(60 + (-130)\)
8. ____________ = \(-2 - (-20)\)

9. Write two subtraction problems with an answer of \(-8\).
   ____________ - ____________ = \(-8\)
   ____________ - ____________ = \(-8\)

10. Write two addition problems with an answer of \(-30\).
    ____________ + ____________ = \(-30\)
    ____________ + ____________ = \(-30\)

Write < or > to make a true number sentence.

11. \(0 - 7 \) ____________ \(\_6\)
12. \(-11 \) ____________ \(-13 - (-5)\)
13. \(7 + (-2) \) ____________ \(-8\)
14. \(18 + (-8) \) ____________ \(-18\)
15. \(26 - (-14) \) ____________ \(27 + (-16)\)
16. \(9 - (-11) \) ____________ \(0 + (-20)\)

List the numbers in order from least to greatest.

17. \(\frac{30}{6}, 8, -14, -0.7, 5.6, -2.5\)
   ____________ ____________ ____________ ____________ ____________ ____________
   least greatest

18. \(0.02, \frac{-3}{5}, -7, 4, 0.46, \frac{-24}{6}\)
   ____________ ____________ ____________ ____________ ____________ ____________
   least greatest

Practice

19. ____________ = \(34 \times 78\)
20. ____________ = \(46 \times 959\)
21. \(632 \div 4 = \) ____________
22. \(746 \div 7 = \) ____________
Find at least one container that holds each of the amounts listed below.
Describe each container and record all the capacity measurements on the label.

1. **Less than 1 Pint**
   
<table>
<thead>
<tr>
<th>Container</th>
<th>Capacity Measurements on Label</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>bottle of hot chili sesame oil</em></td>
<td><em>5 fl oz, 148 mL</em></td>
</tr>
</tbody>
</table>

2. **1 Pint**
   
<table>
<thead>
<tr>
<th>Container</th>
<th>Capacity Measurements on Label</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>bottle of cooking oil</em></td>
<td><em>16 fl oz, 473 mL</em></td>
</tr>
</tbody>
</table>

3. **1 Quart**
   
<table>
<thead>
<tr>
<th>Container</th>
<th>Capacity Measurements on Label</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **More than 1 Quart**
   
<table>
<thead>
<tr>
<th>Container</th>
<th>Capacity Measurements on Label</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete.

5. 2 quarts = _______ pints

6. 3 gallons = _______ cups

7. _______ pints = 4 cups

8. _______ quarts = 12 cups

9. 6 pints = _______ quarts

10. _______ quarts = 2 1/2 gallons

**Practice**

11. \(-3 + 7 = \) _______

12. _______ = 3 + (\(-7\))

13. _______ = 40 + (\(-80\))

14. \(-60 + (\(-60\)) = \) _______
Think about each skill listed below. Assess your own progress by checking the most appropriate box.

<table>
<thead>
<tr>
<th>Skills</th>
<th>I can do this on my own and explain how to do it.</th>
<th>I can do this on my own.</th>
<th>I can do this if I get help or look at an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Add positive and negative numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Subtract positive and negative numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Describe events using terms such as: certain, likely, very unlikely, and impossible.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Count cubes to find the volume of a rectangular prism.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Use a formula to find the volume of a rectangular prism.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Identify, describe, and compare solid figures such as: rectangular prisms, pyramids, and cones.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unit 12: Family Letter

Rates

For the next two or three weeks, your child will be studying rates. Rates are among the most common applications of mathematics in daily life.

A rate is a comparison involving two different units. Familiar examples come from working (dollars per hour), driving (miles per hour), eating (calories per serving), reading (pages per day), and so on.

Our exploration of rates will begin with students collecting data on the rate at which their classmates blink their eyes. The class will try to answer the question “Does a person’s eye-blinking rate depend on what the person is doing?”

During this unit, students will collect many examples of rates and might display them in a Rates All Around Museum. Then they will use these examples to make up rate problems, such as the following:

1. If cereal costs $2.98 per box, how much will 4 boxes cost?

2. If a car’s gas mileage is about 20 miles per gallon, how far can the car travel on a full tank of gas (16 gallons)?

3. If I make $6.25 per hour, how long must I work to earn enough to buy shoes that cost $35?

Then the class will work together to develop strategies for solving rate problems.

The unit emphasizes the importance of mathematics to educated consumers. Your child will learn about unit-pricing labels on supermarket shelves and how to use these labels to decide which of two items is the better buy. Your child will see that comparing prices is only part of being an educated consumer. Other factors to consider include quality, the need for the product, and, perhaps, the product’s effect on the environment.

This unit provides a great opportunity for your child to help with the family shopping. Have your child help you decide whether the largest size is really the best buy. Is an item that is on sale necessarily a better buy than a similar product that is not on sale?

Finally, students will look back on their experiences in the yearlong World Tour project and 50-facts test routine and share them with one another.

Please keep this Family Letter for reference as your child works through Unit 12.

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**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size 1 link (45 g)</th>
<th>Servings per Container 10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount per Serving</strong></td>
<td></td>
</tr>
<tr>
<td>Calories 150</td>
<td>Calories from Fat 120</td>
</tr>
<tr>
<td>% Daily Value</td>
<td></td>
</tr>
<tr>
<td>Total Fat 13 g</td>
<td>20%</td>
</tr>
<tr>
<td>Total Carbohydrate 1 g</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Protein 7 g</td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary

Important terms in Unit 12:

comparison shopping Comparing prices and collecting other information needed to make good decisions about which of several competing products or services to buy.

consumer A person who acquires products or uses services.

per For each, as in ten chairs per row or six tickets per family.

rate A comparison by division of two quantities with different units. For example, a speed such as 55 miles per hour is a rate that compares distance with time.

rate table A way of displaying rate information as in the miles per gallon table below.

<table>
<thead>
<tr>
<th>Miles</th>
<th>35</th>
<th>70</th>
<th>105</th>
<th>140</th>
<th>175</th>
<th>210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallons</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

unit price The price per item or unit of measure. For example, if a 5-ounce package of something costs $2.50, then $0.50 per ounce is the unit price.

unit rate A rate with 1 in the denominator. For example, 600 calories per 3 servings or 600 calories is not a unit rate, but 200 calories per serving is a unit rate.
Do-Anytime Activities

To work with your child on concepts taught in this unit, try these interesting and rewarding activities:

1. Have your child examine the Nutrition Facts labels on various cans and packages of food. The labels list the number of servings in the container and the number of calories per serving. Have your child use this information to calculate the total number of calories in the full container or package. For example:

   A can of soup has 2.5 servings.
   There are 80 calories per serving.
   So the full can has $2.5 \times 80 = 200$ calories.

2. Have your child point out rates in everyday situations. For example:

   store price rates: cost per dozen, cost per 6-pack, cost per ounce
   rent payments: dollars per month or dollars per year
   fuel efficiency: miles per gallon
   wages: dollars per hour
   sleep: hours per night
   telephone rates: cents per minute
   copy machine rates: copies per minute

3. Use supermarket visits to compare prices for different brands of an item and for different sizes of the same item. Have your child calculate unit prices and discuss best buys.

Building Skills through Games

In this unit, your child will play the following games. For more detailed instructions, see the Student Reference Book.

*Credits/Debits Game (Advanced Version)* See Student Reference Book, page 239.
This game for 2 players simulates bookkeeping for a small business. A deck of number cards represents "credits" and "debits." Transactions are entered by the players on recording sheets. The game offers practice in addition and subtraction of positive and negative integers.

*Fraction Top-It* See Student Reference Book, page 247.
This game is for 2 to 4 players and requires one set of 32 Fraction Cards. The game develops skills in comparing fractions.

*Name That Number* See Student Reference Book, page 254.
This game is for 2 or 3 players and requires 1 complete deck of number cards. The game develops skills in representing numbers in different ways.
Examples of Rates

1. Look for examples of rates in newspapers, in magazines, and on labels.

Study the two examples below, and then list some of the examples you find.
If possible, bring your samples to class.

Example: Label on a can of corn says “Servings Per Container 3 1/2”

Example: Lightbulbs come in packages of 4 bulbs. The package doesn’t say so, but there are always 4 bulbs in each package.

Example: 

Example: 

Example: 

Practice

2. \[ \frac{4}{5} - \frac{1}{5} = \] 

3. \[ \quad = \frac{7}{8} - \frac{3}{4} \]

4. \[ \quad = \frac{1}{9} + \frac{8}{9} \]

5. \[ \frac{1}{3} + \frac{3}{6} = \]
Solve the problems.

1. Hotels R Us charges $45 per night for a single room. At that rate, how much does a single room cost per week? $_____

2. The Morales family spends about $84 each week for food. On average, how much do they spend per day? $_____

3. Sharon practices playing the piano the same amount of time each day. She practiced a total of 4 hours on Monday and Tuesday combined. At that rate, how many hours would she practice in a week? _______ hours

| Hours | | | | | | | |
| Days | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Try This

4. People in the United States spend an average of 6 hours and 4 minutes each week reading newspapers.

   a. That's how many minutes per week? _______ minutes per week

   b. At that rate, how much time does an average person spend reading newspapers in a 3-day period? _______ minutes

| Minutes | | | | | | | |
| Days | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Practice

5. _______ = 24 * 379

6. 870 * 63 = _______

7. 652 ÷ 8 = _______

8. 546 ÷ 42 = _______
Mammal Rates

1. A mole can dig a tunnel 300 feet long in one night. How far could a mole dig in one week? About ________ feet

2. An elephant may eat 500 pounds of hay and drink 60 gallons of water in one day.
   a. About how many pounds of hay could an elephant eat per week? About ________ pounds
   b. About how many gallons of water could an elephant drink per week? About ________ gallons

3. The bottle-nosed whale can dive to a depth of 3,000 feet in 2 minutes. About how many feet is that per second? About ________ feet per second

4. A good milking cow will give up to 1,500 gallons of milk in a year.
   a. About how many gallons is that in 3 months? About ________ gallons
   b. About how many quarts is that in 3 months? About ________ quarts

Try This

5. Sloths spend up to 80 percent of their lives sleeping. Not only is a sloth extremely sleepy, but it is also very slow. A sloth travels on the ground at a speed of about 7 feet per minute. In the trees, its speed is about 15 feet per minute.
   a. After one hour, how much farther would a sloth have traveled in the trees than on the ground (if it didn’t stop to sleep)? About ________ feet
   b. About how long would it take a sloth to travel 1 mile on the ground? (Hint: There are 5,280 feet in a mile.) About ________ minutes, or ________ hours

Practice

6. $59 \times 27 = \underline{ \hspace{1cm} }$
7. $\underline{ \hspace{1cm} } = 648 \times 85$
8. $904 \div 5 = \underline{ \hspace{1cm} }$
9. $\underline{ \hspace{1cm} } = 536 \div 8$
Unit Prices

Solve the unit price problems below. Complete the tables if it is helpful to do so.

1. A 12-oz bag of pretzels costs 96 cents. The unit price is ____________ per ounce.

<table>
<thead>
<tr>
<th>Dollars</th>
<th>0.96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ounces</td>
<td>1  3  9  12</td>
</tr>
</tbody>
</table>

2. A package of 3 rolls of paper towels costs $2.07. The unit price is ____________ per roll.

<table>
<thead>
<tr>
<th>Dollars</th>
<th>2.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolls</td>
<td>1  2  3</td>
</tr>
</tbody>
</table>

3. A 4-liter bottle of water costs $1.40. The unit price is ____________ per liter.

<table>
<thead>
<tr>
<th>Dollars</th>
<th>1.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liters</td>
<td>1  2  3  4</td>
</tr>
</tbody>
</table>

4. Choose 4 items from newspaper ads. In the table below, record the name, price, and quantity of each item. Leave the Unit Price column blank.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Sun</td>
<td>24 ounces</td>
<td>$2.99</td>
<td></td>
</tr>
<tr>
<td>Raisins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Practice

Name the factor pairs for each number.

5. 12 ____________________________  6. 50 ____________________________
1. A package of 3 muffins costs $1.89. What is the price per muffin?

2. A 5-pound bag of rice costs $1.85. What is the price per pound?

3. Chewy worms are sold at $2.40 per pound. What is the price per ounce?

4. A 6-pack of bagels costs $2.11. What is the price per bagel?

5. A 2-pound bag of frozen corn costs $2.03. What is the price per pound?

6. A store sells yogurt in two sizes: The 8-ounce cup costs 72 cents, and the 6-ounce cup costs 60 cents. Which is the better buy? Explain your answer.

7. Make up your own “better buy” problem. Then solve it.

8. 42

9. 23
Country Statistics

1. China has the longest border in the world—13,759 miles. Russia has the second longest border in the world—12,514 miles. How much shorter is Russia’s border than China’s border? __________ miles

2. The area of Russia is about 1,818,629 square miles. The area of Spain, including offshore islands, is about 194,897 square miles. About how many times larger is Russia than Spain? ______ times larger

3. Students in China attend school about 251 days per year. Students in the United States attend school about 180 days per year.
   a. About what percent of the year do Chinese students spend in school? ______%
   b. About what percent of the year do American students spend in school? ______%

4. English is officially spoken in 54 countries. Portuguese is officially spoken in 8 countries. Portuguese is spoken in about what fraction of the number of English-speaking countries? ______

5. The table to the right shows the countries in the world with the most neighboring countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Neighbors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>10</td>
</tr>
<tr>
<td>China</td>
<td>15</td>
</tr>
<tr>
<td>Dem. Rep. of Congo</td>
<td>9</td>
</tr>
<tr>
<td>Germany</td>
<td>9</td>
</tr>
<tr>
<td>Russia</td>
<td>14</td>
</tr>
<tr>
<td>Sudan</td>
<td>9</td>
</tr>
</tbody>
</table>

Use the data in the table to answer the following questions.
   a. Which country has the maximum number of neighbors? __________________________
   b. What is the range? __________
   c. What is the mode? __________
   d. What is the median? __________
Think about each skill listed below. Assess your own progress by checking the most appropriate box.

<table>
<thead>
<tr>
<th>Skills</th>
<th>I can do this on my own and explain how to do it.</th>
<th>I can do this on my own.</th>
<th>I can do this if I get help or look at an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Find factors and factor pairs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Compare and order positive and negative fractions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Add positive and negative numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Subtract positive and negative numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Solve rate problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Solve open sentences.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Congratulations!

By completing Fourth Grade Everyday Mathematics, your child has accomplished a great deal. Thank you for all of your support.

This Family Letter is a resource to use throughout your child’s vacation. It includes an extended list of Do-Anytime Activities, directions for games that can be played at home, a list of mathematics-related books to check out over vacation, and a sneak preview of what your child will be learning in Fifth Grade Everyday Mathematics. Enjoy the vacation!

Do-Anytime Activities

Mathematics means more when it is rooted in real-life situations.

To help your child review many of the concepts he or she has learned in fourth grade, we suggest the following activities for you and your child to do together over vacation. These activities will help your child build on the skills he or she has learned this year and help prepare him or her for Fifth Grade Everyday Mathematics.

1. Have your child practice any multiplication and division facts that he or she has not yet mastered. Include some quick drills.
2. Provide items for your child to measure. Have your child use personal references, as well as U.S. customary and metric measuring tools.
3. Use newspapers and magazines as sources of numbers, graphs, and tables that your child may read and discuss.
4. Have your child practice multidigit multiplication and division using the algorithms that he or she is most comfortable with.
5. Ask your child to look at advertisements and find the sale prices of items using the original prices and rates of discount or find rates of discount using original prices and sale prices. Have your child use a calculator and calculate unit prices to determine best or better buys.
6. Continue the World Tour by reading about other countries.
Building Skills through Games

The following section lists rules for games that can be played at home. You will need a deck of number cards, which can be made from index cards or by modifying a regular deck of cards as follows:

A regular deck of playing cards includes 54 cards (52 regular cards plus 2 jokers). Use a permanent marker to mark some of the cards:

- Mark each of the four aces with the number 1.
- Mark each of the four queens with the number 0.
- Mark the four jacks and four kings with the numbers 11 through 18.
- Mark the two jokers with the numbers 19 and 20.

**Beat the Calculator**

**Materials** number cards 1–10 (4 of each); calculator

**Players** 3

**Directions**

1. One player is the “Caller,” one is the “Calculator,” and one is the “Brain.”

2. Shuffle the deck of cards and place it facedown.

3. The Caller draws two cards from the number deck and asks for their product.

4. The Calculator solves the problem with a calculator. The Brain solves it without a calculator. The Caller decides who got the answer first.

5. The Caller continues to draw two cards at a time from the number deck and asks for their product.

6. Players trade roles every 10 turns or so.

**Example:** The Caller draws a 10 and 7 and calls out “10 times 7.” The Brain and the Calculator solve the problem.

The Caller decides who got the answer first.

**Variation 1:** To practice extended multiplication facts, have the Caller draw two cards from the number deck and attach a 0 to either one of the factors or to both factors before asking for the product.

**Example:** If the Caller turns over a 4 and a 6, he or she may make up any one of the following problems:

\[4 \times 60 \quad 40 \times 6 \quad 40 \times 60\]

**Variation 2:** Use a full set of number cards: 4 each of the numbers 1–10, and 1 each of the numbers 11–20.
Building Skills through Games

*Name That Number*

**Materials** 1 complete deck of number cards

**Players** 2 or 3

**Object of the game** To collect the most cards

**Directions**

1. Shuffle the cards and deal five cards to each player. Place the remaining cards number-side down. Turn over the top card and place it beside the deck. This is the target number for the round.

2. Players try to match the target number by adding, subtracting, multiplying, or dividing the numbers on as many of their cards as possible. A card may be used only once.

3. Players write their solutions on a sheet of paper or a slate. When players have written their best solutions:
   - They set aside the cards they used to name the target number.
   - Replace them by drawing new cards from the top of the deck.
   - Put the old target number on the bottom of the deck.
   - Turn over a new target number, and play another hand.

4. Play continues until there are not enough cards left to replace all of the players’ cards. The player who sets aside more cards wins the game.

**Example:** Target number: 16  A player’s cards: 7 5 8 2 10

Some possible solutions:

- $10 + 8 - 2 = 16$ (three cards used)
- $7 \times 2 + 10 - 8 = 16$ (four cards used)
- $8 / 2 + 10 + 7 - 5 = 16$ (all five cards used)

The player sets aside the cards used to make a solution and draws the same number of cards from the top of the deck.
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 listed below were recommended by teachers who use Everyday Mathematics in their classrooms. They are organized by mathematical topic. Visit your local library and check out these mathematics-related books with your child.

**Geometry**
- *A Cloak for the Dreamer* by Aileen Friedman
- *The Greedy Triangle* by Marilyn Burns

**Measurement**
- *The Magic School Bus Inside the Earth* by Joanna Cole
- *The Hundred Penny Box* by Sharon Bell Mathis

**Numeration**
- *Alexander, Who Used to Be Rich Last Sunday* by Judith Viorst
- *If You Made a Million* by David M. Schwartz
- *Fraction Action* by Loreen Leedy
- *How Much Is a Million?* by David M. Schwartz

**Operations**
- *Anno’s Mysterious Multiplying Jar* by Masaichiro Anno
- *The King’s Chessboard* by David Birch
- *One Hundred Hungry Ants* by Elinor J. Pinczes
- *A Remainder of One* by Elinor J. Pinczes

**Patterns, Functions, and Sequences**
- *Eight Hands Round* by Ann Whitford Paul
- *Visual Magic* by David Thomas

**Reference Frames**
- *The Magic School Bus: Inside the Human Body* by Joanna Cole
- *Pigs on a Blanket* by Amy Axelrod

**Looking Ahead: Fifth Grade Everyday Mathematics**

Next year your child will . . .
- Develop skills with decimals and percents
- Continue to practice multiplication and division skills, including operations with decimals
- Investigate methods for solving problems using mathematics in everyday situations
- Work with number lines, times, dates, and rates
- Collect, organize, describe, and interpret numerical data
- Further explore the properties, relationships, and measurement of 2- and 3-dimensional objects
- Read, write, and use whole numbers, fractions, decimals, percents, negative numbers, and exponential notation
- Explore scientific notation

*Again, thank you for all of your support this year. Have fun continuing your child’s mathematical experiences throughout the vacation!*