LESSON 77

• Mass and Weight

Objectives

- Distinguish between mass and weight.
- Estimate the weight of an object using customary units.
- Estimate an object's mass using metric units.

Facts Multiply.

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9 × 9 = 81	1 × 8 = 8	4 × 4 = 16	2 × 5 = 10	7 × 9 = 63	5 × 5 = 25	3 × 4 = 12	4 × 6 = 24	2 × 9 = 18	6 × 9 = 54
6 × 6 = 36	2 × 7 = 14	5 × 8 = 40	3 × 9 = 27	6 × 8 = 48	8 × 9 = 72	2 × 2 = 4	7 × 8 = 56	3 × 7 = 21	7 × 6 = 42
3 × 6 = 18	10 × 10 = 100	2 × 3 = 6	5 × 6 = 30	4 × 9 = 36	3 × 8 = 24	4 × 7 = 28	5 × 9 = 45	0 × 4 = 0	2 × 6 = 12
2 × 8 = 16	4 × 5 = 20	6 × 7 = 42	3 × 3 = 9	5 × 7 = 35	2 × 4 = 8	8 × 8 = 64	3 × 5 = 15	4 × 8 = 32	7 × 7 = 49

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Power Up

facts Power Up G

count aloud Count by fives from 2 to 52.

mental math Before adding, make one number larger and the other number smaller.

a. **Number Sense:** 55 + 47

b. **Number Sense:** 24 + 48

c. **Number Sense:** 458 + 33

d. **Number Sense:** 15 × 30

e. **Money:** Renee bought a pair of gloves for $14.50 and a hat for $8.99. What was the total cost of the items?

f. **Measurement:** Compare: 2 miles 10,000 feet

g. **Estimation:** An *acre* is a measurement of land. A square plot of land that is 209 feet on each side is about 1 acre. Round 209 feet to the nearest hundred feet.

h. **Calculation:** 7^2, − 1, ÷ 8, + 4, − 4, ÷ 6

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Colby wants to cover his bulletin board with square sheets of paper that are 1 foot on each side. His bulletin board is 5 feet wide and 3 feet tall. If Colby has already cut 12 squares of paper, how many more squares does he need to cut? Explain how you found your answer.

New Concept

There is a difference between *weight* and *mass*. The **mass** of an object is how much matter an object has. **Weight** is the measure of the force of gravity on that object. Though an object's weight depends on the force of gravity, its mass does not. For example, the force of gravity on the moon is less than it is on Earth, so the weight of an object on the moon is less, but its mass remains the same.

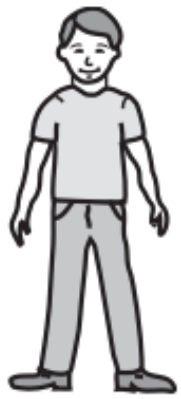
The units of *weight* in the U.S. Customary System are **ounces, pounds,** and **tons.** Remember that in Lesson 40, we used the word *ounce* to describe an amount of fluid. However, *ounce* can also describe an amount of weight. A fluid ounce of water weighs about one ounce.

16 oz = 1 lb

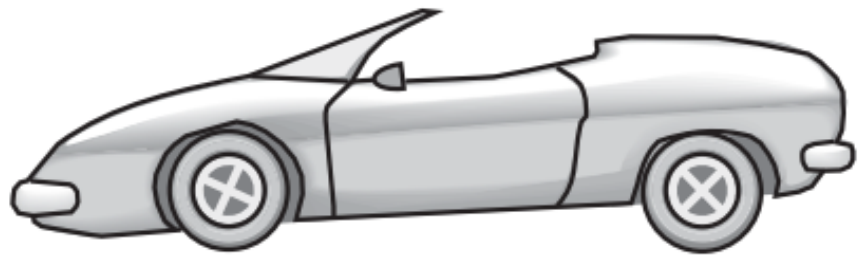
2000 lb = 1 ton

A box of cereal might weigh 24 ounces. Some students weigh 98 pounds. Many cars weigh 1 ton or more.

24 ounces



98 pounds



1 ton

Example 1

Mallory's book weighs about 2 pounds. Two pounds is how many ounces?

Example 2

The rhinoceros weighed 3 tons. Three tons is how many pounds?

Activity 1

Customary Weight

Materials needed:

- **Lesson Activity 30**
- balance scale
- #2 pencils (unsharpened, taped in bundles of 5)

Use a balance scale and pencils to perform these activities. Use the U.S. Customary Weights table on **Lesson Activity 30** to record your answers.

a. Each bundle of 5 pencils is equal to 1 ounce. Using this information, how many pencils would weigh a pound?

b. Find a small object in the classroom to weigh, such as a ruler or tape. Use the bundle of pencils to estimate the weight of this object in ounces, and then place the object on a balance scale. Record the name of the object, your estimate, and the measured weight in ounces. Was your estimate reasonable? Why or why not?

c. Find two different objects that you estimate to be the same weight. Place the two objects on the balance scale to see if the scale is balanced. Record the names of the two objects, and state which object is heavier or if the weights are equal.

Grams and *kilograms* are metric units of mass. Recall that the prefix *kilo-* means "thousand." This means a kilogram is 1000 grams. Gram is abbreviated **g.** Kilogram is abbreviated **kg.**

$$1000 \text{ g} = 1 \text{ kg}$$

A dollar bill has a mass of about 1 gram. This book has a mass of about 1 kilogram. Since this book has fewer than 1000 pages, each page is more than 1 gram.

Example 3

Choose the more reasonable measure for parts a–c.

a. pair of shoes: 1 g or 1 kg

b. cat: 4 g or 4 kg

c. quarter: 5 g or 5 kg

a.

b.

c.

Example 4

Delores's rabbit has a mass of 4 kilograms. Four kilograms is how many grams?

Activity 2

Metric Mass

Materials needed:

- **Lesson Activity 30**
- balance scale
- gram masses

Use a balance scale and gram masses to perform these activities. Use the "Metric Mass" table on **Lesson Activity 30** to record your answer.

a. Select an object such as a pencil or ruler and estimate its mass in grams. Then balance the object on a balance scale with gram masses to find its mass. Record the name of the object, your estimate, and the measured mass.

b. Estimate how many pencils would equal a kilogram. Then weigh a number of pencils to improve your estimate. Describe how you can make a close estimate of the number of pencils that would equal a kilogram.

c. Find a small book and estimate its weight in grams. Use a balance scale to find the actual weight of the book. How close was your estimate to the actual weight?

Name _____

Lesson Activity 30

For use with Lessons 77

Tables

U.S. Customary Weights (Remember to give your table a title.)

(Title) _____

	Object	Estimated Weight	Measured Weight
a.	_____ pencils	1 pound	_____
b.	_____	_____ pencils	_____ ounces
	_____ pencils	_____	1 pound
c.	_____	_____	_____
	_____	_____	_____

Metric Mass (Remember to give your table a title.)

(Title) _____

	Object	Estimated Weight	Measured Weight
a.	_____	_____ grams	_____ grams
b.	_____ pencils	1kilogram	1kilogram

Explain your estimate for problem **b.** _____

_____

Lesson Practice

- **a.** Dave's pickup truck can haul a half ton of cargo. How many pounds is a half ton?
- **b.** The newborn baby weighed 7 lb 12 oz. The baby's weight was how much less than 8 pounds?

Estimate Choose the more reasonable measure in problems **c–h:**

- **c.** tennis ball: 57 g or 57 kg
- **d.** tennis ball: 5 oz or 5 lb
- **e.** dog: 6 g or 6 kg
- **f.** dog: 11 oz or 11 lb
- **g.** bowling ball: 7 g or 7 kg
- **h.** bowling ball: 13 oz or 13 lb

i. Seven pounds is how many ounces?

j. Which depends on the force of gravity: mass or weight?

k. Nancy had 4 pounds of peaches. To make a peach cobbler, she needs 24 ounces of peaches. After making the cobbler, how many ounces of peaches will Nancy have left?