Name Date Time

STUDY LINK 10•10

Unit 11: Family Letter

Volume

Unit 11 focuses on developing your child's ability to think spatially. Many times, students might feel that concepts of area and volume are of little use in their everyday lives compared with computation skills. Encourage your child to become more aware of the relevance of 2- and 3-dimensional shapes. Point out geometric solids (pyramids, cones, and cylinders) as well as 2-dimensional shapes (squares, circles, and triangles) in your surroundings.

Volume (or capacity) is the measure of the amount of space inside a 3-dimensional geometric figure. Your child will develop formulas to calculate the volume of rectangular and curved solids in cubic units. The class will also review units of capacity, such as cups, pints, quarts, and gallons. Students will use units of capacity to estimate the volume of irregular objects by measuring the amount of water each object displaces when submerged. Your child will also explore the relationship between weight and volume by calculating the weight of rice an average Thai family of four consumes in one year and by estimating how many cartons would be needed to store a year's supply.

Area is the number of units (usually squares) that can fit onto a bounded surface, without gaps or overlaps. Your child will review formulas for finding the area of rectangles, parallelograms, triangles, and circles and use these formulas in calculating the surface area of 3-dimensional shapes.

The goal of this unit is not to have students memorize formulas, but to help them develop an appreciation for using and applying formulas in various settings. By the end of this unit, your child will have had many experiences using 2- and 3-dimensional geometry.

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

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Vocabulary

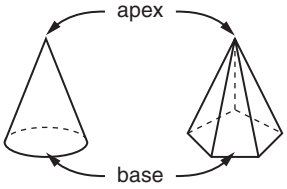
Important terms in Unit 11:

apex In a pyramid or cone, the vertex opposite the base.

base of a parallelogram The side of a parallelogram to which an altitude is drawn. The length of this side.

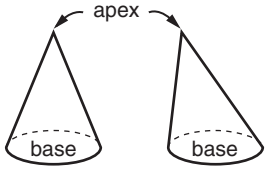
base of a prism or cylinder Either of the two parallel and congruent faces that define the shape of a prism or a cylinder.

base of a pyramid or cone The face of a pyramid or cone that is opposite its apex.



calibrate To divide or mark a measuring tool, such as a thermometer, with gradations.

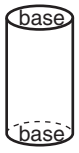
cone A geometric solid with a circular base, a vertex (apex) not in the plane of the base, and all of the line segments with one endpoint at the apex and the other endpoint on the circumference of the base.



cones

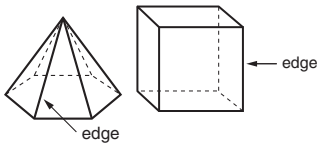
cube A polyhedron with 6 square faces. A cube has 8 vertices and 12 edges.

cylinder A geometric solid with two congruent, parallel circular regions for bases, and a curved face formed by all the segments with an endpoint on each circle that are parallel to the segment with endpoints at the center of the circles.



cylinder

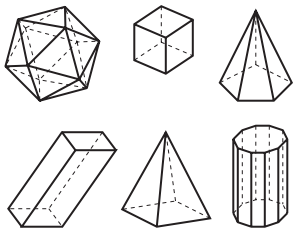
edge A line segment where two faces of a polyhedron meet.



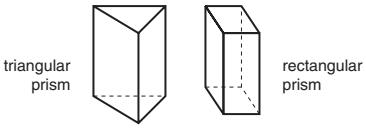
face A flat surface on a polyhedron.

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

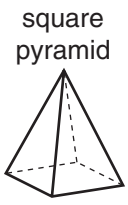
polyhedron A 3-dimensional shape formed by polygons with their interiors (faces) and having no holes.


polyhedrons

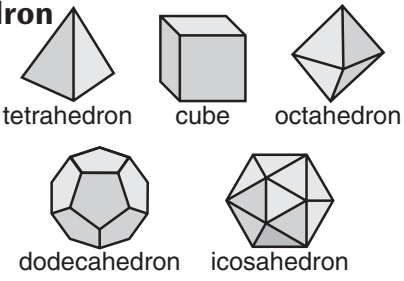
prism A polyhedron with two parallel and congruent polygonal regions for bases and lateral faces formed by all the line segments with endpoints on corresponding edges of the bases. The lateral faces are all parallelograms. Prisms get their names from the shape of their bases.



pyramid A polyhedron made up of any 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 the faces except perhaps the base are triangular. Pyramids get their names from the shape of their base.



regular polyhedron A polyhedron whose faces are all congruent regular polygons and in which the same number of faces meet at each vertex.

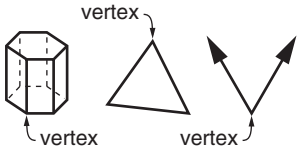


The five regular polyhedrons

sphere The set of all points in space that are a given distance from a given point. The given point is the center of the sphere, and the given distance is the radius.

surface area A measure of the surface of a 3-dimensional figure.

vertex (vertices or vertexes) The point where the rays of an angle, the sides of a polygon, or the edges of a polyhedron meet.



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Do-Anytime Activities

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

1. Have your child compile a 2- and 3-dimensional shapes portfolio or create a collage of labeled shapes. Images can be taken from newspapers, magazines, photographs, and so on.
2. **Explore Kitchen Measures**
   The most common use of measuring volume is cooking. Work with your child to make a favorite recipe. (Doubling the recipe can be good practice in computing with fractions.) Ask your child to use measuring spoons and cups to find the capacity of various containers. The data can be organized in a table.

Container	Capacity
Coffee mug	$1\frac{1}{4}$ cups
Egg cup	3 tablespoons

Building Skills through Games

In Unit 11, your child will practice operations with whole numbers and geometry skills by playing the following games. Detailed instructions for each game are in the *Student Reference Book* or the journal:

Name That Number See *Student Reference Book,* page 325.
This is a game for two or three players using the Everything Math Deck or a complete deck of number cards. Playing *Name That Number* helps students review operations with whole numbers, including the order of operations.

3-D Shape Sort See *Student Reference Book,* page 332.
This game is similar to *Polygon Capture.* Partners or 2 teams each with 2 players need 16 Property cards and 12 Shape cards to play. *3-D Shape Sort* gives students practice identifying properties of 3-dimensional shapes.

Rugs and Fences See journal page 380.
This game uses 32 Polygon cards and 16 Area and Perimeter cards and is played by partners. *Rugs and Fences* gives students practice finding the area and perimeter of polygons.

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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 some of this unit's Study Links.

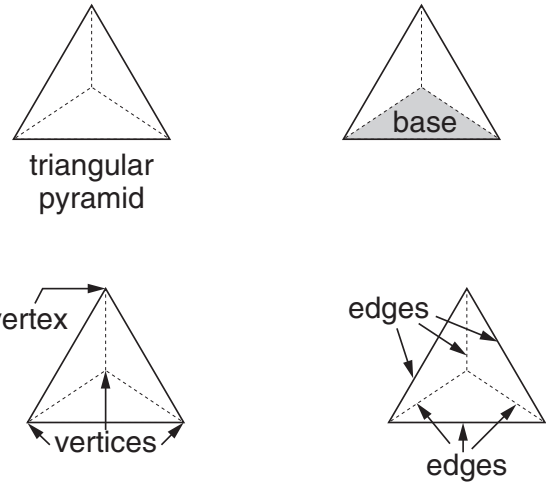
Study Link 11•1

1. Answers vary.

2. D

Study Link 11•2

1.



Study Link 11•3

Sample answers:

1. 2.8 cm; 4.3 cm; 24.6 cm^2; 105.9 cm^3

3a. $30 * 30 * 18 = 16{,}200$

5. more; 283,500,000 cm^3

7. $5\frac{3}{8}$

Study Link 11•4

1. $<$ **2.** $<$ **3.** $>$

4. Because both pyramids have the same height, compare the areas of the bases. The base of the square pyramid has an area of $5 * 5 = 25$ m^2. The base area of the triangular pyramid is $\frac{1}{2} * 5 * 5$ or $12\frac{1}{2}$ m^2.

5. $10\frac{16}{27}$ **6.** $1\frac{11}{21}$ **7.** 600,000 **8.** 25.39

Study Link 11•5

Most of the space taken up by a handful of cotton is air between the fibers.

Study Link 11•6

1. $>$ **2.** $=$ **3.** $<$

4. $<$ **5.** $<$ **6.** $=$

7. cubic inches

8. gallons

9. gallons

10. milliliters

11. cubic centimeters

12. capacity

13. volume

14. –250 **15.** 137,685

16. $10\frac{2}{5}$ **17.** 0.48

Study Link 11•7

1. 88 in^2; Sample answer: I found the area of each of the 6 sides and then added them together.

2. Yes. A 4 in. by 4 in. by $3\frac{1}{2}$ in. box has a volume of 56 in^3 and a surface area of 88 in^2.

3. Volume: 502.4 cm^3; Surface area: 351.7 cm^2

4. Volume: 216 in^3; Surface area: 216 in^2

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