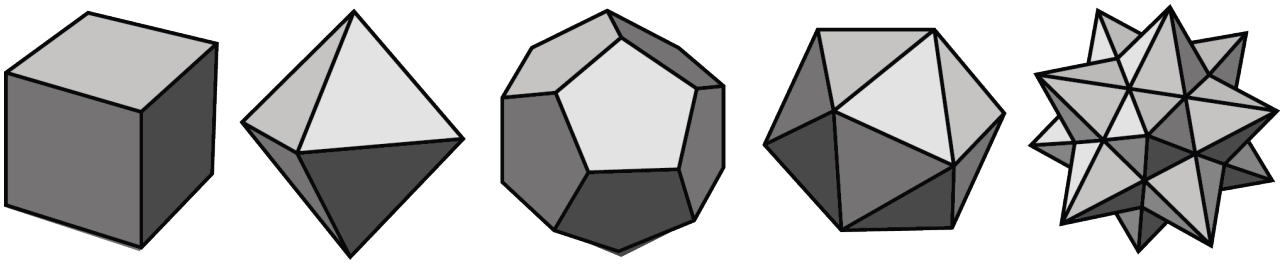
Unit 1, Lesson 13

Polyhedra

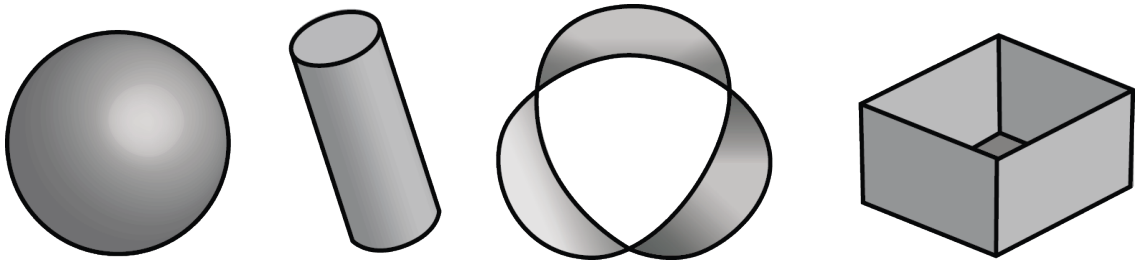
Let's investigate polyhedra.

13.1 What Are Polyhedra?



These five drawings represent **polyhedra**.

The next four drawings do *not* represent polyhedra.

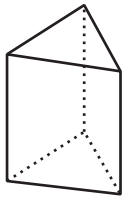


1. Your teacher will give you some figures or objects. Sort them into polyhedra and non-polyhedra.
2. What characteristics helped you distinguish the polyhedra from the other figures?

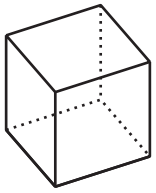
13.2 Prisms and Pyramids

1. Here are some polyhedra called **prisms**.

A



B



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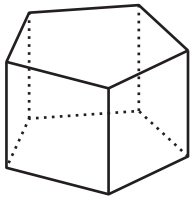

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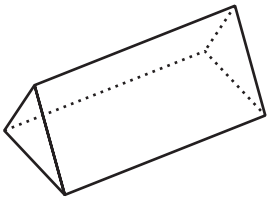

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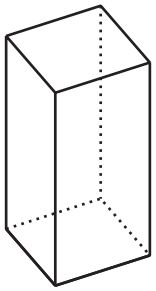
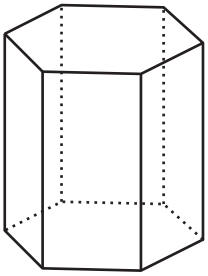
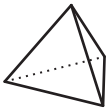


F

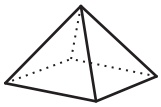


Here are some polyhedra called **pyramids**.

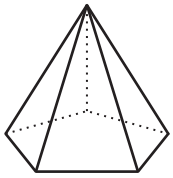
P



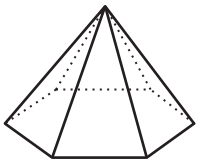
Q



R



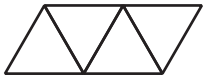
S



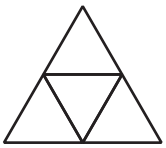
a. Look at the prisms. What are their characteristics?

b. Look at the pyramids. What are their characteristics?

2. Which of these **nets** can be folded into Pyramid P? Select all that apply.



Net 1



Net 2

Net 3

3. Your teacher will give your group some polygons and assign a polyhedron.

   a. Decide which polygons are needed to compose your assigned polyhedron. List the polygons and how many of each are needed.

   b. Arrange the cut-outs into a net that, if taped and folded, can be assembled into the polyhedron. Sketch the net. If possible, show a different net for the same polyhedron.

Are you ready for more?

What is the smallest number of faces a polyhedron can possibly have? Explain how you know.

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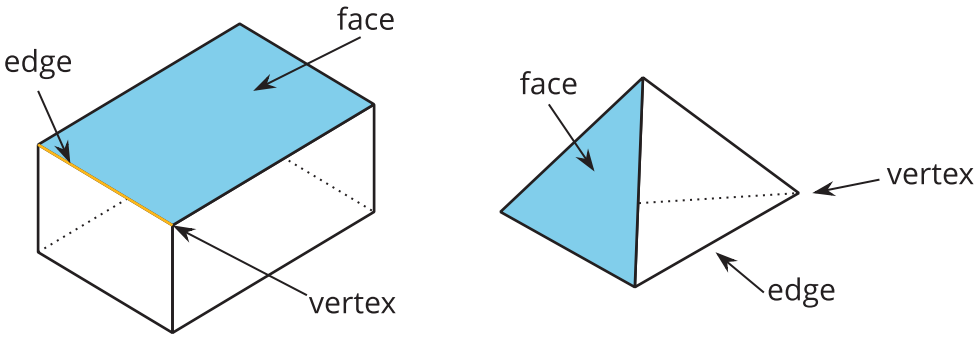
13.3 Assembling Polyhedra

1. Your teacher will give you the net of a polyhedron. Cut out the net, and fold it along the edges to assemble a polyhedron. Tape or glue the flaps so that there are no unjoined edges.
2. How many vertices, edges, and faces are in your polyhedron?

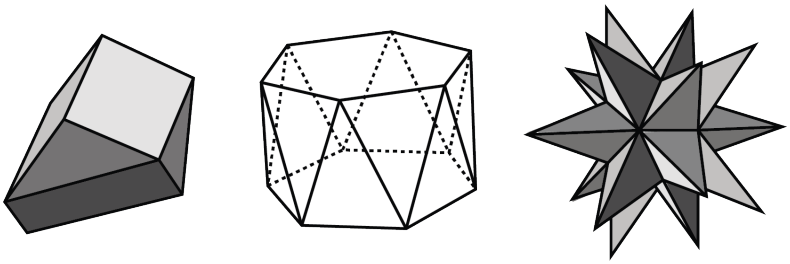
Lesson 13 Summary

A **polyhedron** is a three-dimensional figure composed of faces. Each face is a polygon and meets only one other face along a complete edge. The ends of the edges meet at points that are called vertices.



A polyhedron always encloses a three-dimensional region.

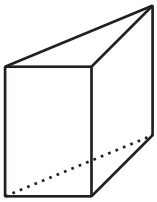
The plural of polyhedron is polyhedra. Here are some drawings of polyhedra:



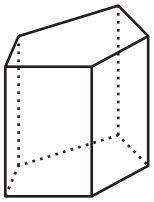
A **prism** is a type of polyhedron with two identical faces that are parallel to each other and that are called **bases**. The bases are connected by a set of rectangles (or sometimes parallelograms that aren't rectangles).

A prism is named for the shape of its bases. For example, if the base is a pentagon, then it is called a "pentagonal prism."

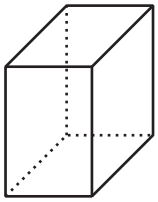
triangular prism



pentagonal prism



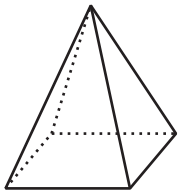
rectangular prism



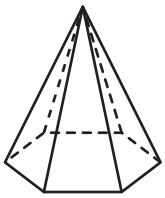
A **pyramid** is a type of polyhedron that has one special face called the base. All of the other faces are triangles that all meet at a single vertex.

A pyramid is named for the shape of its base. For example, if the base is a pentagon, then it is called a "pentagonal pyramid."

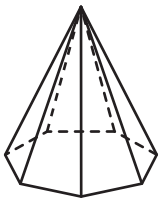
rectangular pyramid



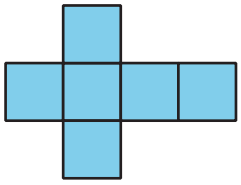
hexagonal pyramid



heptagonal pyramid



A **net** is a two-dimensional representation of a polyhedron. It is composed of polygons that form the faces of a polyhedron.



A cube has 6 square faces, so its net is composed of six squares, as shown here.

A net can be cut out and folded to make a model of the polyhedron.

In a cube, every face shares its edges with 4 other squares. In a net of a cube, not all edges of the squares are joined with another edge. When the net is folded, each of these open edges will join another edge.