TOPIC 3

Decimals and Volume

Lesson 3.1a/b
Length, Width, and Depth
Deepening Understanding of Volume
6.G.2
6.NS.3

Lesson 3.2a/b
Which Warehouse?
Volume Composition and Decomposition
6.G.2
6.NS.3

Lesson 3.3a/b/c
Breaking the Fourth Wall
Surface Area of Rectangular Prisms and Pyramids
6.G.4
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Lesson 3.4a/b
Dividend in the House
Dividing with Volume and Surface Area
6.NS.2
6.NS.3

TOPIC 3

LESSON 3.1a

Length, Width, and Depth

6.G.2
6.NS.3

Objective: Deepening Understadning of Volume

Warm-Up

Determine the least common multiple of the numbers in each pair.

1. 2, 10

Sample worked out

	1	2	3	4	5	6	7	8	9	10
2:	2×1= **2**	2×2= **4**	**9**	**12**	**10**	**12**	**14**	**16**	**18**	**20**
10:	10×1= **10**	2×10= 20	**30**							

LCM of 2 and 10 is **10**

2. 3, 8

3. 6, 14

4. 10, 15

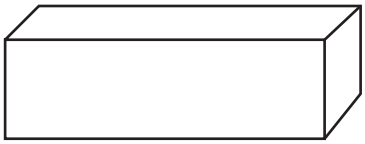
GETTING STARTED

Common Figures

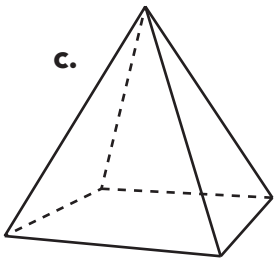
Use the shapes you see below. Sort the figures into two or more groups. Name each category and be prepared to share your reasoning.

a.

b.



c.



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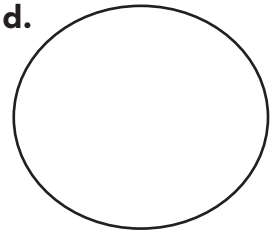
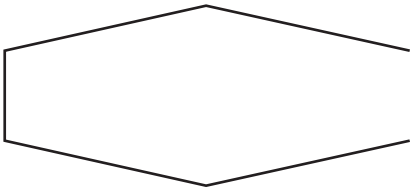


e.



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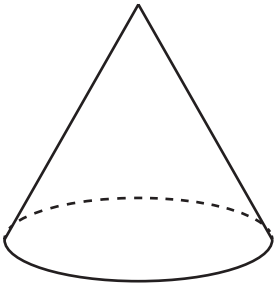

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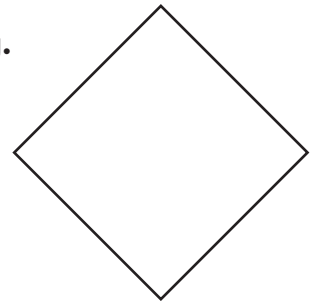
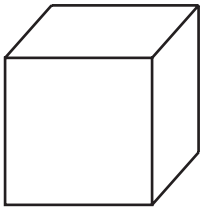


h.



1. Make a table and sort the figures into one of these three categories and explain your reasoning.

Polygon	Polyhedron	Neither

EXPLORE 1

Name that Figure

It is important to speak a common language when studying mathematics.

A word you may have used in the past may actually have a more precise definition when dealing with mathematics. For example, the word point has many meanings outside of math. However, the mathematical definition of **point** is a location in space. A mathematical point has no size or shape, but it is often represented by using a dot and is named by a capital letter.

A **line segment** is a portion of a line that includes two points and all the points between those two points. Knowing these definitions will help you learn the meanings of other geometric words.

Recall, a **polygon** is a closed figure formed by three or more line segments.

A **geometric solid** is a bounded three-dimensional geometric figure.

A **polyhedron** is a three-dimensional solid figure that is made up of polygons.

A **face** is one of the polygons that makes up a polyhedron.

An **edge** is the intersection of two faces of a three-dimensional figure. The point where multiple edges meet is known as a **vertex** of a three-dimensional figure.

Let's revisit the different figures you sorted.

Three **polyhedra** are shown.

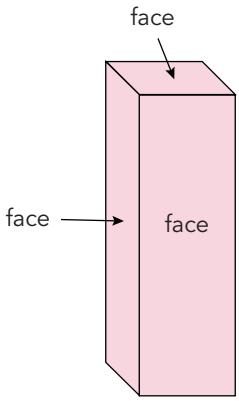


Figure A

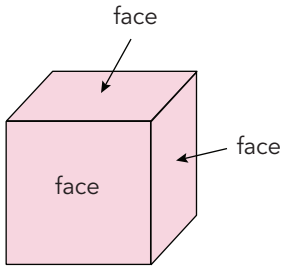


Figure B

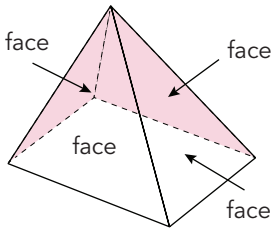


Figure C

Figure A is a right rectangular prism. A **right rectangular prism** is a polyhedron with three pairs of congruent and parallel rectangular faces.

Figure B is an example of a cube, which is a special kind of right rectangular prism. A **cube** is a polyhedron that has congruent squares as faces.

Figure C is an example of a rectangular pyramid. A **pyramid** is a polyhedron with one base and the same number of triangular faces as there are sides of the base.

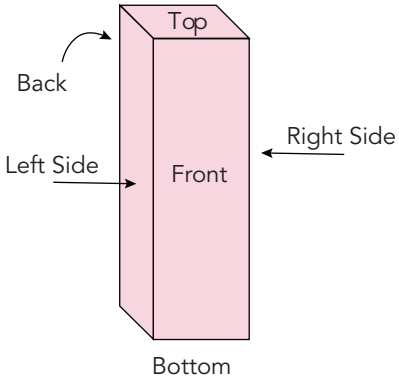
2. Describe the different faces of each polyhedron.

Figure A:

Figure B:

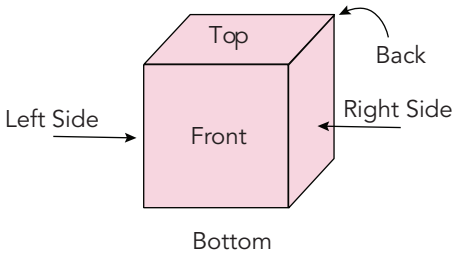
Figure C:

3. Study the right rectangular prism **Figure A**. Identify the **three (3) pairs** of congruent parallel faces.



4. Study the cube.

a. Describe the locations of the cube faces you can see and the locations of the faces you cannot see.

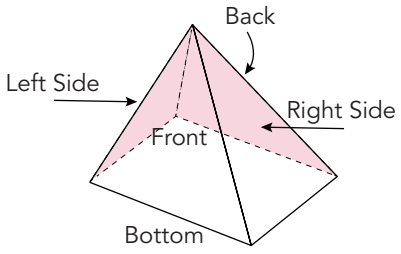


b. What do you know about the length, width, and height of the cube?

c. Describe how the cube is also an example of a right rectangular prism.

5. Compare the numbers of faces, edges, and vertices of the cube and the other right rectangular prism. Write what you notice.

6. Study the rectangular pyramid. How do the faces of the rectangular pyramid differ from the faces of the rectangular prisms?



7. List examples in the real-world objects that are shaped like right rectangular prisms or pyramids.

EXPLORE 2

Volume of Rectangular Prisms

Volume is the amount of space occupied by an object. The volume of an object is measured in cubic units.

The volume of a cube is calculated by multiplying the length times the width times the height.

$$\text{Volume of a cube} = l \times w \times h$$

1. Use the given formula and calculate the volume of each **cube** with the given side length.

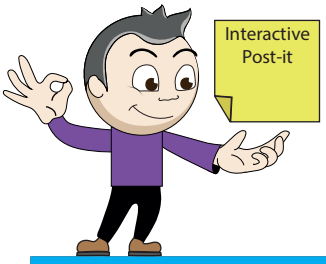
a. $\frac{9}{10}$ centimeter

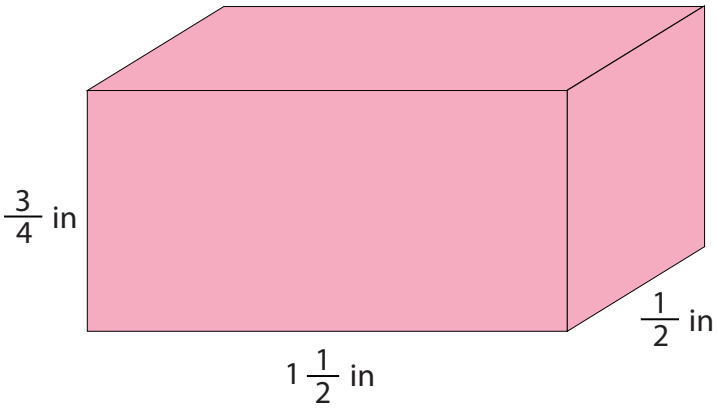
b. $1\frac{1}{3}$ centimeters

2. Suppose a cube has a volume of 27 cubic meters. What are the dimensions of the cube?

To determine the **Volume of a Rectangular Prism**, you can also pack the prism with cubes. You may have done this in elementary school.

Consider the rectangular prism shown. What do you notice about the side lengths? Can you determine its volume by packing it with cubes?





WORKED EXAMPLE

To determine the volume of the right rectangular prism with dimensions $1\frac{1}{2} \times \frac{1}{2} \times \frac{3}{4}$.

Volume of rectangular prism = length × weight × height

V= $1\frac{1}{2} \times \frac{1}{2} \times \frac{3}{4}$	Substitute the values into each variable
V= $\frac{3}{2} \times \frac{1}{2} \times \frac{3}{4}$	Convert the mixed number into an improper fraction
V= $\frac{3}{4} \times \frac{3}{4}$	Multiply one set of fraction, before the other
V= $\frac{9}{16}$ cubic inches	Final solution

Name: _____ Date: _____ Class: _____

Homework HW

LESSON 3.1a

Length, Width, and Depth

Objective Deepening Understading of Volume

To find the dimensions of such prisms may require finding a cube root for a cube or dividing fractions for non-cubic rectangular prisms. Complete Table 1 for these solids with fractional dimensions.

Table 1: Rectangular Prism Sides and Volumes

Height	Length	Width	Volume
$\frac{1}{4}$ ft	$\frac{2}{3}$ ft	$\frac{3}{5}$ ft	1. _____ ft^3
0.1 m	2. _____ m	0.01 m	0.0005 m^3
$\frac{4}{3}$ in.	$\frac{3}{4}$ in.	1 in.	3. _____ in^3
1.1 km	4. _____ km	0.9 km	9.9 km^3

Use the data in Table 1 to complete Table 2 with >, <, or =.

Table 2: Rectangular Prism Volumes

Height	Length	Width	Volume
$h < 1$	$l < 1$	$w < 1$	5. V ◯ 1
$h > 1$	$l > 1$	$w > 1$	6. V ◯ 1
h	$\frac{1}{h}$	$w = 1$	7. V ◯ 1