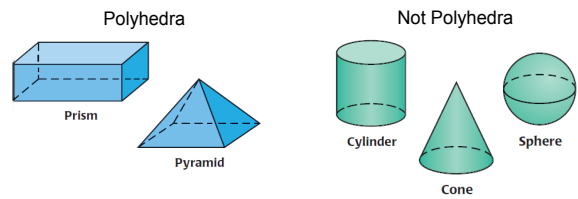


# Solids

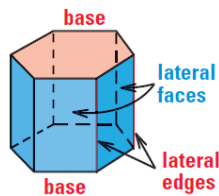
**Polyhedron**—a three-dimensional solid bounded by polygons

- **Face**—one of the polygons that form the polyhedron's surface
- **Edge**—a line segment formed by the intersection of two faces
- **Vertex**—a point where three or more edges meet
- Plural is *polyhedra*, or *polyhedrons*.



**Prism**—a polyhedron with two congruent bases that lie in parallel planes

- **Lateral faces**—the other faces formed by connecting the corresponding vertices of the bases
  - ◆ While the bases can be any polygon, the lateral faces are parallelograms.
- **Lateral edges**—the segments connecting the corresponding vertices



**Right solid**—each lateral edge is perpendicular to the base(s)

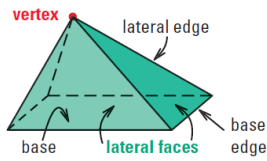
**Oblique solid**—lateral edges are not perpendicular to the base(s)

- **Height**—perpendicular distance between the bases
- **Slant height**—length of the oblique lateral edge



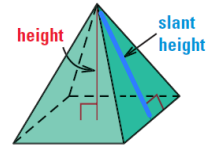
Pyramid—a polyhedron in which the base is a polygon and the lateral faces are triangles with a common vertex

- Lateral edge—intersection of two lateral faces
- Base edge—intersection of the base and a lateral face
- Height—perpendicular distance between the base and the vertex



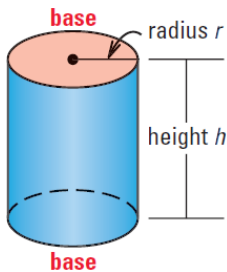
Regular pyramid—a pyramid whose base is a regular polygon

- The lateral faces are congruent isosceles triangles.
- Slant height—the height of a lateral face
  - ◆ A nonregular pyramid does not have a slant height.



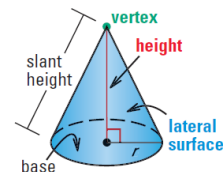
Cylinder—a solid with congruent circular bases that lie in parallel planes

- Lateral area—area of its curved surface



Cone—a solid with a circular base and a vertex that is not in the same plane as the base

- Height—the perpendicular distance between the vertex and the plane that contains the base
  - ◆ In a right cone, the height connects the vertex and the center of the base.
- Slant height—distance between the vertex and a point on the base edge



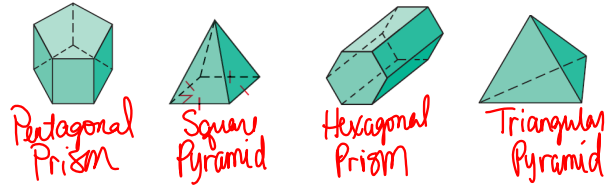
Sphere—the set of all points in 3-dimensional space equidistant from a given point, called the center of the sphere

- Radius of a sphere—a segment from the center to a point on the sphere
- Chord of a sphere—a segment whose endpoints are on the sphere
- Diameter of a sphere—a chord that contains the center
- Hemisphere—half of a sphere

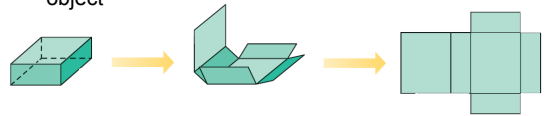


### Classifying Polyhedra

To name a prism or pyramid, use the shape of its base.



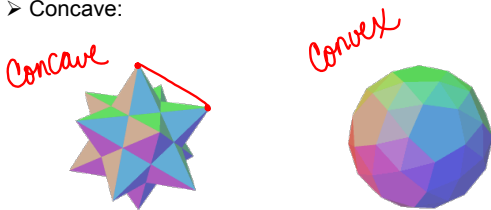
Net—a 2-dimensional representation of a 3-dimensional object



Regular polyhedron—a polyhedron whose faces are all congruent regular polygons

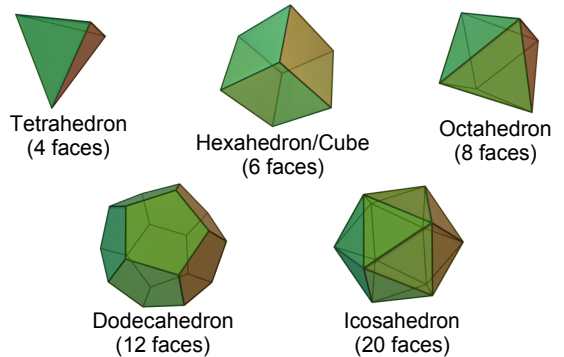
#### Convex vs Concave

- Convex:
- Concave:



Platonic solids—the five regular convex polyhedra

- named for the Greek mathematician and philosopher Plato



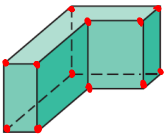
**Euler's Theorem**

The number of faces ( $F$ ), vertices ( $V$ ), and edges ( $E$ ) of a polyhedron are related by the formula

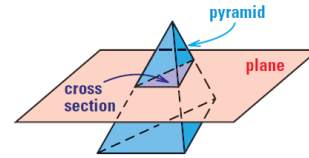
$$F + V = E + 2$$

$$8 + 12 = 18 + 2$$

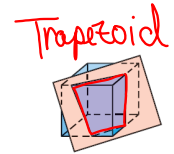
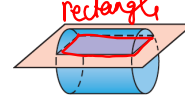
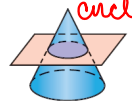
Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.



Cross section—the intersection of a plane and a solid



Describe the cross section.



**Assignment**

**Solids Wkst**