Name: _____ Date: _____

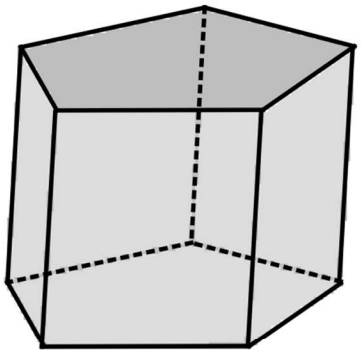
TYPES OF SOLIDS
N-GEN MATH® 6

We live in a three-dimensional world (3D) and need to be able to think about three-dimensional **solids**. In today's lesson, we will learn about a variety of solids and their characteristics. We start with the **prism**.

WHAT IS A PRISM?

A **prism** is any solid with two identical **parallel faces** that are **polygons** and whose other faces are all **parallelograms**. The identical faces are known as the **bases** of the solid.

***Exercise* #1:** The following figure shows a prism. Answer the following questions based on this image.



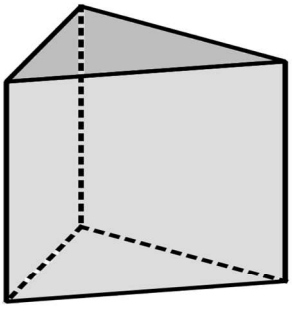
(a) A **face** is a polygon that encloses the solid. We don't use the word **side** because it could be confused with the side of a polygon. How many **faces** does this solid have?

(b) Every prism has two identical faces known as its **bases**. What kind of polygon are the two **bases**? Why?

(c) All other faces of a prism besides the bases are known as the **lateral** faces and must be **parallelograms.** How many **lateral** faces does this prism have?

(d) If another prism had **bases** that were **octagons**, how many **total faces** would the prism have? Explain your thinking.

***Exercise* #2:** A prism is shown below.



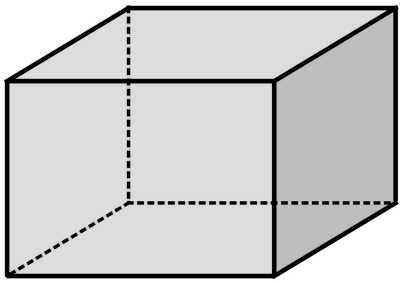
(a) What type of shape is its base?

(b) How many faces does this prism have?

(c) This prism is known as a **right prism**. What type of **lateral faces** (non-base) does it have?

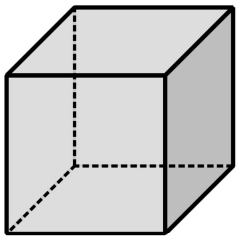
***Exercise* #3:** Perhaps the most common prism of all is the **right rectangular prism** (a.k.a. a box).

(a) How many faces does a right rectangular prism have?



(b) What type of polygons are all faces of this prism, both base and lateral?

(c) A special type of **right rectangular prism** is one where **all the faces are squares**. What type of special shape is this?

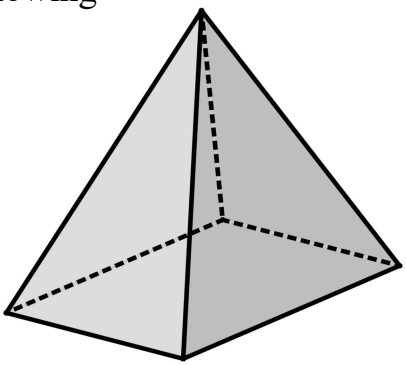


We will investigate **right rectangular prisms** in many future lessons. They are extremely important. But, we also want to look at **pyramids**.

WHAT IS A PYRAMID?

A **pyramid** is any solid with a **single polygon base** that could be any type of polygon and all other **faces** (lateral) are **triangles** that meet at a common point known as the **vertex**.

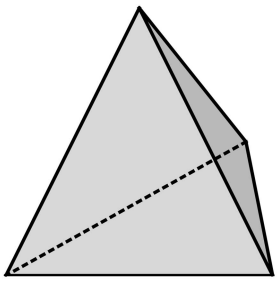
***Exercise* #4:** For the pyramid shown to the right, answer the following questions.



(a) What type of figure appears to serve as its base?

(b) How many triangular lateral faces does it have?

***Exercise* #5:** A pyramid can be made solely out of identical triangles. This shape is known as a **tetrahedron**. What type of triangle do you think each of its identical **faces** is?



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TYPES OF SOLIDS
N-GEN MATH® 6 HOMEWORK

FLUENCY

1. All but two of the faces of a prism must be which of the following shapes?

   (1) triangles (3) parallelograms

   (2) trapezoids (4) squares _____

2. The faces of a prism or pyramid that are not the bases are known as

   (1) lateral faces (2) edge faces

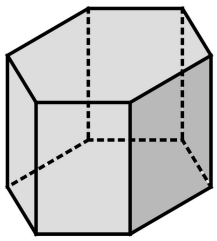
   (3) surrounding faces (4) vertical faces _____

3. How many total faces would a prism have if its bases were identical hexagons?

   (1) 12 (3) 6

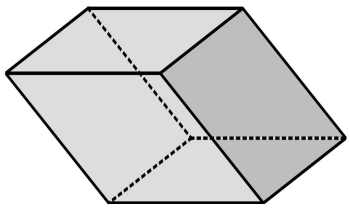
   (2) 8 (4) 4 _____

4. For each solid, state whether it is a **prism** or a **pyramid** and state the number of faces it has.

(a) 

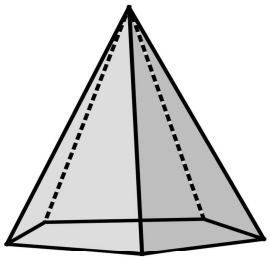
Type:_____

Faces: _____

(b) 

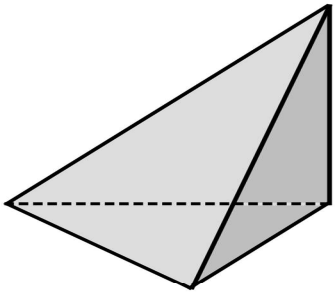
Type:_____

Faces: _____

(c) 

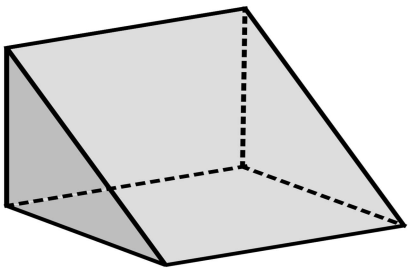
Type:_____

Faces: _____

(d) 

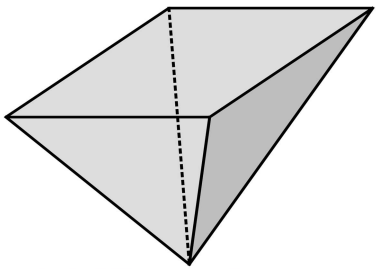
Type:_____

Faces: _____

(e) 

Type:_____

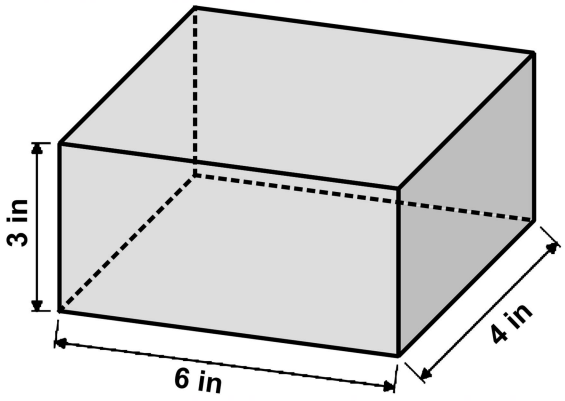
Faces: _____

(f) 

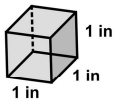
Type:_____

Faces: _____

5. A **right rectangular prism** (a.k.a. **a box**) is shown below that is 6 inches long, 3 inches high, and 4 inches deep (in this case the width).



(a) Shown below is a cube that has edges with lengths of 1 inch each. If you began to fill the box with a **single layer** of these cubes, how many would fit? Explain.

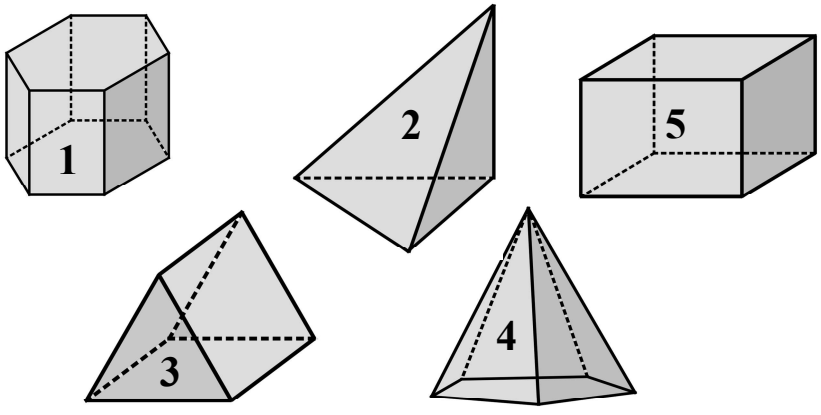


(b) Based on (a), how many **unit cubes** would fit into the entire box? Explain.

(c) If you cut out six rectangles that covered each of the faces, what would be the combined area of all the faces? This will take quite a few calculations, but you can find them all.

6. The **line segments** that enclose the faces are known as **edges** and the **points** where edges meet are known as **vertices**. Let ***v*** be the number of vertices a figure has, let ***e*** be the number of edges it has and let ***f*** be the number of faces it has.

For each figure fill out the following table and see if you can spot a pattern.



Shape	*v*	*f*	*v* + *f*	*e*
1				
2				
3				
4				
5				

Compare the last two columns in the table. What is the pattern? Can you write it as an equation?