# Mr. Baroody's Web Page

Surface Areas of Prisms - Lesson 12-1

Here's the warmup!

A room is 32 feet by 20 feet, with a 10-foot-high ceiling. How many square feet of surface must be painted to cover the walls, the ceiling, and the floor?

Today we'll begin to discuss Surface Area. In order to do this, we must start by discussing *polyhedra*:

A *polyhedron* is a solid formed by flat surfaces enclosed by polygons. The flat polygonal surfaces are called its *faces*. A segment where two faces intersect is called an *edge*. A point of intersection of three or more edges is called a *vertex*.
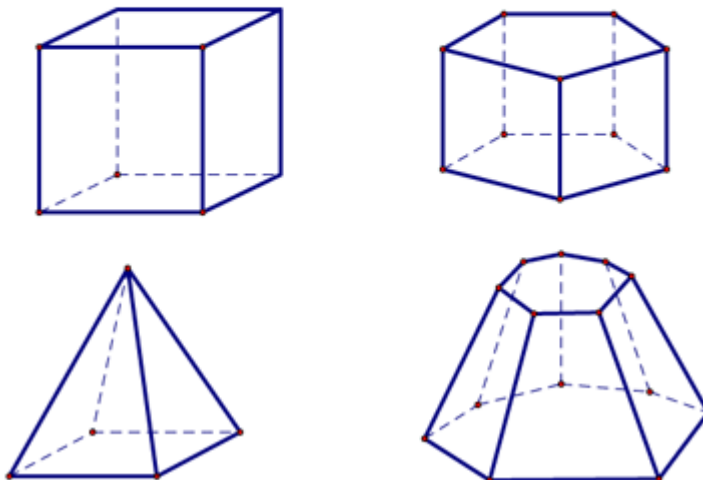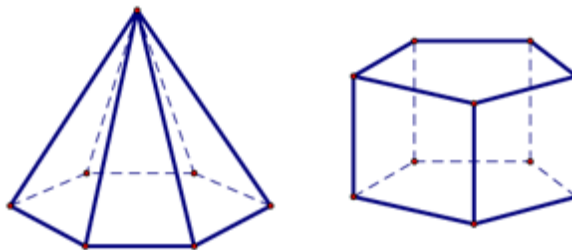
We can then noted that polyhedra are classified by the number of faces. For instance, a 4-faced polyhedrdon is called a *tetrahedron*:
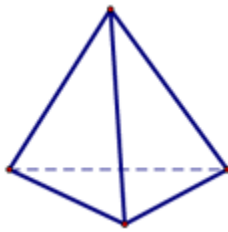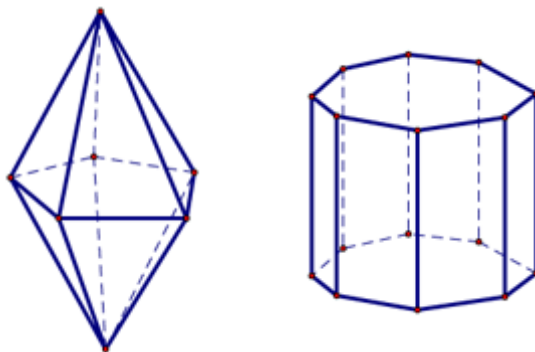
A 6-faced polyhedron is called a *hexahedron*:
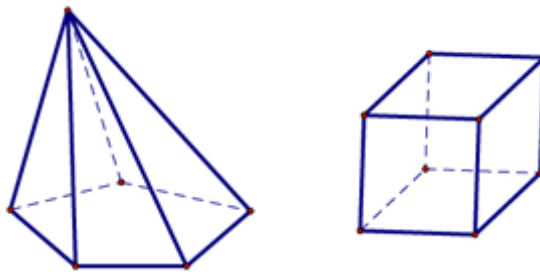
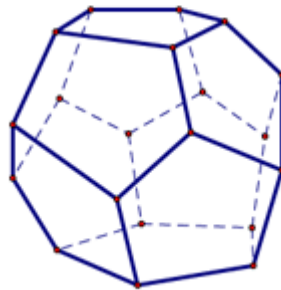A 7-faced polyhedron is called a *heptahedron*:

And a 10-faced polyhedron is called a *decahedron*:

We can then define a *regular polyhedron* and show an example regular dodecahedron:

A *regular polyhedron* is a polyhedron in which each face is enclosed by a regular polygon and each face is congruent.

At this point, we will define a *prism* and learn what the *lateral surface area* and the *total surface area* of these polyhedra are:

A *prism* is a polyhedron with two faces (called bases) that are congruent and parallel polygons and whose other faces (called the lateral faces) are parallelograms formed by segments connecting the corresponding vertices of the bases.

e.g.,
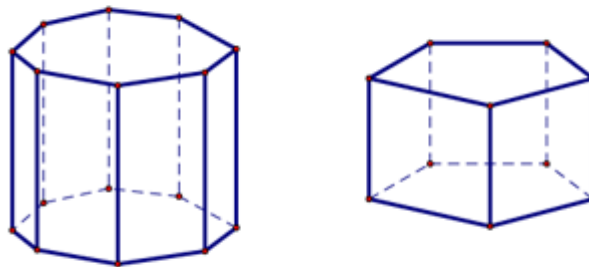
The *lateral surface area* of a prism is the sum of the areas of the lateral faces.

The *total surface area* of a prism is the sum of the prism's lateral area and the areas of the two bases.

Finally, we can define a *right prism*, *oblique prism*, and *altitude of a prism*:

When all the lateral faces of a prism are rectangles (when the lateral edges are perpendicular to the bases), it is a *right prism*.

A prism that is not a right prism is called an *oblique prism*.

An *altitude of a prism* is a perpendicular segment from one base to the plane of the other and the *height of the prism* is the length of an altitude.

Right Prism

Oblique Prism

Altitude
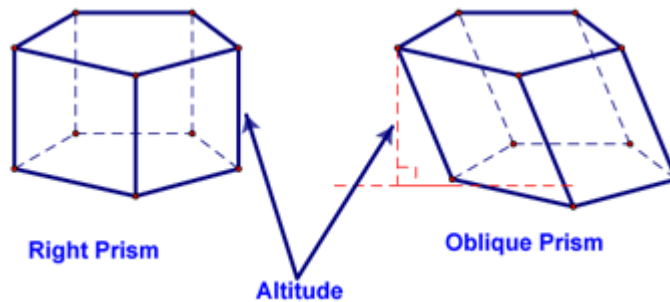
At this point, we can look at a couple of examples. First find the total surface area of a right rectangular prism:

Find the total surface area of the rectangular prism.

2 cm

4 cm

5 cm
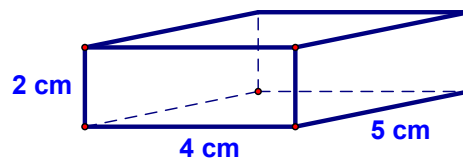
And lastly, try this:

Find the total surface area of the regular pentagonal right prism.