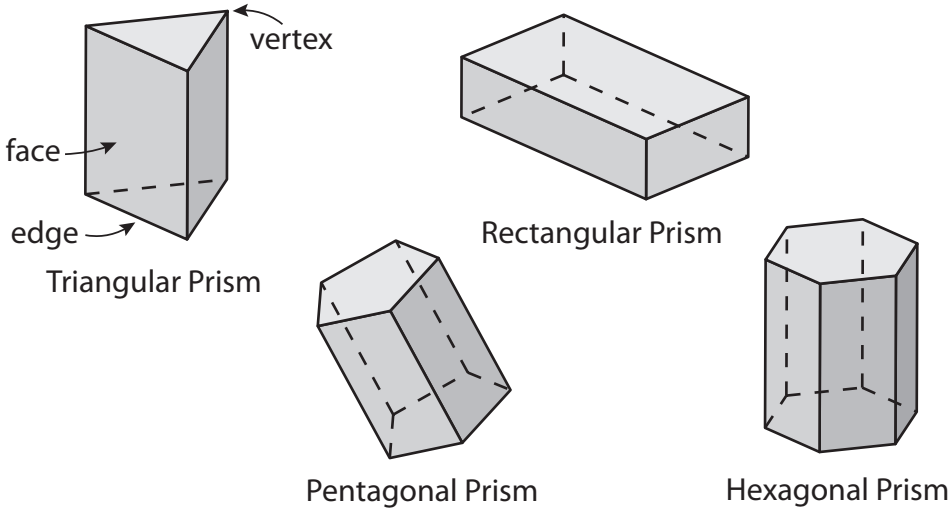
11.4 Start Thinking

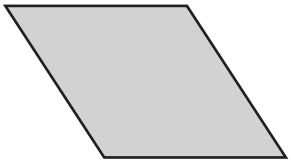
Each of the prisms shown below is a polyhedron. A polyhedron is a solid that is bounded by polygons, called faces. The faces intersect to form segments called edges. When three or more edges intersect, they form a point called a vertex. Count the number of faces F, vertices V, and edges E, for each of the prisms. Then determine the value of the expression $F + V - E$ for each prism. How do the values of F, V, and E relate?



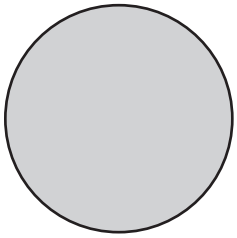
11.4 Warm Up

Determine if the figure is a polygon. If not, explain why.

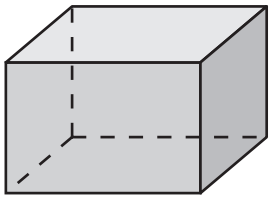
1. rhombus



2. circle



3. rectangular solid



11.4 Cumulative Review Warm Up

Find the distance between the two points.

1. $(-3, 1), (5, 1)$

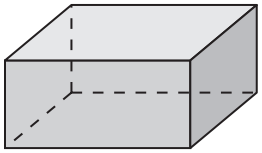
2. $(7, -8), (9, -3)$

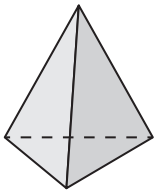
3. $\left(\frac{1}{2}, \frac{2}{3}\right), \left(\frac{5}{2}, -\frac{3}{2}\right)$

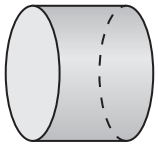
Name _____ Date _____

11.4 Practice A

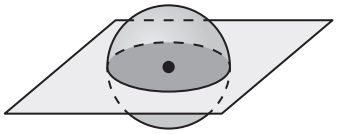
In Exercises 1–3, tell whether the solid is a polyhedron. If it is, name the polyhedron.

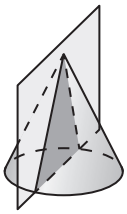
1. 

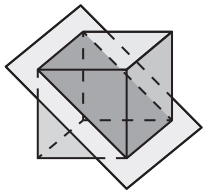
2. 

3. 

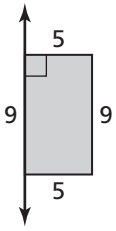
In Exercises 4–6, describe the cross section formed by the intersection of the plane and the solid.

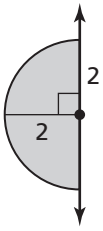
4. 

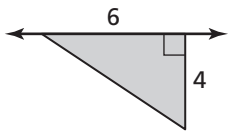
5. 

6. 

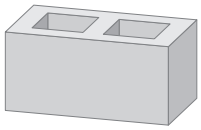
In Exercises 7–9, sketch the solid produced by rotating the figure around the given axis. Then identify and describe the solid.

7. 

8. 

9. 

10. Is the block shown a polyhedron? Explain your reasoning.



11. Sketch a cube. Is it possible for a cross section of a cube to be a square? Explain your reasoning. If so, describe or sketch two different ways in which the plane could intersect the solid.

12. Consider the rectangular prism in Exercise 1. The length of the prism is 4 inches, the width is 2 inches, and the height is 2 inches.

a. What is the perimeter of the cross section?

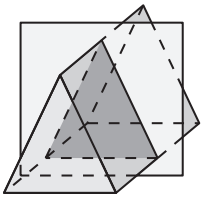
b. What is the area of the cross section?

Name_____ Date _____

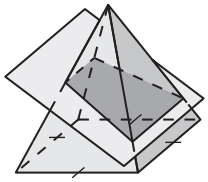
11.4 Practice B

In Exercises 1–3, describe the cross section formed by the intersection of the plane and the solid.

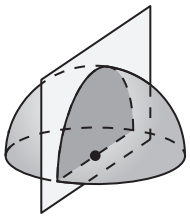
1.



2.

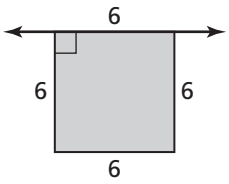


3.

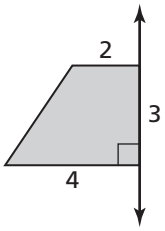


In Exercises 4–6, sketch the solid produced by rotating the figure around the given axis. Then identify and describe the solid.

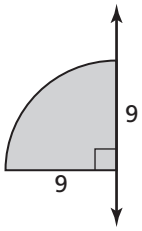
4.



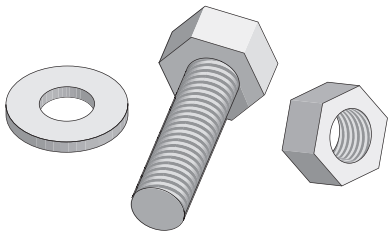
5.



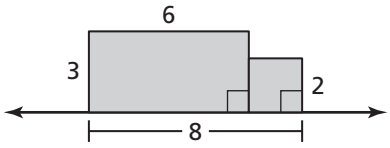
6.



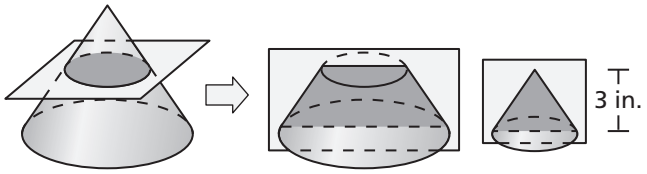
7. Which of the parts shown are polyhedrons? Explain your reasoning.



8. Sketch the composite solid produced by rotating the composite figure around the given axis. Then identify and describe the composite solid.



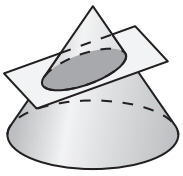
9. A cone with a height of 6 inches and radius of 4 inches is sliced in half by a horizontal plane, creating a circular cross section with a radius of 2 inches. Each piece is then sliced in half by a vertical plane, as shown.



a. Describe the shape formed by each cross section.

b. What are the perimeters and areas of the cross sections?

c. Suppose the horizontal plane is tilted, slicing the original cone as shown at the right. Is the cross section a circle? If it is not, describe how it is different from a circle and sketch the cross section.



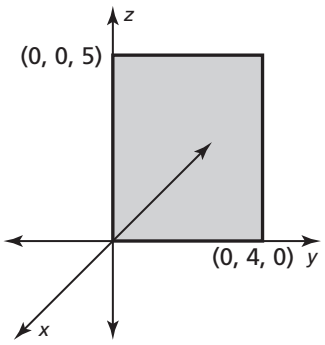
Name _____ Date _____

11.4 Enrichment and Extension

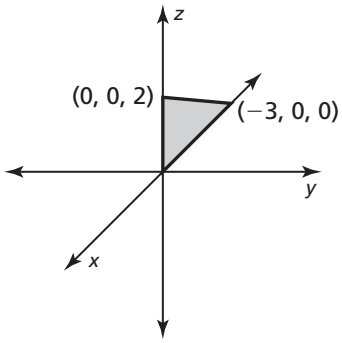
Three-Dimensional Figures

Draw the solid revolution formed by the shape rotated around the *z*-axis.

1.

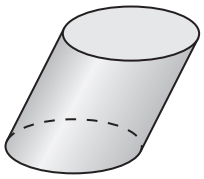


2.



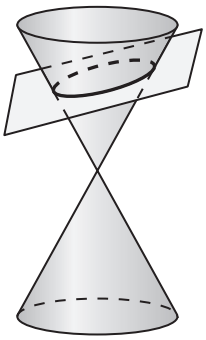
3. If you find the cross section of a solid of revolution in a plane that is perpendicular to the axis of rotation, you will always get the same shape. What is it?

4. The figure to the right is an example of an oblique cylinder. Is this a solid of revolution? Explain your reasoning.

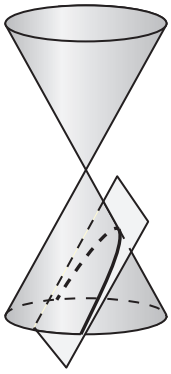


A *double cone* is formed by two cones that share the same vertex. Sketch each cross section formed by a double cone and plane.

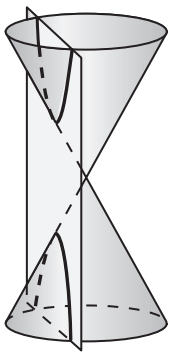
5.



6.



7.



Name____ Date__________

11.4 Puzzle Time

Why Was Everyone So Tired On April 1st?

A	B	C	D	E	F
G	H	I	J		

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

Complete the sentence.

A. A(n) _______ is a solid that is bounded by polygons called faces.

B. The intersection of a plane and a solid is called a _______ section.

C. An edge of a polyhedron is a line segment formed by the _______ of two faces.

D. A(n) _______ of a polyhedron is a point where three or more edges meet.

E. There are six Platonic solids. True or false?

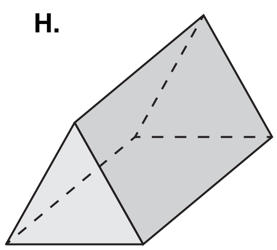
Identify what solid is produced by rotating the indicated figure around the given axis.

F. a 4-by-4 square on a vertical axis

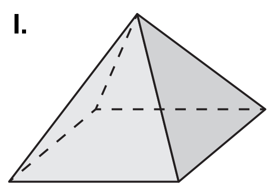
G. a 3-by-3 right triangle on a vertical axis

Identify the polyhedron.

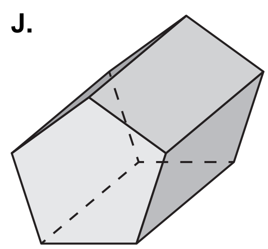
H.



I.



J.



Answer	Word
true	MOST
cylinder	A
Egyptian triangle	BEFORE
polyhedron	BECAUSE
merging	MIDNIGHT
pentagonal prism	DAYS
platonic hut	FOR
vertex	JUST
tritex	OIL
triangular prism	OF

Answer	Word
rectangular pyramid	THIRTY-ONE
hat box	HOME
prism	FOOLS
intersection	HAD
plain	SLEEP
cross	THEY
box	AND
false	FINISHED
cone	MARCH
pyramid	THE