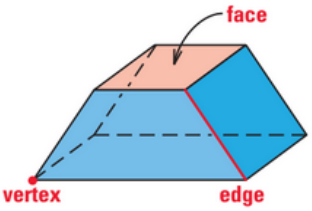
Geometry	Lesson 10.1: Three-Dimensional Figures	Notes

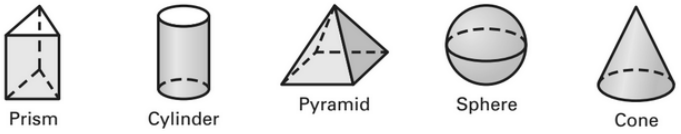
THREE DIMENSIONAL SOLIDS NOTES

- In Geometry, a three-dimensional figure is often referred to as a ***solid***.

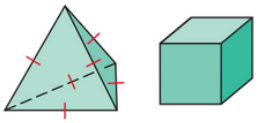


- A *polyhedron* is a solid made of **all** polygons.
  - So, no curved surfaces.
- The polygons form the ***faces*** of the polyhedron.
- The line segment formed by the intersection of two *faces* is called an ***edge***.
- The intersection of three or more *edges* is called a ***vertex*** of the polyhedron.

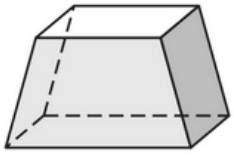
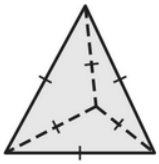
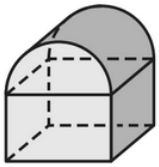
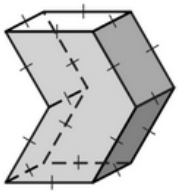
- We will study 5 basic types of solids.
  - The prism and pyramid are both polyhedra.
  - The cylinder, sphere, and cone *are not* polyhedra.



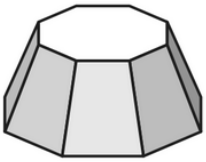
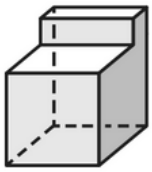
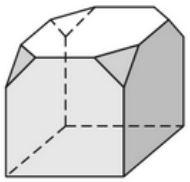
- A ***regular polyhedron*** has the same congruent regular polygon for every single face.



EXAMPLE 1 – Tell whether the solid is a polyhedron. *If so, determine if the polyhedron is regular or nonregular.*

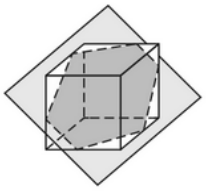
1.	2.	3.	4.
			

EXAMPLE 2 – Decide whether the polyhedron is *convex* or *concave*.

1.	2.	3.
		

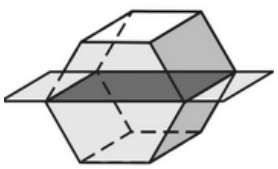
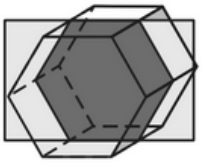
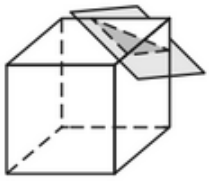
CROSS SECTION NOTES

- The *cross section* is the two-dimensional figure formed when a plane slices through a solid.



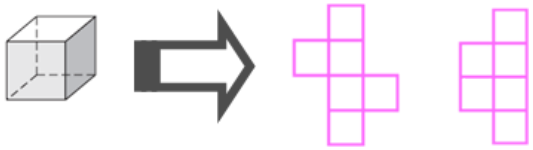
  - ✓ It will typically be identifiable by the region formed by dashed lines or a darkly shaded region.
    - ★ Typically this will be some type of polygon, circle, semi-circle, etc.

EXAMPLE 3 – Describe the cross section.

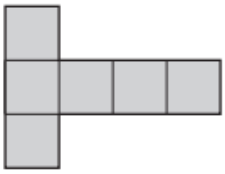
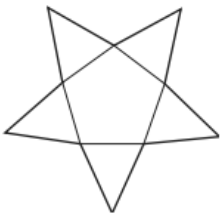
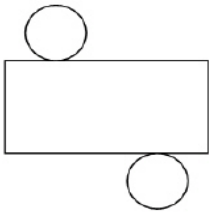
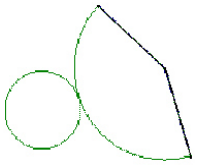
1.	2.	3.
		

SOLIDS AS NETS NOTES

- A ***net*** is a two-dimensional representation of the faces and edges of a three-dimensional solid.
  - If you were to unfold a solid, the net would show what it looks like.
- Most every solid has a *net* to represent them.
  - 🤔 The "edgeless" solids, such as a sphere, do not have a representation.
  - ✓ However, there are only certain ways to draw a *net* for each solid



EXAMPLE 4 – Describe the solid represented by the given net.

1.	2.	3.	4.
			

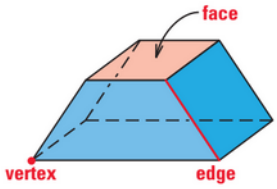
EULER'S THEOREM NOTES

Euler's *(Oil-ers)* Theorem

- The number of *faces* (F), *vertices* (V), and *edges* (E) of a polyhedron are related by

$$F + V = E + 2 \quad or \quad F + V - E = 2$$

  - ✓ *This should really be used to check your work in that you have counted correctly.*



EXAMPLE 5 – Use Euler's Theorem to find the unknown number.

1. Faces:_____ Vertices: 34 Edges: 50	2. Faces: 7 Vertices: _____ Edges: 15	3. Faces: 7 Vertices: 7 Edges: _____

EXAMPLE 6 – Count the number of faces, vertices, and edges of the polyhedron.

1.	2.	3.