Name Date Time

Family Letter

Study Link 10.7

Unit 11: 3-Dimensional 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.

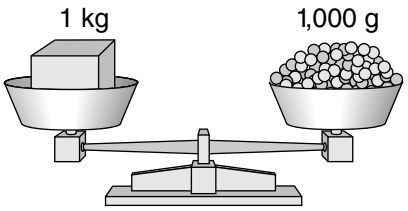
We begin with a lesson on weight, focusing on grams and ounces. Students handle and weigh a variety of objects, trying to develop "weight sense" so that they can estimate weights effectively.

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. The class will also search for 3-dimensional objects that look like geometric shapes to put into a Shapes Museum. For example, someone might bring a can of soup to represent a cylinder. You might want to help your child find such objects.

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 familiar units of capacity (cups, pints, quarts, gallons) and the relationships among them.

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.

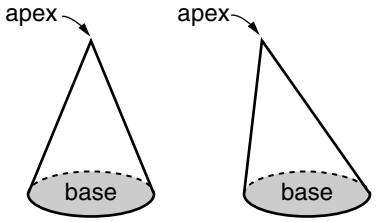
Please keep this Family Letter for reference as your child works through Unit 11.

Vocabulary

Important terms in Unit 11:

capacity The amount a container can hold. Also, the heaviest weight a scale can measure.

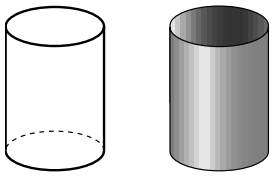
cone A 3-dimensional shape that has a circular *base,* a curved surface, and one vertex, which is called the *apex.* The points on the curved surface of a cone are on straight lines connecting the apex and the circumference of the base.



cubic unit A unit used in measuring volume, such as cubic centimeters or cubic feet.

curved surface A surface that is not flat.

cylinder A 3-dimensional shape that has two circular or elliptical bases that are parallel and congruent and are connected by a curved surface. The points on the curved surface of a cylinder are on straight lines connecting corresponding points on the bases. A can is shaped like a cylinder.

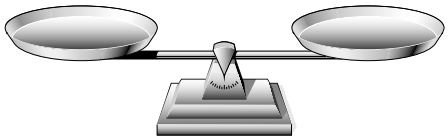


dimension A property of space; extension in a given direction. A straight line has one dimension, a square has two dimensions, and a rectangular prism has three dimensions.

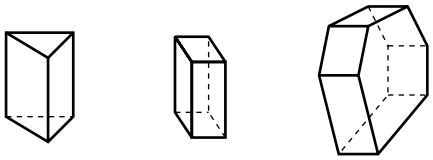
formula A general rule for finding the value of something. A formula is often written using letters, called variables, that stand for the quantities involved. For example, the formula for the area of a rectangle may be written as $A = l * w$, where A represents the area of the rectangle, l represents its length, and w represents its width.

geometric solid 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.

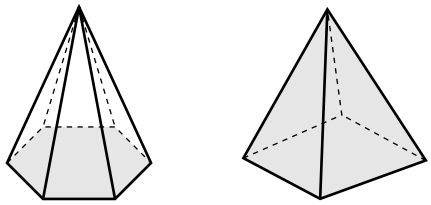
pan balance A tool used to weigh objects or compare their weights.



prism A solid with two parallel *faces,* called *bases,* that are congruent polygons, and other *faces* that are all parallelograms. The points on the lateral faces of a prism are all on lines connecting corresponding points on the bases. A prism is named for the shape of its base.



pyramid A solid in which one face, the *base,* is any polygon and all the other *faces* are triangles that come together at a point called the *vertex* or *apex.* A pyramid is named for the shape of its base.



3-dimensional (3-D) Solid objects that take up volume. 3-dimensional objects have length, width, and thickness.

volume The amount of space inside a 3-dimensional object. Volume is usually measured in cubic units, such as cubic centimeters or cubic inches. Sometimes volume is measured in units of capacity, such as gallons or liters.

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 man-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 this unit, your child will work on his or her understanding of operations with positive and negative numbers by playing the following games. For detailed instructions, see the *Student Reference Book.*

Credits/Debits Game See *Student Reference Book,* page 192.

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 to practice addition of positive and negative integers.

***Credits/Debits Game* (Advanced Version)** See *Student Reference Book,* page 193.

This game is similar to the *Credits/Debits Game* and helps students to practice both addition and subtraction of positive and negative integers.

As You Help Your Child with Homework

As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

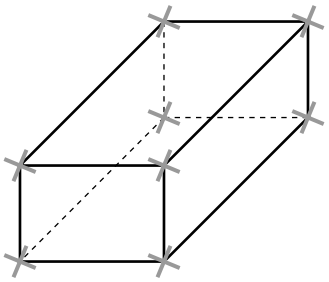
Study Link 11.1

Answers vary.

Study Link 11.2

1. **a.** square pyramid **b.** cone
c. sphere **d.** cylinder
e. rectangular prism **f.** triangular prism

2.



3. 6

Study Link 11.3

1. cone
2. square pyramid
3. hexagonal prism
4. octahedron

Study Link 11.4

Answers vary.

Study Link 11.5

1. **a.** 39 cm^3 **b.** 30 cm^3
2. **a.** 54 cm^3 **b.** 97 cm^3
3. **a.** 133 cubes **b.** 137 cubes

Study Link 11.6

1. < **2.** <
3. > **4.** >
5. > **6.** >
7. $-14, -2.5, -0.7, \frac{30}{6}, 5.6, 8$
8. $-7, -\frac{24}{6}, -\frac{3}{5}, 0.02, 0.46, 4$
9. Sample answers:
$4 - 12 = -8$ $-20 - (-12) = -8$
10. Sample answers:
$-50 + 20 = -30$ $-15 + (-15) = -30$
11. -110
12. -8
13. -8
14. 15
15. 14
16. -19
17. -70
18. 18

Study Link 11.7

Answers vary for Problems 1–4.

5. 4
6. 48
7. 2
8. 3
9. 3
10. 10