Geometry
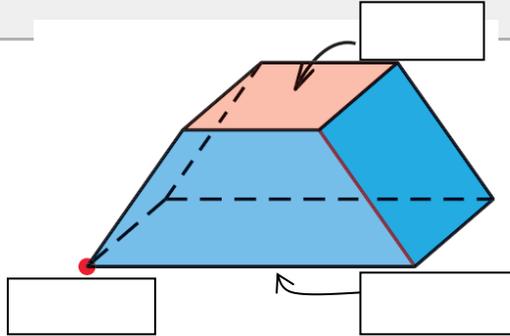
12.1 Explore Solids (12.1, new)

Polyhedron

- Solid with _____ sides
- _____ sides

Parts of Polyhedron
- Face
- Edge
- Vertex

Types of Solids

Prism
- Polyhedron with two _____ surfaces on _____
  planes (the 2 ends (_____) are the same)
- Named by _____

Cylinder
- Solid with congruent _____ bases on parallel planes

Pyramid
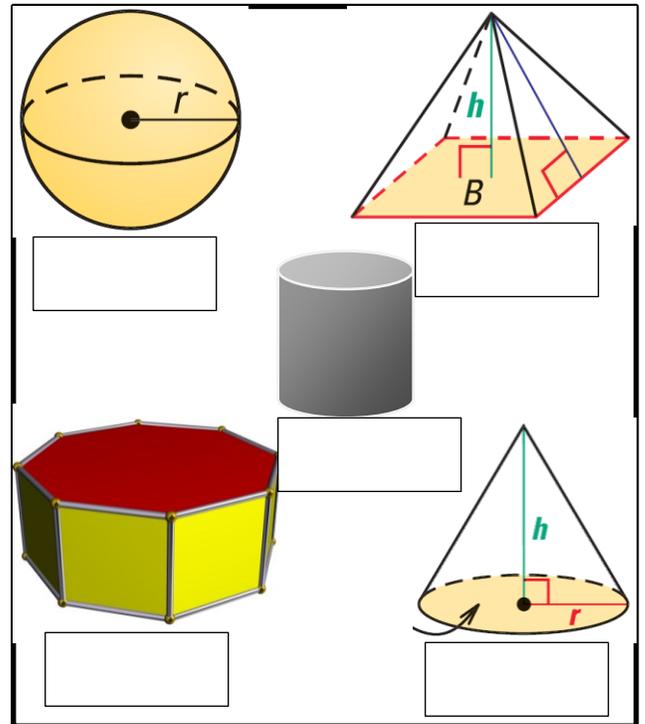- Polyhedron with all but one _____ intersecting in one
  _____

Cone
- Circular _____ with the other surface meeting in a
  _____

Sphere
- All the _____ that are a given _____ from the
  center

Euler's Theorem

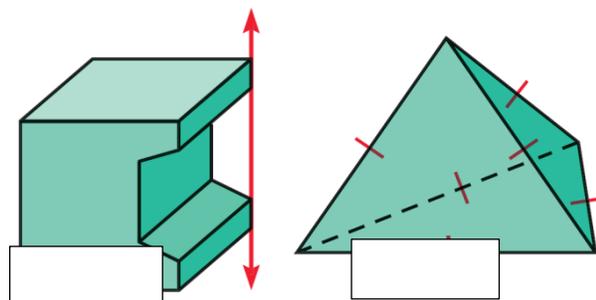**The number of faces (F), vertices (V), and edges (E) of a polyhedron are related by**
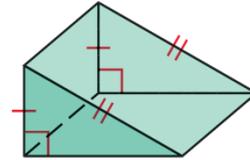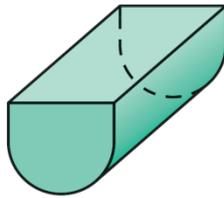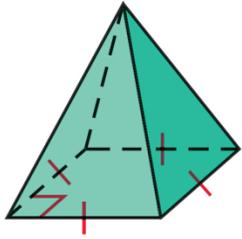$$F + V = E + 2$$

Convex
- Any two points can be connected with _____
  _____

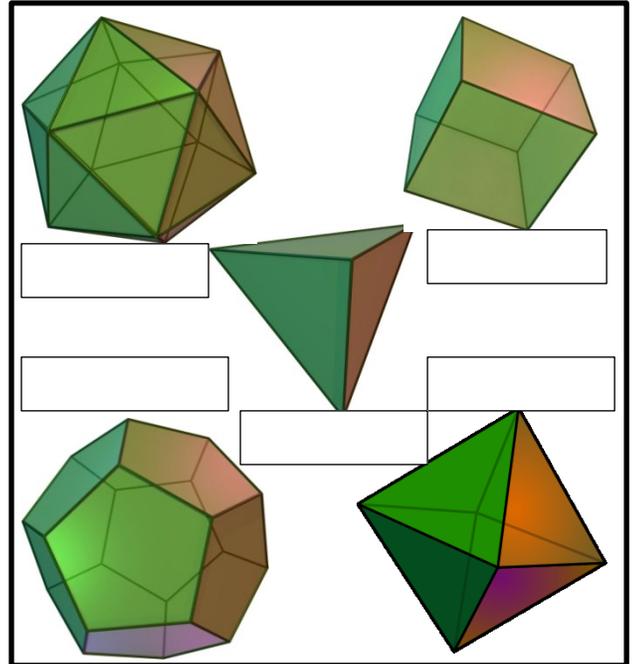Concave
- Not _____
- Has a "**cave**"

Tell whether the solid is a polyhedron. If it is, name the polyhedron and find the number of faces, vertices, and edges and describe as convex or concave.
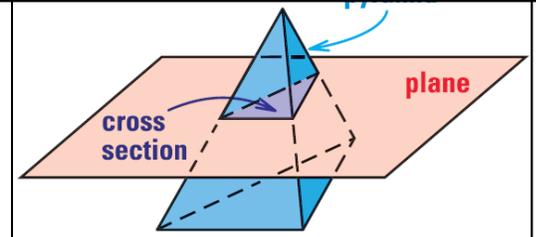
Regular Polyhedron

- Polyhedron with _____ _____ faces
- Only _____ types (**Platonic solids**)
- **Tetrahedron**
  - ____ faces (triangular pyramid)
- **Hexahedron**
  - ____ faces (cube)
- **Octahedron**
  - ____ faces (2 square pyramids put together)
- **Dodecahedron**
  - ____ faces (made with pentagons)
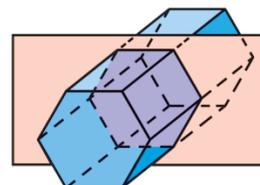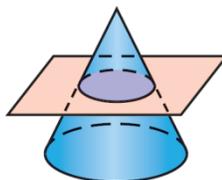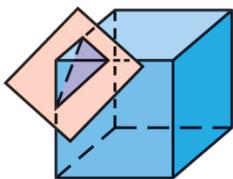- **Icosahedron**
  - ____ faces (made with triangles)

Cross Section

- Imagine slicing a very thin slice of the solid.
- The cross section is the _____ of the thin slice.

Find the number of faces, vertices, and edges of a regular dodecahedron. Check with Euler's Theorem.
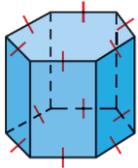
Describe the cross section.
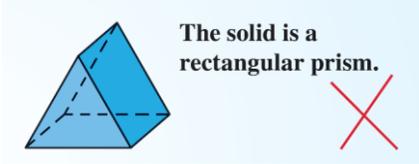
Assignment: Attached worksheet

Assignment:

1. State Euler's Theorem in words.

Determine whether the solid is a polyhedron. If it is, name the polyhedron. *Explain* your reasoning.

2.

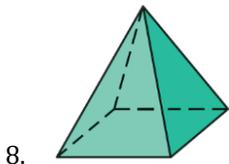3. Describe and correct the error in identifying the solid.

The solid is a rectangular prism.

Sketch the polyhedron.
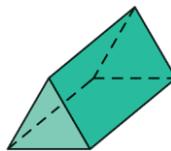
4. Triangular prism

5. Pentagonal pyramid

Use Euler's Theorem to find the value of *n*.

6. Faces: 5
   Vertices: *n*
   Edges: 8

7. Faces: *n*
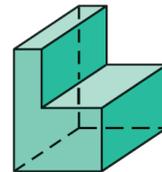   Vertices: 12
   Edges: 30

Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

8.

9.

10.

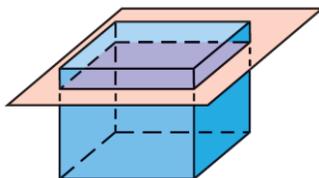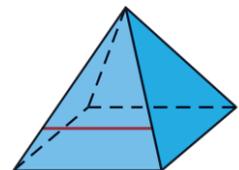**Determine whether the solid puzzle is *convex* or *concave*.**

11.

12.

Draw and describe the cross section formed by the intersection of the plane and the solid.

13.

14. What is the shape of the cross section formed by the plane parallel to the base that intersects the red line drawn on the square pyramid?
   (A) Square
    (B) Triangle
    (C) Kite
    (D) Trapezoid

15. Which two solids have the same number of faces?
    (A) A triangular prism and a rectangular prism
    (B) A triangular pyramid and a rectangular prism
    (C) A triangular prism and a square pyramid
    (D) A triangular pyramid and a square pyramid

16. The solid shown has 32 faces and 90 edges. How many vertices does the solid have? *Explain* your reasoning.
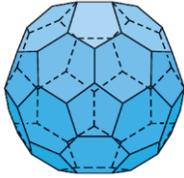
17. The speaker shown at the right has 7 faces. Two faces are pentagons and 5 faces are rectangles.
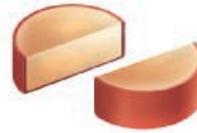   a. Find the number of vertices
    b. Use Euler's Theorem to determine how many edges the speaker has.

Describe the shape of the cross section that is formed by the cut made in the food shown.
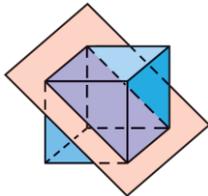
18.

19.

20. The figure at the right shows a plane intersecting a cube through four of its vertices. An edge length of the cube is 6 inches.
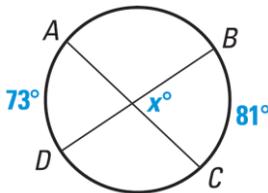   a) Describe the shape formed by the cross section.
    b) What is the perimeter of the cross section?
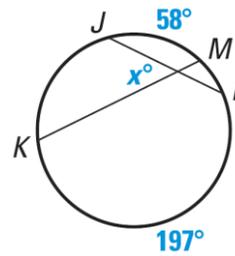   c) What is the area of the cross section?

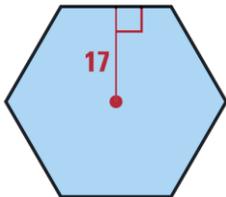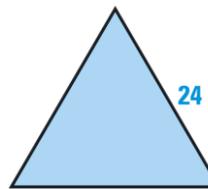**Mixed Review**

Find the value of x.

21.

22.

Use the given radius r or diameter d to find the circumference and area of the circle. Round your answers to two decimal places.

23. $d = 28$ in.

Find the perimeter and area of the regular polygon. Round your answers to two decimal places.

24.

25.