

# Geometry Investigation 5

## Nets

Recall that a polyhedron is a 3-dimensional solid with polygonal faces.

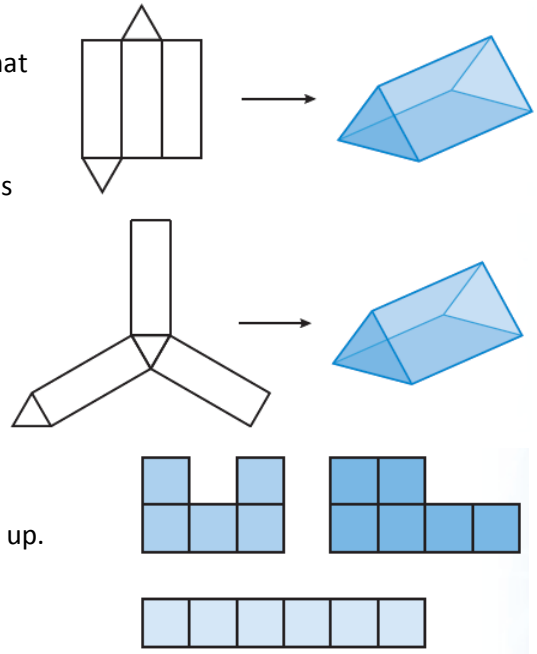
**Net** - A diagram of the faces of a three-dimensional figure, arranged so that the diagram can be folded to form the three-dimensional figure.

1. **Model:** Use graphing paper to make a net of a cube. How many squares will comprise the net of the cube? Sketch two possible ways to draw a net for a cube.

Choose one net and draw it on graph paper. Make each side of the cube's faces 5 units long. Cut the net out and fold it along each edge. Fold the net up into the shape of a cube and use tape to secure the edges of the cube.

2. **Analyze:** Explain why the nets shown cannot make a cube when folded up.

3. **Model:** Draw two more possible nets for a cube.



Next, make a regular tetrahedron. A tetrahedron has four faces that are congruent equilateral triangles. Draw an equilateral triangle on grid paper.

Make the length of each side 5 units and use a protractor to ensure that each of the triangle's angles measures  $60^\circ$ . To complete the net, draw three more congruent triangles, each sharing one side with the original triangle.

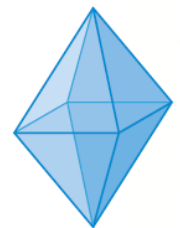
4. Cut out the tetrahedron and fold it up. What kind of solid is it? Classify it based on its faces and its base.

5. Is a cube a regular polyhedron?

6. Are either of the solids made in problem 1 or 4 prisms?

7. Is the tetrahedron a regular polyhedron?

The solid shown in the diagram is a regular octahedron. Think about unfolding one of the pyramids that comprise this shape to create a net. Working in groups with other students, draw two possible nets for the octahedron. Then, pick another solid from the following list, draw a net, and construct it: hexagonal pyramid, pentagonal prism, pentagonal pyramid, rectangular prism, and rectangular pyramid.



8. Are there more than two ways to draw the net of the octahedron?

9. **Write:** Describe one method that can be used to make the net of any regular pyramid.

### Math Reasoning

**Generalize** Which is the only pyramid that is a regular polyhedron? Which is the only prism that is a regular polyhedron?

10. Write: Describe one method that can be used to make the net of any regular prism.

11. Is the last solid that was made a regular polyhedron? Why or why not?

Investigation Practice

a. Generalize: How many different nets are there for a regular triangular pyramid? Sketch some nets and look for a pattern.

b. Using congruent squares, draw 5 different nets of a cube.

c. Draw a diagram using the connected faces of a cube that cannot be folded into a cube.

d. Draw another net for an octahedron (a regular solid with 8 equilateral triangle faces).

e. Draw a net for a pentagonal prism.