



## 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.

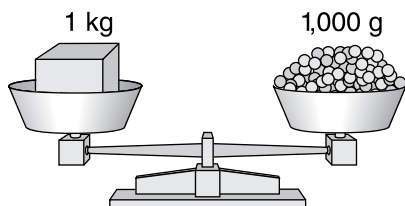
We begin with a lesson on weight, focusing on grams and ounces. Students handle and weigh a variety of objects, trying to develop “weight sense” so that they can estimate weights effectively. The class participates in creating a Gram & Ounce Museum by displaying everyday objects labeled with their weights.

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 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.

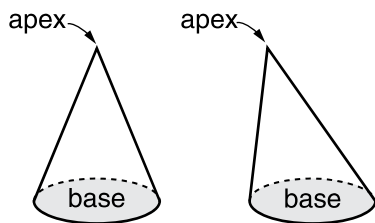
**Please keep this Family Letter for reference as your child works through Unit 11.**

# Vocabulary

Important terms in Unit 11:

**capacity** (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.

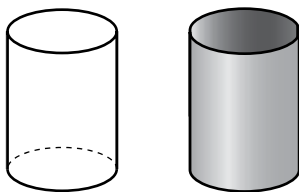
**cone** A 3-dimensional shape that has a circular base, a *curved surface*, and one vertex, which is called the apex. The points on the curved surface of a cone are on straight lines connecting the apex and the circumference of the base.



**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.

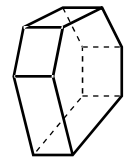
**prism** A 3-dimensional shape with two parallel and congruent polygonal regions for bases and lateral faces formed by all the line segments with endpoints on corresponding edges of the bases. The lateral faces are all parallelograms.



triangular prism

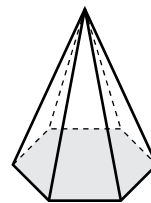


rectangular prism

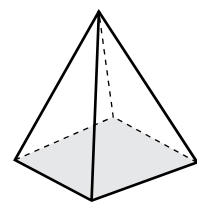


hexagonal prism

**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.



hexagonal pyramid



rectangular pyramid

**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  $\text{cm}^3$ , 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.

# As You Help Your Child with Homework

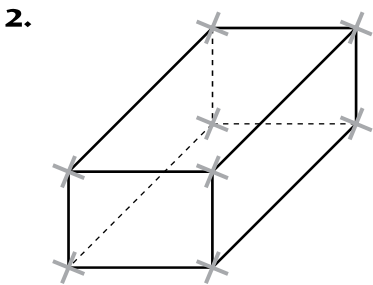
As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

## Study Link 11•1

1. 59                      2. 96,640
3. Bagel and pumpkin; or taco and gingerbread man
4. Pasta, Chocolate bar, Hamburger, Ice cream sundae
6. -\$50                  7. -\$75                  8. \$0
9. \$30

## Study Link 11•2

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



3. 6                          4. 7,000; 63,560; and 91
5. 24; 120; 600

## Study Link 11•3

1. cone    2. square pyramid
3. hexagonal prism                              4. octahedron
6. \$10    7. -\$70
8. -\$15    9. -\$100
10. -\$55    11. -\$400

## Study Link 11•4

4. 24                          5.  $17\text{ R}1$ , or  $17\frac{1}{5}$
6. 29                          7.  $89\text{ R}2$ , or  $89\frac{2}{4}$

## Study Link 11•5

1. a. 39    b. 30
2. a.  $(3 * 3) * 6 = 54$ ; 54  
b.  $(2 * 5) * 9.7 = 97$ ; 97
3. a. 150    b. 150
4. -49                          5. -40                          6. 29                          7. 73

## Study Link 11•6

1. -110                          2. -8                              3. -8
4. 15                              5. 14                              6. -19
7. -70                              8. 18
11. <                              12. <                              13. >
14. >                              15. >                              16. >
17. -14, -2.5, -0.7,  $\frac{30}{6}$ , 5.6, 8
18. -7,  $-\frac{24}{6}$ ,  $-\frac{3}{5}$ , 0.02, 0.46, 4
19. 2,652                          20. 44,114                          21. 158
22.  $106\text{ R}4$ , or  $106\frac{4}{7}$

## Study Link 11•7

Answers vary for Problems 1–4.

5. 4                              6. 48                              7. 2
8. 3                              9. 3                              10. 10
11. 4                              12. -4                              13. -40
14. -120