Lesson Objective: Find products and quotients by using properties of exponents.

Vocabulary Box

exponent or **power** — A number that indicates the operation of repeated multiplication. Example: the 5 in 3^5.

Independent Practice

Directions: Complete the following practice problems on your own. Your teacher will review the answers. Make sure that you show all of your work.

Rewrite the following expressions, using a single base. Then simplify each expression.

1. $4^2 \bullet 4^3$

2. $6^2 \bullet 6^1$

3. $9 \bullet 9^2$

4. $\dfrac{7^6}{7^4}$

5. $\dfrac{10^9}{10^4}$

6. $\dfrac{3^5}{3^1}$

7. $\dfrac{2^7}{2}$

8. $\dfrac{5^7}{5^9}$

9. $\dfrac{8}{8^5}$

10. $\dfrac{43^7}{43^7}$

BONUS?

Directions: Rewrite the following expressions, using a single base. Then simplify each expression.

1. $\dfrac{5^2 \bullet 5^7}{5^4 \bullet 5^4}$

2. $(2^3)^2$

3. $\left(\dfrac{3^3}{3^7}\right)^3$

Problem Solving

Directions: Complete the following table, using the established pattern. As you work, look for additional patterns.

Powers of 1	Powers of 2	Powers of 3	Powers of 4	Powers of 5	Powers of 6	Powers of 7	Powers of 8	Powers of 9	Powers of 10
1	2	3	4	5	6				
1	4	9	16	25	36				
1	8	27	64						1,000
1	16	81						6,561	10,000
	32	243					32,768	59,049	100,000
						117,649	262,144	531,441	1,000,000
					279,936	823,543	2,097,152	4,782,969	10,000,000
				390,625		5,764,801	16,777,216	43,046,721	100,000,000
			262,144			40,353,607	134,217,728	387,420,489	1,000,000,000
		59,049				282,475,249	1,073,741,824	3,486,784,401	10,000,000,000

Directions: Answer the question below.

A *seismologist* studies and measures the intensity of earthquakes. The strength of an earthquake is measured using the *Richter scale.* If an earthquake measures 5 on the Richter scale, it is 10 times as powerful as an earthquake that measures a 4 on the scale. We write the intensity of an earthquake measuring 5 on the scale as 10^4 (the exponent is one less than the reading on the scale).

Suppose a seismologist finds that an earthquake in City A measures 6 on the Richter scale. An earthquake in City B measures 3 on the Richter scale. How many times more powerful is the earthquake in City A than the earthquake in City B?

<u>Directions</u>: Rewrite the following expressions, using a single base. Then simplify each expression.

1. $2^3 \bullet 2^4$

2. $\dfrac{6^5}{6^2}$

3. $\dfrac{4^3}{4^5}$

Lesson Objective: Calculate the surface area and volume of prisms, with an emphasis on rectangular prisms.

Vocabulary Box

face — A flat surface of a three-dimensional figure. Example: A rectangular prism has six flat surfaces, or faces.

surface area — For a three-dimensional figure, the sum of the areas of all the faces. Example: The surface area of a rectangular prism equals the total sum of the areas of all six faces.

volume — A measurement of space or capacity; the amount of space taken up by a three-dimensional object. Example: The volume of a rectangular prism equals its length times width times height.

Guided Practice

Directions: Complete the following practice problems. Your teacher will review the answers. Make sure that you show all your work.

I. Work with a partner to find surface area and volume.

1. Use a ruler to find the surface area of your triangular prism in cm^2.

2. Use the appropriate measurements that you found in Question 1 to find the volume of the triangular prism in cm^3.

II. Work independently to find surface area and volume.
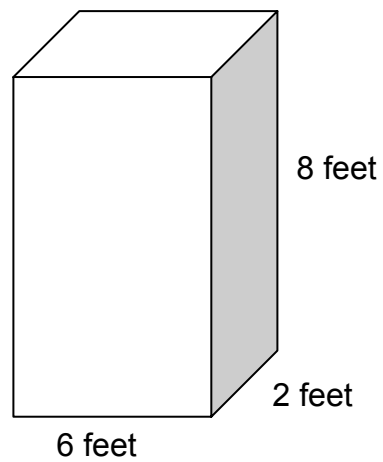
1. Find the volume of the rectangular prism shown above.

2. Find the surface area of the rectangular prism shown above.

Summary/Closure

A. Vocabulary Words

Directions: Draw a line to match each term with its definition.

1. face

2. surface area

3. volume

a. A measurement of space, or capacity.

b. A flat surface of a three-dimensional figure.

c. For a three-dimensional figure, the sum of the areas of all the faces.

Directions: For each formula, write whether it is a formula for surface area or volume. Then state the type of prism for which each formula is used.

1. *lwh*

2. 2(*lw + lh + wh*)

3. sum of the areas of all the faces

4. *Bh*

B. Summarize What We Learned Today

Directions: Create a perspective, or three-dimensional, drawing of a rectangular prism. Choose and label the length, width, and height of the rectangular prism. Then find the surface area and volume. Write a few sentences explaining how to calculate each measurement. You will use this explanation as a personal reminder.

Lesson Objective: Calculate the surface area and volume of prisms, with an emphasis on rectangular prisms.

Vocabulary Box

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volume — A measurement of space or capacity; the amount of space taken up by a three-dimensional object. Example: The volume of a rectangular prism equals its length times width times height.

Independent Practice

Directions: Complete the following practice problems on your own. Your teacher will review the answers. Make sure that you show all of your work.

I. Draw a perspective drawing of a rectangular prism. Label its length 20 centimeters, its width 5 cm, and its height 2 cm. Do not worry about actual measurements of each side, but try to estimate relative size.

Find the volume.

Find the surface area.

II. Use the triangular prism pictured below to find the following measurements. Be careful not to confuse the height of the triangular base with the height of the prism.

8 cm

10 cm

12 cm

6 cm
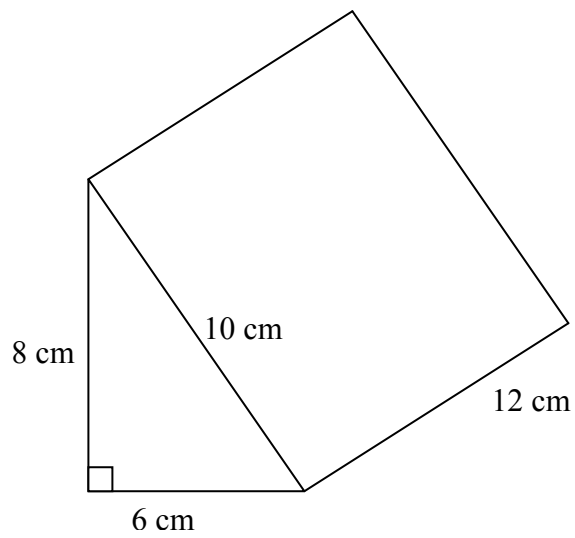
Find the surface area.

Find the volume.

**III.** The edge of a cube measures 5 feet.

Find the surface area of the cube.

Find the volume of the cube.

BONUS?

1. The volume of a rectangular prism is 162 cubic inches. Its length is 9 inches and its height is 6 inches. Find its surface area.

2. The surface area of a rectangular prism is 250 square inches. Its length is 10 inches and its width is 5 inches. Find its volume.

Problem Solving
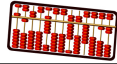
Directions: Use the formulas for surface area and volume to help you solve the word problems. Be sure your answers are written in correct units.

Phil and Dwayne Fill and Drain

1. Phil is filling a pool with a hose from a water tanker. The hose fills the pool at a constant rate of 12 cubic feet per minute. If the pool is in the shape of a rectangular prism, and its length is 40 feet, its width is 20 feet, and its depth is 9 feet, how many hours will it take to fill the pool if it was empty to start?

2. Dwayne is draining a different pool. When he opens the plug, water will drain from the pool at a rate of 5 gallons per minute. If the pool is in the shape of a rectangular prism, and its length is 22 feet, its width is 13 feet, and its depth is 6 feet, how many hours will it take to empty the pool if it was full to start? (1 gallon ≈ 0.13 cubic feet)

3. A pool used for competitive swimming is in the shape of a rectangular prism and is 50 meters long, 25 meters wide, and 2.2 meters deep. One cubic meter equals 1,000 liters. How many liters of water are in this pool if it is full?

What I Know

Directions: Use what you know about surface area and volume to complete the following problems.

1. Draw a perspective drawing of a rectangular prism. Label its length 9 inches, its width 5 inches, and its height 10 inches. Do not worry about actual measurements of each side, but try to estimate relative size.

2. Find the surface area.

3. Find the volume.