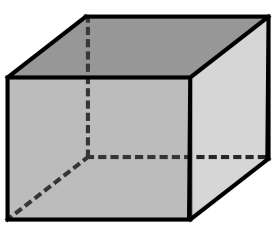
Name: _____ Date: _____

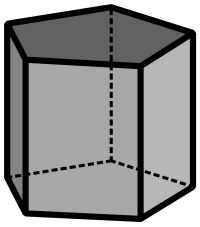
SOLIDS AND THEIR CROSS SECTIONS
COMMON CORE GEOMETRY

We live in a three-dimensional world and thus deal with solids or three-dimensional shapes all the time. There are literally an infinite number of these shapes. In today's lesson, we will simply introduce the most common ones that we will be using to help model geometric problems.

***Exercise* #1:** A **prism** is a solid that has two congruent faces (the bases) with all other faces being parallelograms. Two examples of **right prisms** are shown below.

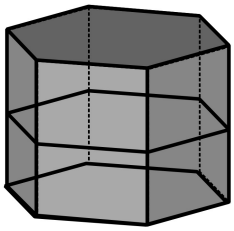
(a) Why do you believe these are called **right** prisms?

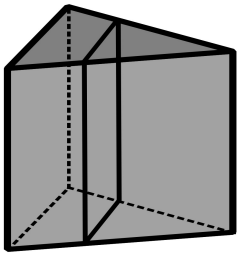




(b) If you **sliced** a prism with a **horizontal plane**, what would be true about the **cross-section** that you would see?

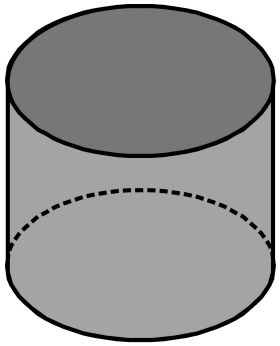
(c) If you sliced a prism with a **vertical-plane**, what would be true about the cross section that you would see?





***Exercise* #2:** A **cylinder** is a shape very similar to a prism, except the base face is enclosed by a curve, rather than a polygon. Typically, this curve is a circle. The most common is a **right circular cylinder**.

(a) For a **right circular cylinder** (the most common and shown), what are the two measurements that control its size.

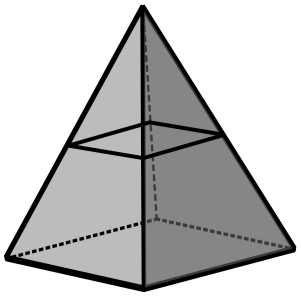


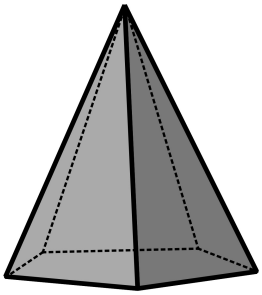
(b) What two-dimensional shape wraps around the surface **laterally?** What are its dimensions?

(c) What two-dimensional figure, when rotated about one of its sides, would produce a right circular cylinder? Draw this figure on the cylinder above to illustrate.

***Exercise* #3:** A **pyramid** is a solid where one face, known as the base, is a polygon and all other faces are triangles that meet at a common vertex.

(a) Explain why the horizontal cross sections of these pyramids would not be congruent to the base shapes? Is there a special relationship?

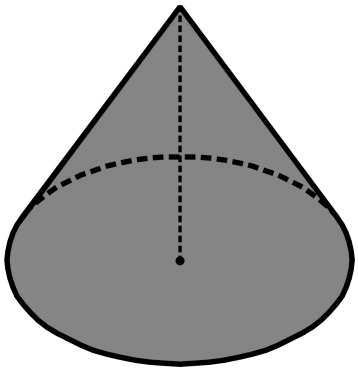




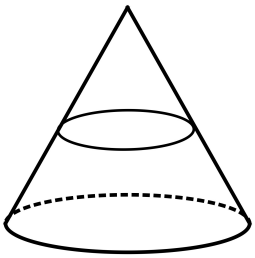
(b) Under what conditions would the triangular sides of the pyramid all have to be congruent to each other?

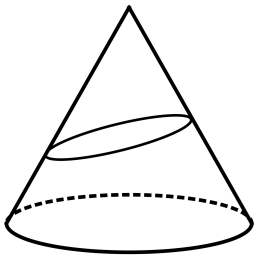
***Exercise* #4:** A **cone** is a shape very similar to a pyramid except that its base is enclosed by a curve instead of a polygon. Like the cylinder, this curve is most often a circle. The most common cone is a right circular cone.

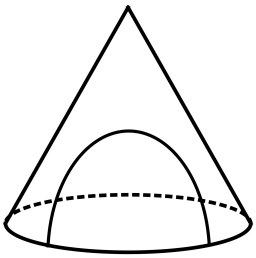
(a) Similar to a cylinder, a cone can be produced by rotating a common two-dimensional shape around one of its sides. What shape? Draw it on the cylinder.

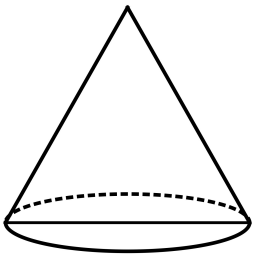


(b) Describe the cross-sections of the cone shown below.







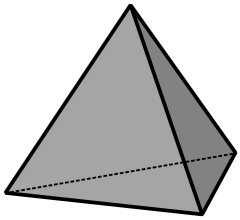


Name: _____ Date: _____

SOLIDS AND THEIR CROSS SECTIONS
COMMON CORE GEOMETRY HOMEWORK

PROBLEM SOLVING

1. The following figure has faces that are all triangles. It would be classified as which of the following solids?



(1) a prism (3) a cone

(2) a pyramid (4) a cylinder

_____

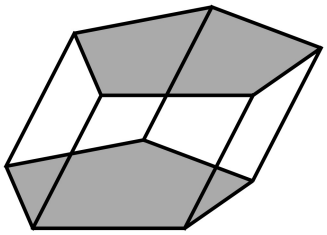
2. If a rectangle is revolved around one of its sides, the solid produced is a

(1) sphere (3) cylinder

(2) prism (4) cone

_____

3. Which of the following **must** be true about the faces of the following prism?



(1) there are a total of five faces

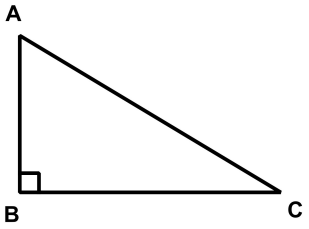
(2) all non-pentagon faces must be rectangles

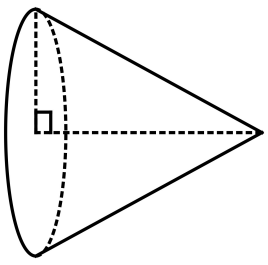
(3) there are five faces that are parallelograms

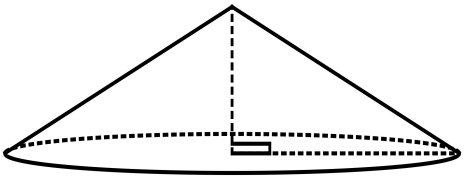
(4) there is only one pair of congruent faces

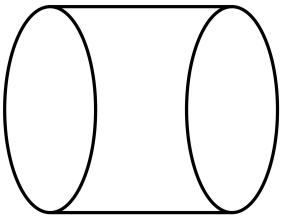
_____

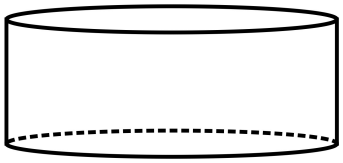
4. If right triangle ABC, shown, was rotated around segment $\overline{BC}$, then the solid produced would look like



(1) 

(3) 

(2) 

(4) 

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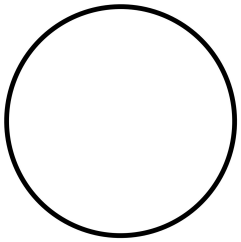
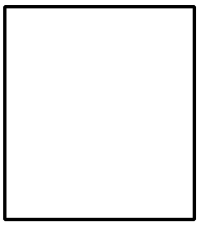
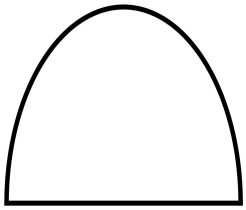
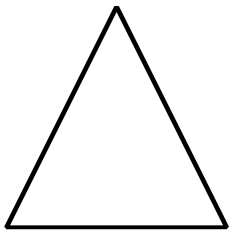
5. Which of the following shapes would *not* be a cross-section of a cone?

(1) 

(3) 

(2) 

(4) 

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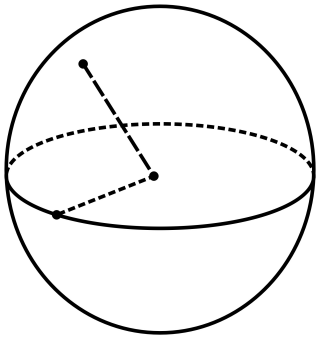
REASONING

One of the main solids we have not discussed yet is the **sphere**. A **sphere** is defined as being the **collection of all points equidistant from a fixed point**.



6. The definition of a sphere is the three-dimensional version of the two-dimensional shape the _____.

7. Every cross-section of a sphere will be what shape? _____

8. A sphere can be created by rotating a circle. About what line or line segment must the circle be rotated in order to produce a sphere?

9. If the circle below was rotated about the line shown, what type of solid would be produced? Hint - it's not a sphere this time.