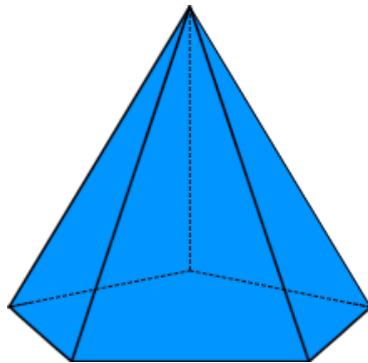
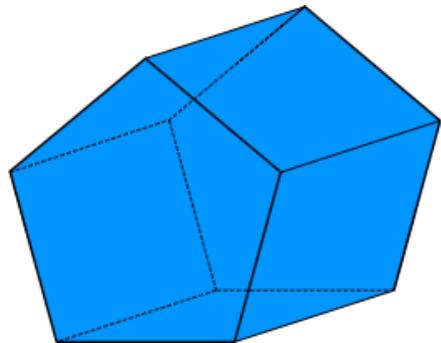
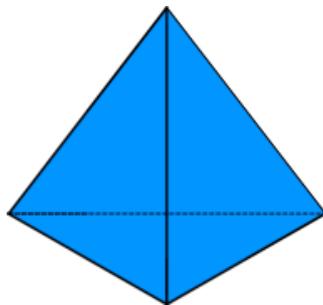
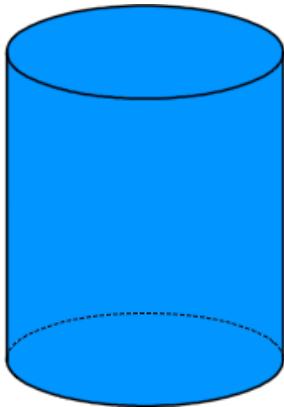
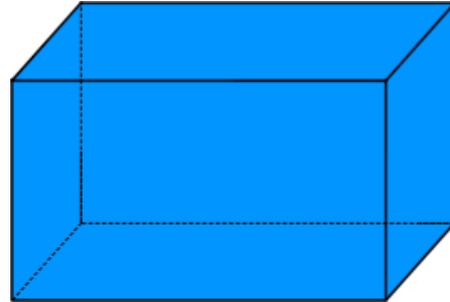
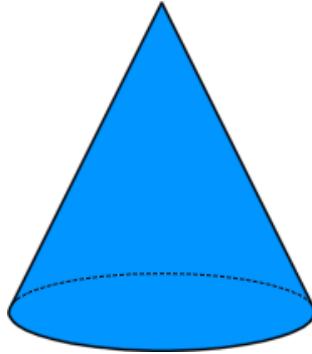
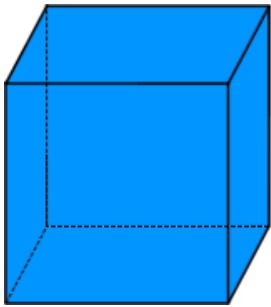


14.3 3-d Shapes/Solids

What do we call these?



Basic Terminology

Face-->Polygonal region (forms dihedral angle).

Edge-->Line segment that is common to a pair of faces.

Dihedral Angle-->The angle formed by the union of polygonal regions in space that share an edge.

Vertex-->A point of intersection between edges.

Polyhedron-->(plural is polyhedra) The union of faces, any two of which have at most one edge in common, such that a connected finite region in space is enclosed without holes (i.e. such that it will contain liquid without spilling).

Convex-->A polyhedron is convex if every line segment formed by connecting two points inside the polyhedron is wholly contained inside that polyhedron OR is on a face of the polyhedron.

Types of Polyhedra

Prism-->Has two opposite, parallel faces (called *bases*) that are identical polygons.

Right Prism-->A prism whose *lateral faces* (those faces that are neither of the bases) are rectangles; the lateral faces meet up with the bases at a right angle.

Pyramid-->Has polygon for a base and a point NOT in the plane of the base (called the apex) that is connected with line segments to each vertex of the polygonal base.

Right Pyramid-->A pyramid whose apex lies perpendicularly over the center of the base.

Regular Polyhedron-->All faces are identical regular polygons and all dihedral angles are the same.

Platonic Solids-->The ONLY five regular, convex polyhedra.

Semiregular Polyhedron-->Has several different regular polygonal faces, but it has the same arrangement of polygons at each vertex.

Other 3d Solids

Cylinder-->Has two opposite, parallel, identical, simple, closed shapes as bases and line segments that connect corresponding points from base to base (it's like a prism, except that the bases are not polygons).

Right Cylinder-->A cylinder whose "lateral" surface meets the base at right angles.

Oblique Cylinder-->A cylinder that is not a right cylinder, i.e. the "lateral" surface meets the bases at acute or obtuse angles.

Cone-->Has a simple, closed curve that creates the base and a point NOT in the plane of the base that is connected with line segments to each vertex of the base (it's like a pyramid, except that the base is not polygonal).

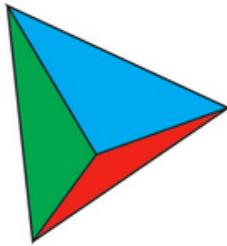
Right Cone-->A cone whose apex lies perpendicularly over the centroid of the base.

Sphere-->The set of all points in 3d space that are equidistant from a fixed point (called the *center*).

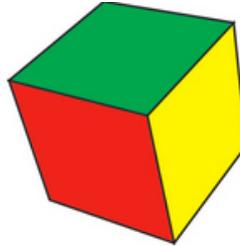
Platonic Solids

www.youtube.com/watch?v=voUVDAgFtho

www.youtube.com/watch?v=BsaOPSNMcCM



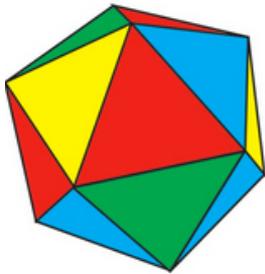
TETREHEDRON



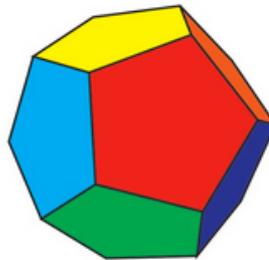
HEXAHEDRON



OCTOHEDRON



ICOSAHEDRON



DODECAHEDRON

Euler's Formula

Is there some formulaic relationship between the number of faces, edges and vertices for any convex polyhedron?