Section 2.4 Three Dimensional Shapes

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Polyhedron (polyhedra)

- A three dimensional figure composed of polygonal regions (called **faces**) joined at the sides (**edges**). The point where edges meet is called a **vertex**.
Polyhedra are often categorized by their shapes

- **Prisms** – composed of two bases (which are congruent polygons), joined by parallelograms (called lateral faces).
- **Pyramids** – composed of 1 polygonal base and lateral faces that are triangles that meet at a single point called the apex.
Prisms

- Triangular Prism
- Rectangular Prism
- Cube
- Pentagonal Prism
- Hexagonal Prism
Other info about prisms

• Prisms are often named for the shape of the base
  – See previous slide

• IF the lateral faces are rectangles, then we have a right prism. IF the lateral faces are not rectangles, then we have an oblique prism.

• The **height** of a prism is the perpendicular distance between the bases.

• See page 76
Pyramid

- face
- edge
- vertex
More info about pyramids

• Pyramids are often named by the shape of the base.

• The **height** of a pyramid is the perpendicular distance from the apex to the base.

• The **slant height** of a pyramid is the distance from the apex along a lateral face of the pyramid, perpendicular to the opposite edge of the face. (see next slide)
More facts about pyramids

• IF the apex is over the center of the base, then the pyramid is a **right pyramid**, if not, then the pyramid is **oblique**.

• IF the base of the pyramid is a regular polygon, then the pyramid is said to be a **regular pyramid**.
Heights of pyramids

Right Regular Square pyramid

12
8
Height of an oblique pyramid

Note: the height is outside the pyramid
Regular polyhedra (Platonic solids)

- Tetrahedron
- Hexahedron
- Octahedron
- Dodecahedron
- Icosahedron
Fun fact!

• There are only 5 possible regular polyhedra.
• Can you explain why?
• We’ll explore this in a minute.
• We will also investigate something called Euler’s Formula.
What about curved shapes?

- **Cylinders** have 2 congruent simple closed curves for **bases** connect with either a parallelogram or a rectangle as a **lateral surface.** (Special type of prism)

- **Cones** have 1 simple closed curve as a base and every point around the base is joined to a single point **(apex)** not in the same plane as the base. (Special type of pyramid)

- **Sphere** is the set of all points in space that are equidistant from a given point called the **center.**
Right and oblique cylinders and cones

Note: heights for cylinders and cones are similar to the heights for prisms and pyramids.
Spheres

- Spheres have a radius and diameter, similar to a circle
Folding nets

- This is what a polyhedron looks like if you flatten it out.