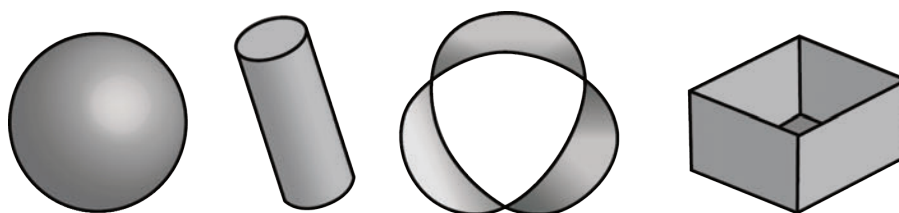# Unit 1, Lesson 13: Polyhedra

Let's investigate polyhedra.

13.1: What are Polyhedra?

Here are pictures that represent **polyhedra**:

Here are pictures that do *not* represent polyhedra:

1. Your teacher will give you some figures or objects. Sort them into polyhedra and non-polyhedra.

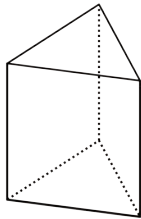2. What features helped you distinguish the polyhedra from the other figures?
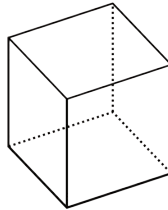
13.2: Prisms and Pyramids
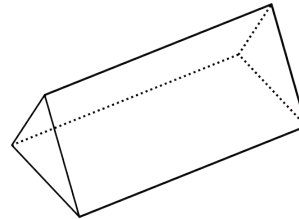
1. Here are some polyhedra called **prisms**.

A   B   C
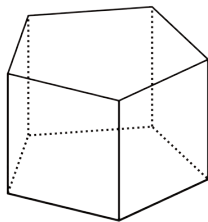
D   E   F

Here are some polyhedra called **pyramids**.

P   Q   R   S

a. Look at the prisms. What are their characteristics or features?
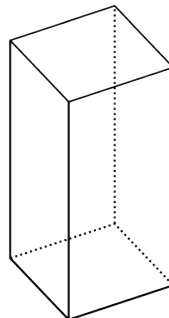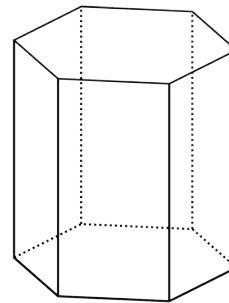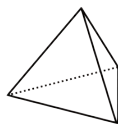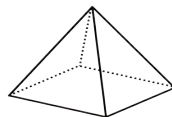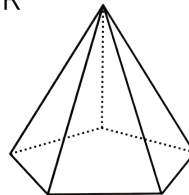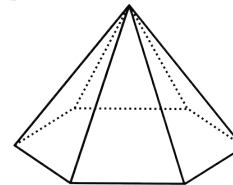
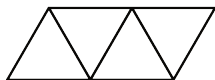b. Look at the pyramids. What are their characteristics or features?
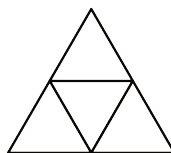
NAME   DATE   PERIOD
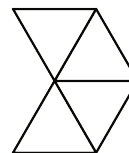
2. Which of the following **nets** can be folded into Pyramid P? Select all that apply.

net 1   net 2   net 3

3. Your teacher will give your group a set of 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, find more than one way to arrange the polygons (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.

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.

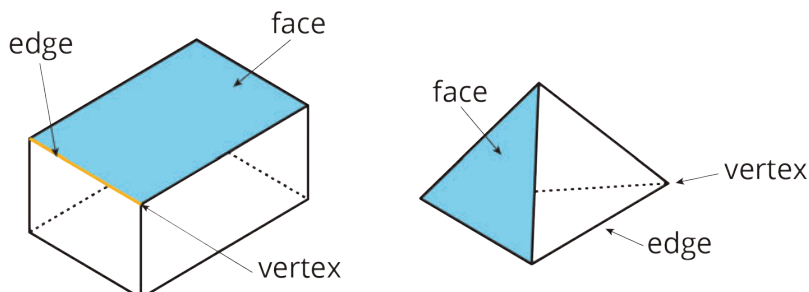2. How many **vertices**, **edges**, and **faces** are in your polyhedron?

Lesson 13 Summary

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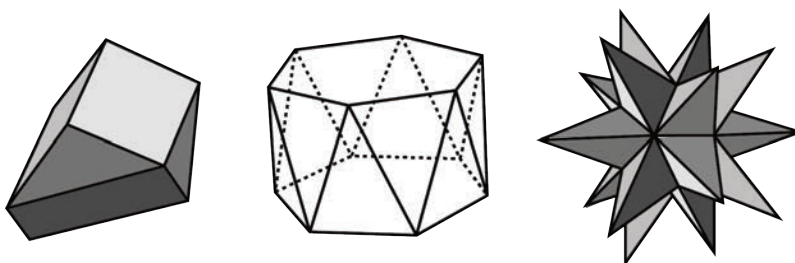
polygon and meets only one other face along a complete **edge**. The ends of the edges meet at points that are called **vertices**.


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).

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   pentagonal   rectangular
prism   prism   prism
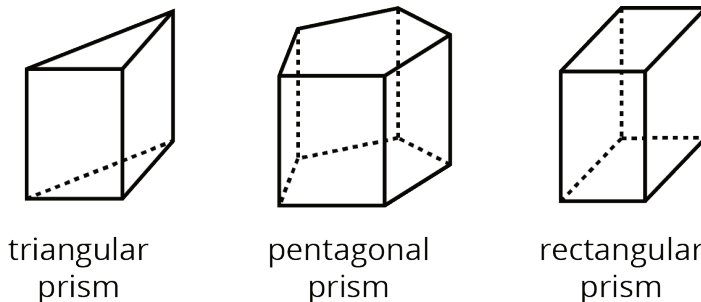
NAME   DATE   PERIOD

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 | decagonal pyramid |
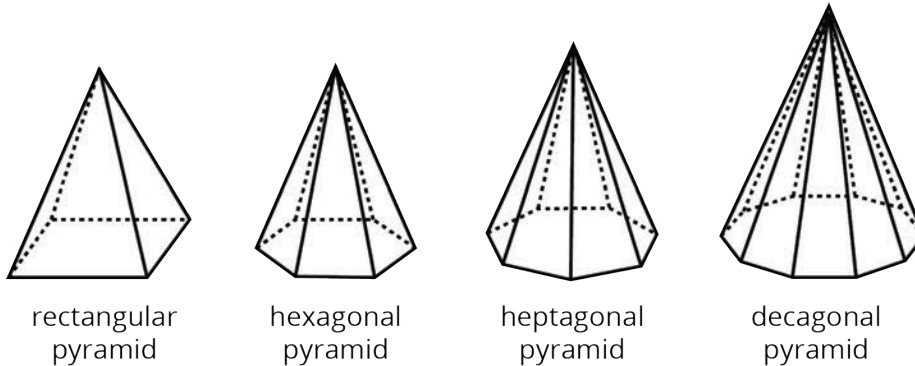
A **net** is a two-dimensional representation of a polyhedron. It is composed of polygons that form the faces of a polyhedron.
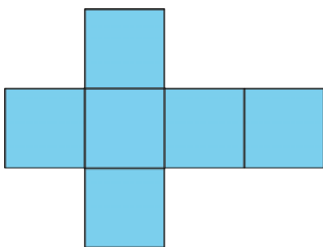
A cube has 6 square faces, so its net is composed of six squares, as shown here.

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, however, each of these open edges will join another edge.

It takes practice to visualize the final polyhedron by just looking at a net.

Lesson 13 Glossary Terms

- face

- net

- polyhedron (polyhedra)

- prism

- pyramid

- vertex (vertices)

- edge

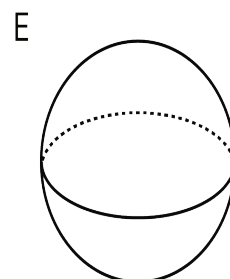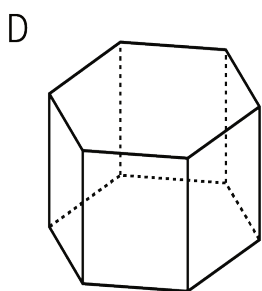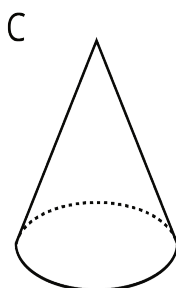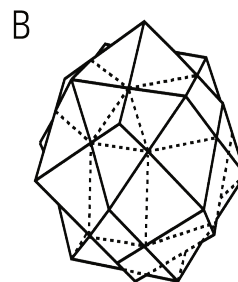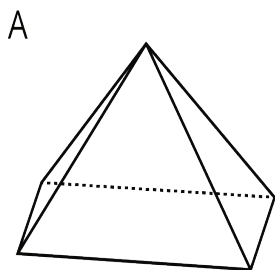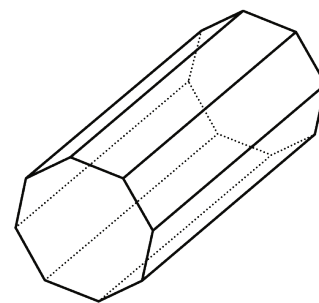# Unit 1, Lesson 13: Polyhedra

1.
   Select **all** the polyhedra.

   A
   B
   C
   D
   E

2.   a. Is this polyhedron a prism, a pyramid, or neither? Explain how you know.
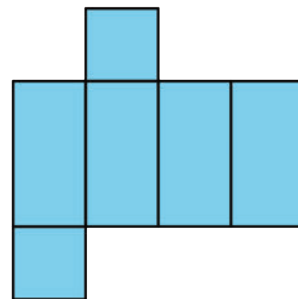
   b. How many faces, edges, and vertices does it have?

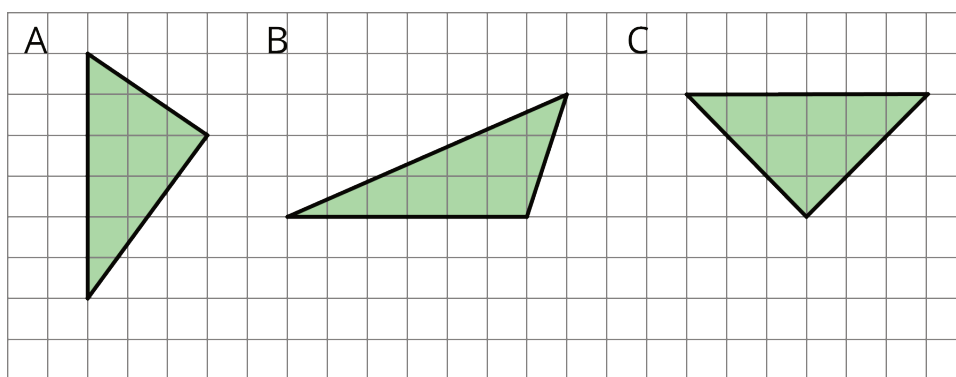3. Tyler said this net cannot be a net for a square prism because not all the faces are squares.

Do you agree with Tyler's statement? Explain your reasoning.

4. Explain why each of the following triangles has an area of 9 square units.

A   B   C

(from Unit 1, Lesson 8)

5.   a. A parallelogram has a base of 12 meters and a height of 1.5 meters. What is its area?

b. A triangle has a base of 16 inches and a height of $\frac{1}{8}$ inches. What is its area?

c. A parallelogram has an area of 28 square feet and a height of 4 feet. What is its base?

d. A triangle has an area of 32 square millimeters and a base of 8 millimeters. What is its height?
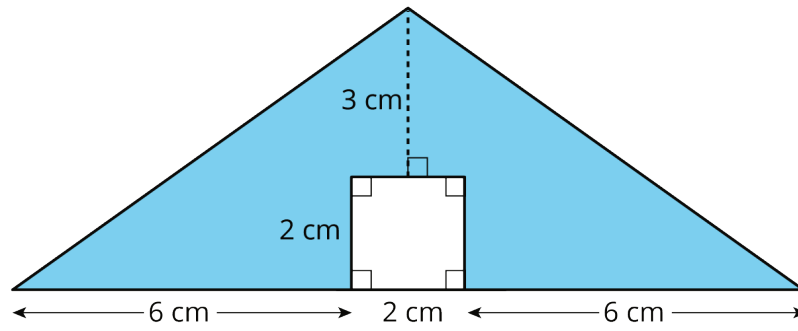
(from Unit 1, Lesson 9)

6. Find the area of the shaded region. Show or explain your reasoning.

E

3 cm

2 cm

←————— 6 cm —————→ 2 cm ←————— 6 cm —————→

(from Unit 1, Lesson 3)