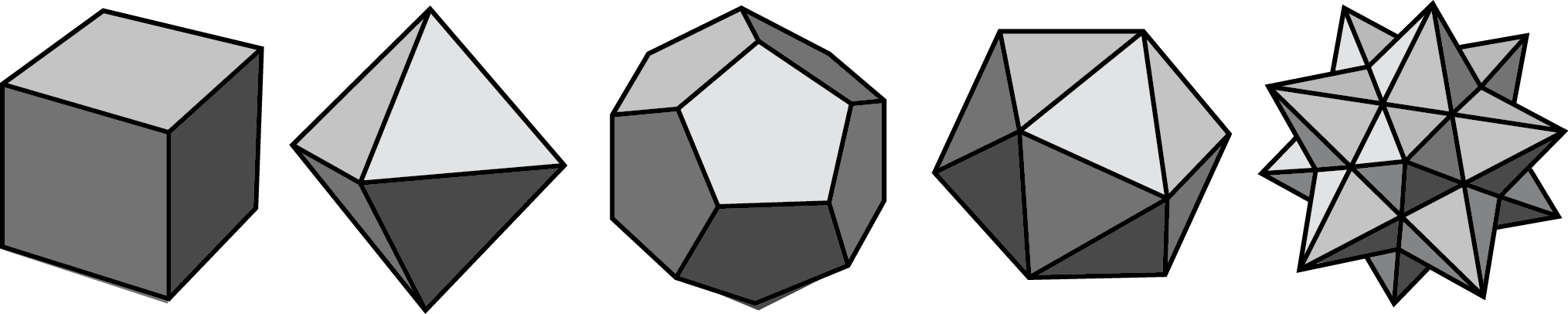
## Lesson 11: Polyhedra and Nets

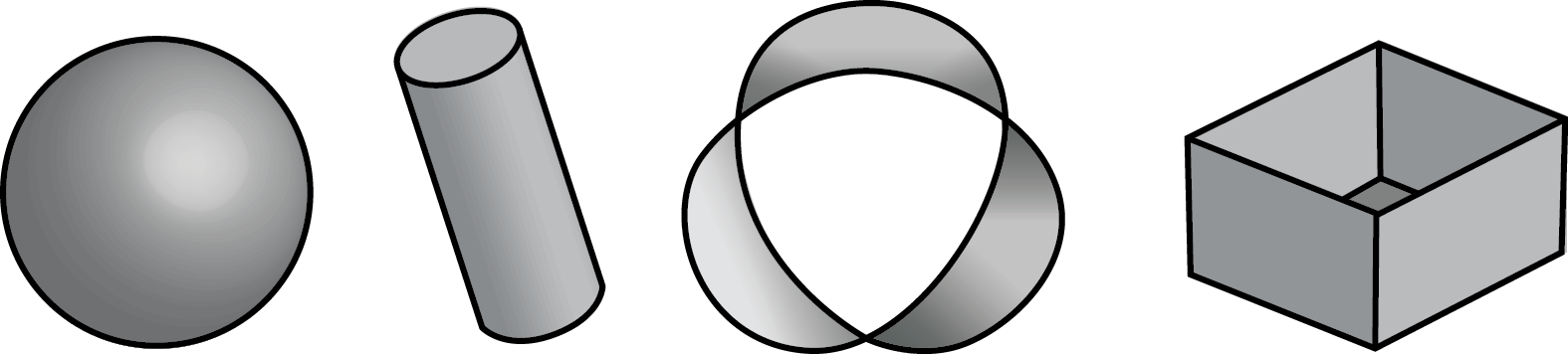
Let's use nets to find the surface area of polyhedra.

### 11.1: What are Polyhedra?

Here are pictures that represent **polyhedra**:



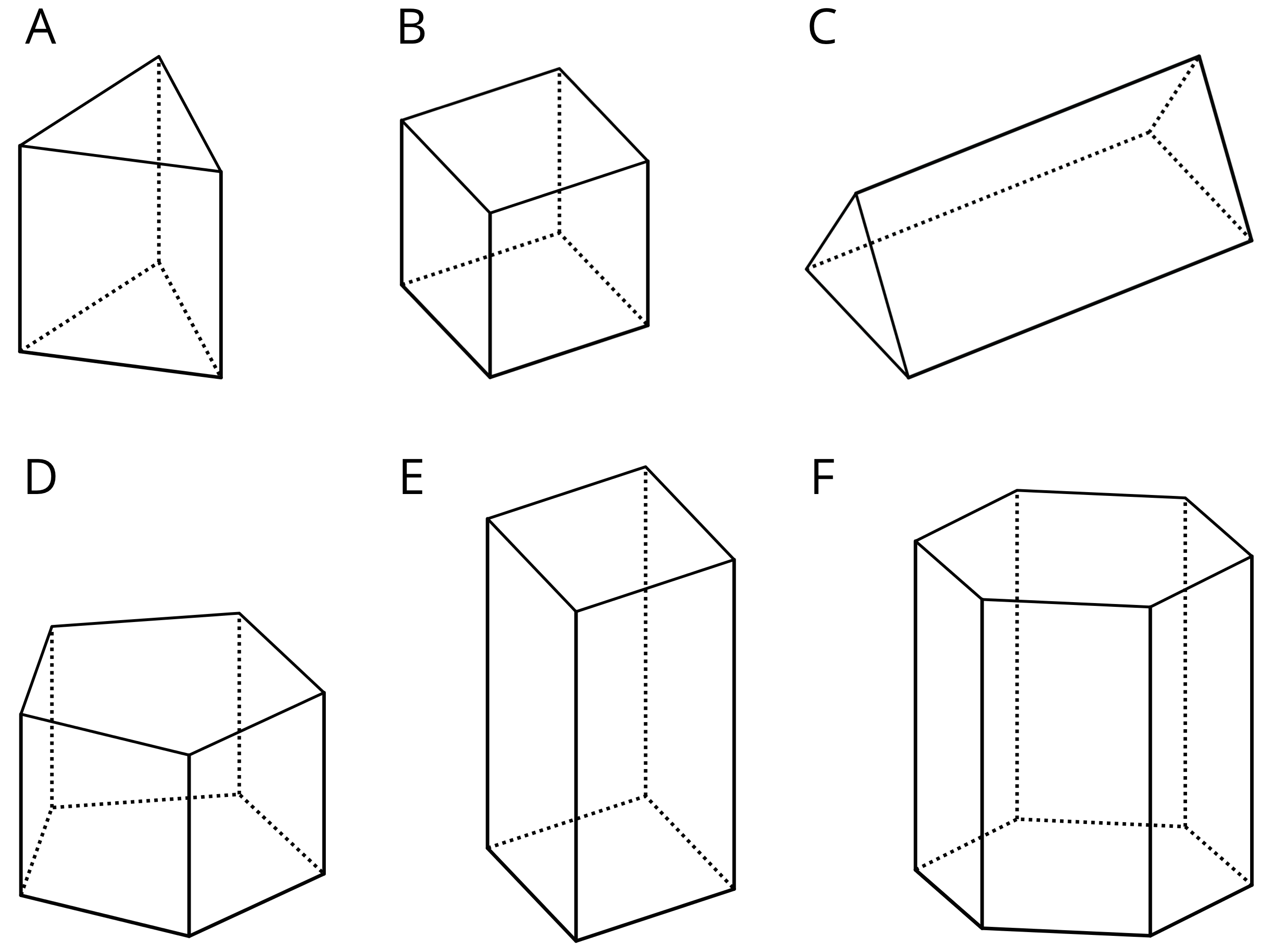
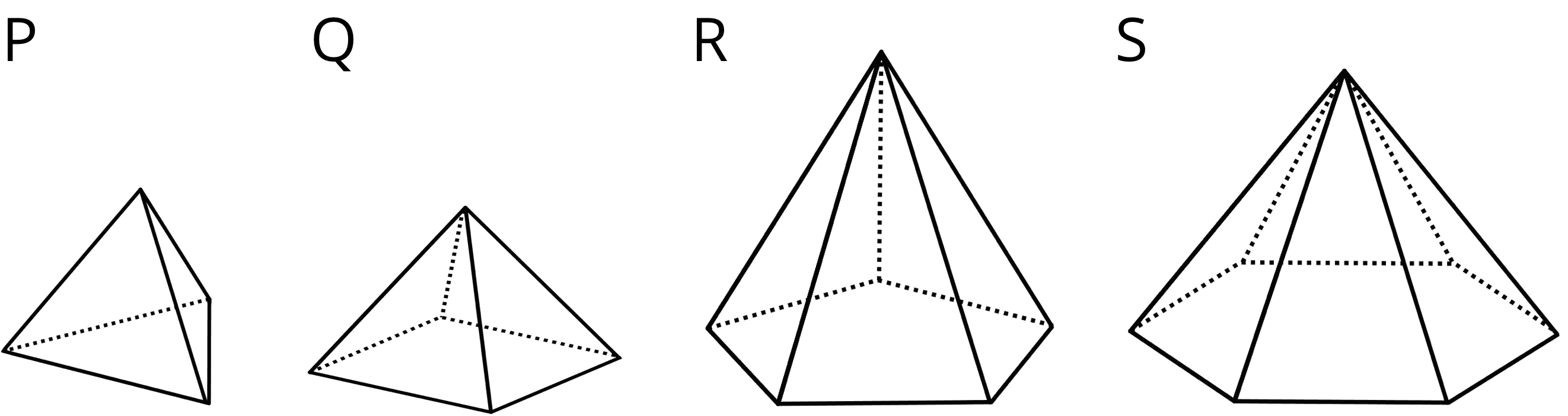
Here are pictures that do *not* represent polyhedra:



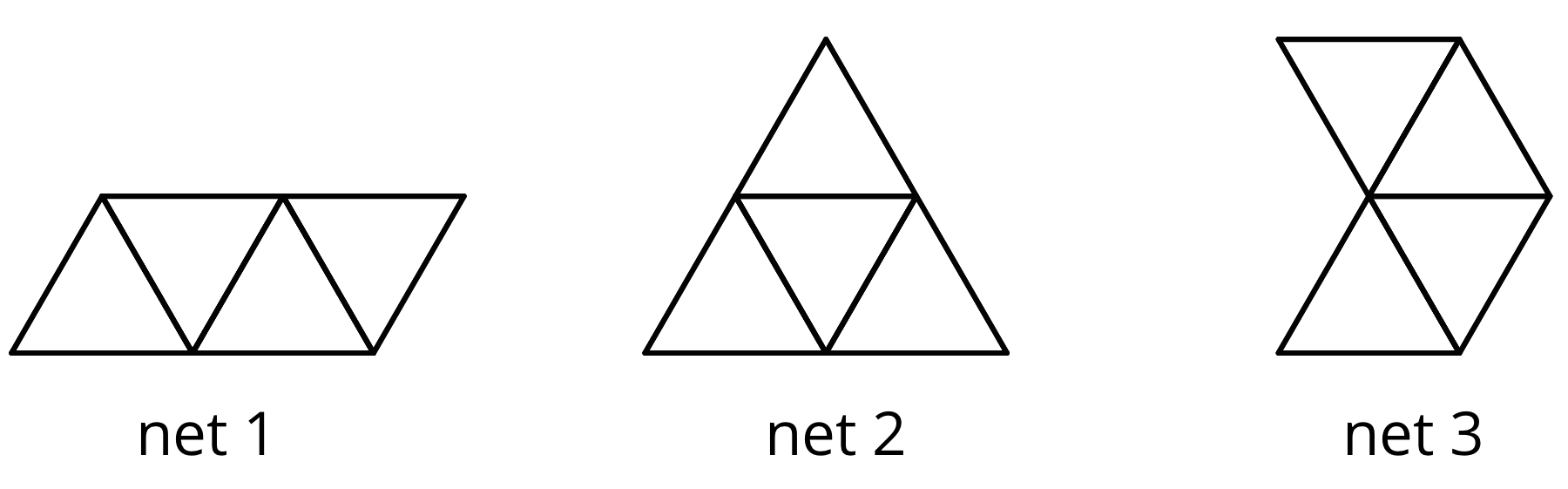
1. Your teacher will give you some figures or objects. Sort them into polyhedra and non-polyhedra.
2. What features helped you distinguish the polyhedra from the other figures?

### 11.2: Prisms and Pyramids

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

* 
* Here are some polyhedra called **pyramids**.
* 
  1. Look at the prisms. What are their characteristics or features?
  2. Look at the pyramids. What are their characteristics or features?

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

* 

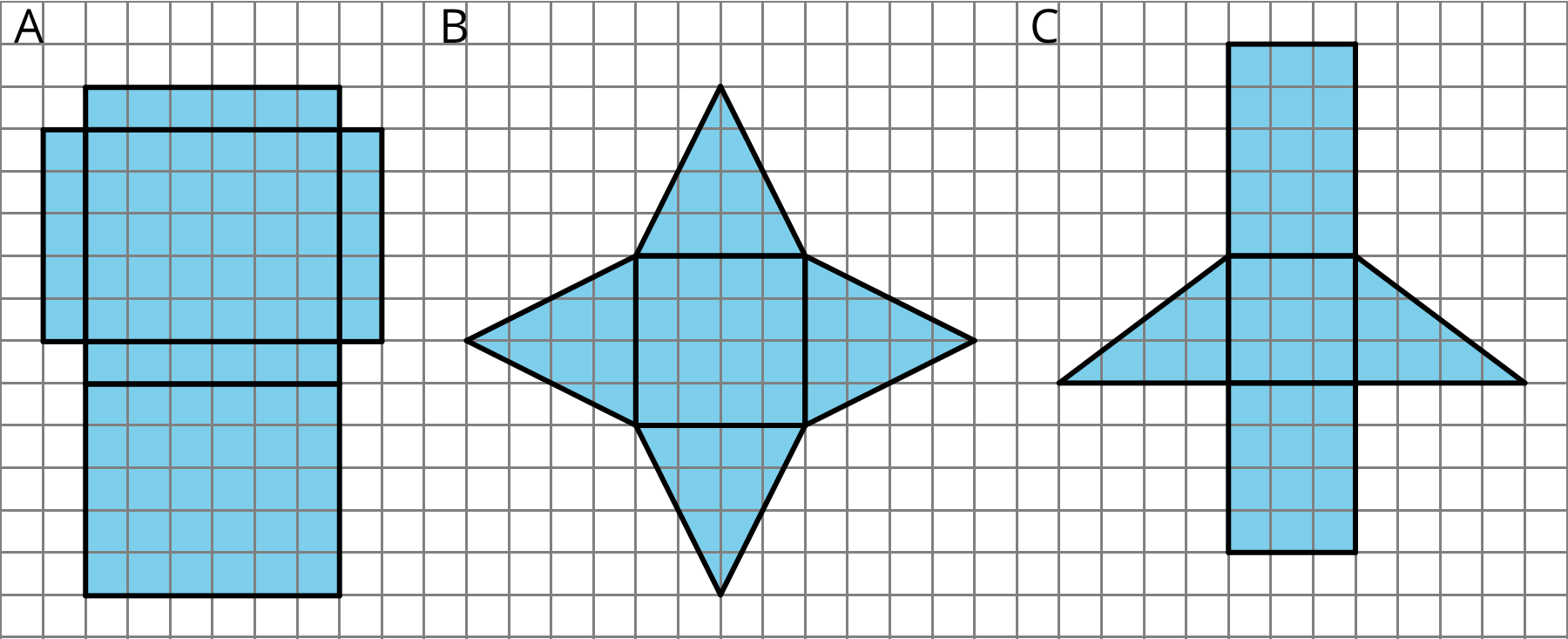
1. Your teacher will give your group a set of polygons and assign a polyhedron.
   1. Decide which polygons are needed to compose your assigned polyhedron. List the polygons and how many of each are needed.
   2. Arrange the cut-outs into a net that, if taped and folded, can be assembled into the polyhedron. 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.

### 11.3: Using Nets to Find Surface Area

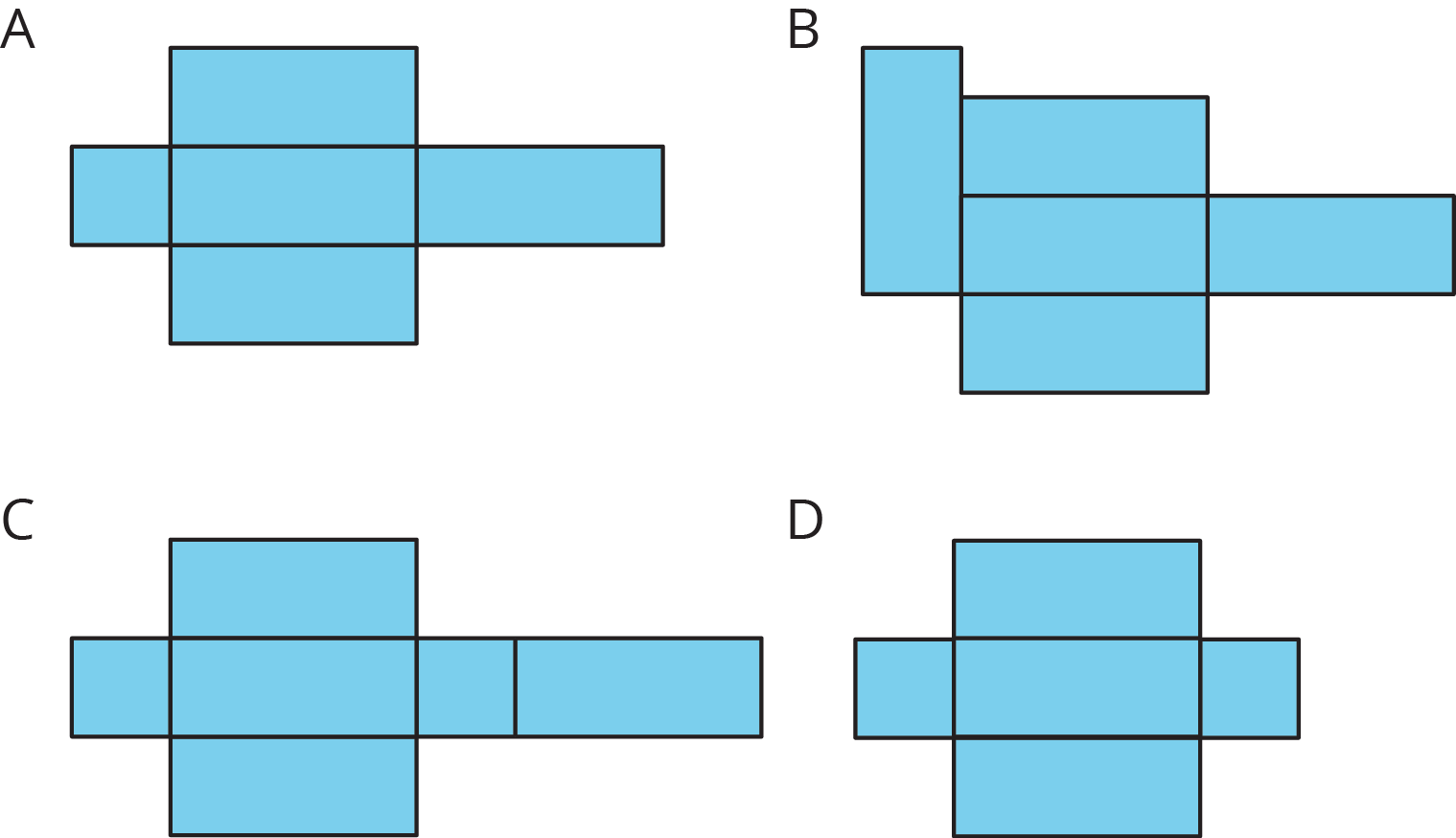
1. Name the polyhedron that each net would form when assembled.

* 

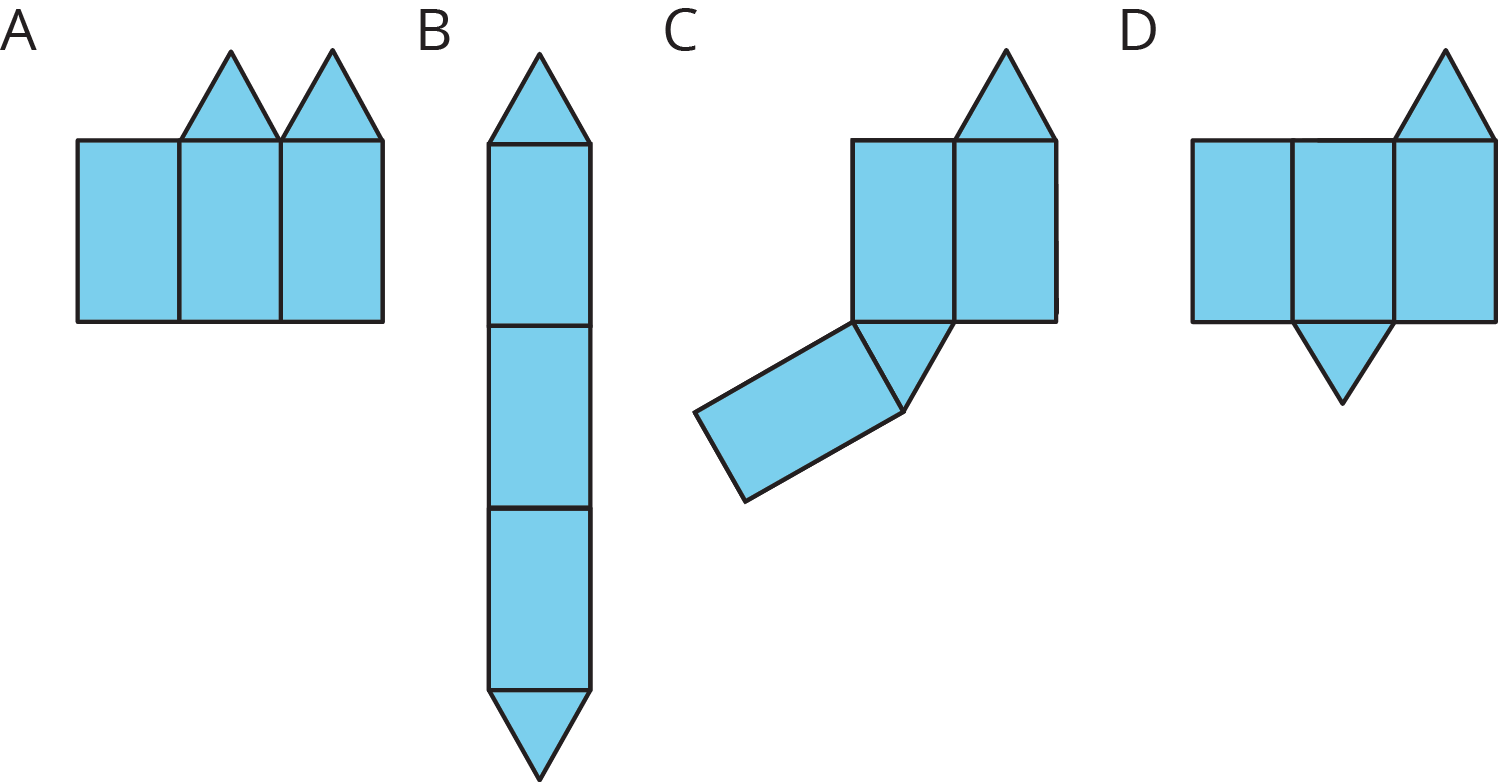
1. Your teacher will give you the nets of three polyhedra. Cut out the nets and assemble the three-dimensional shapes.
2. Find the **surface area** of each polyhedron. Explain your reasoning clearly.

#### Are you ready for more?

1. For each net, decide if it can be assembled into a rectangular prism.

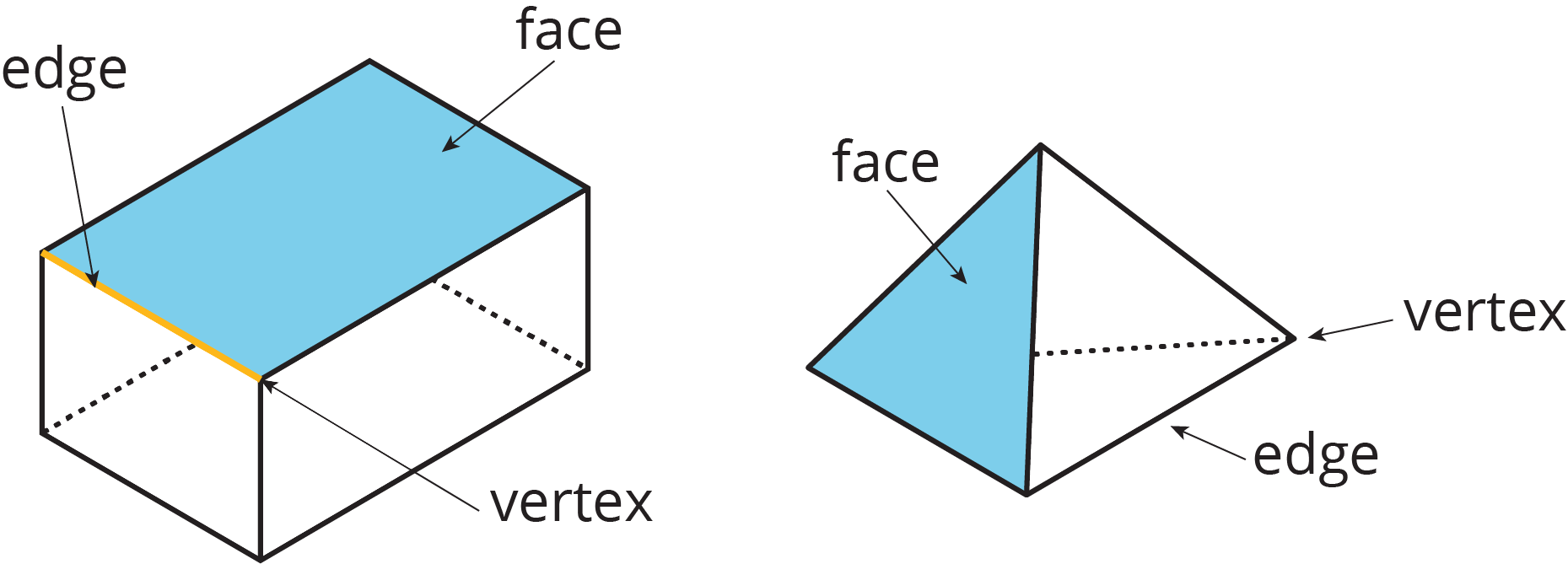
* 

1. For each net, decide if it can be folded into a triangular prism.

* 

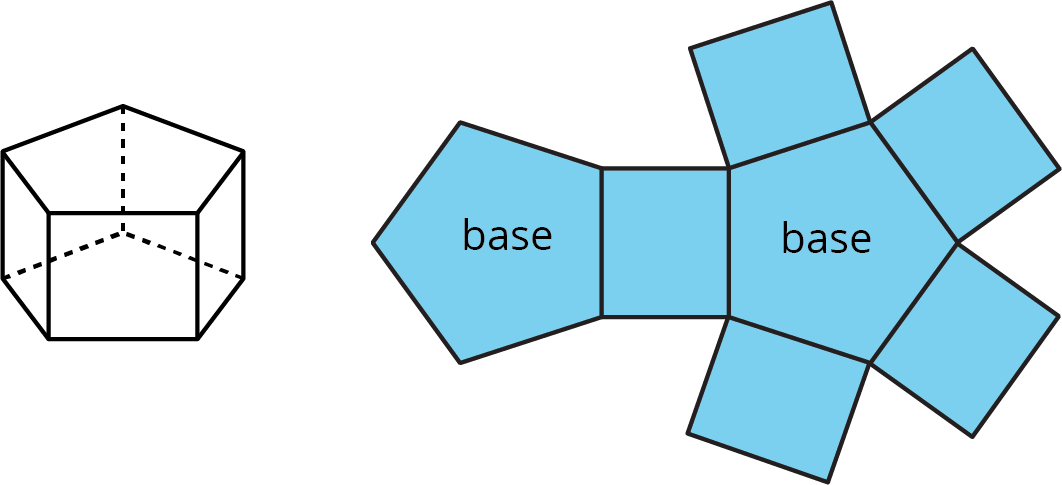
### Lesson 11 Summary

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.



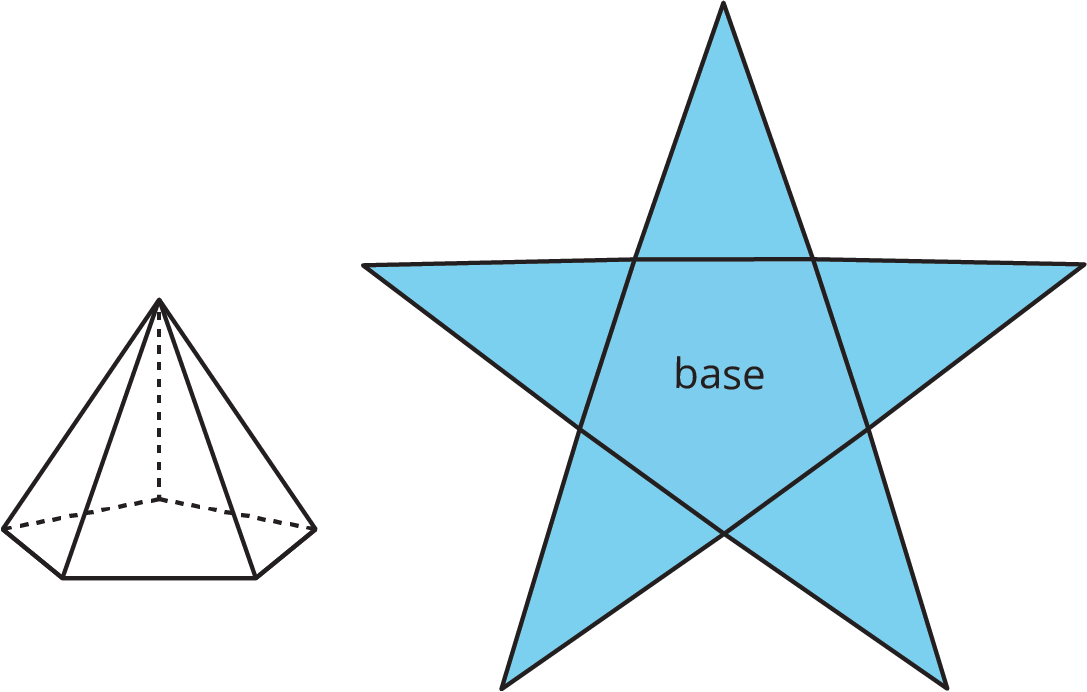
A **prism** is a type of polyhedron with two identical faces that are parallel to each other and that are called **bases**. The bases are connected by a set of rectangles (or sometimes parallelograms). A prism is named for the shape of its bases. For example, if the base is a pentagon, then it is called a “pentagonal prism.”

A **net** is a two-dimensional representation of a polyhedron. It is composed of polygons that form the faces of a polyhedron. A net of a prism has two copies of the polygon that is the base. The rest of the polygons are rectangles. A pentagonal prism and its net are shown here.

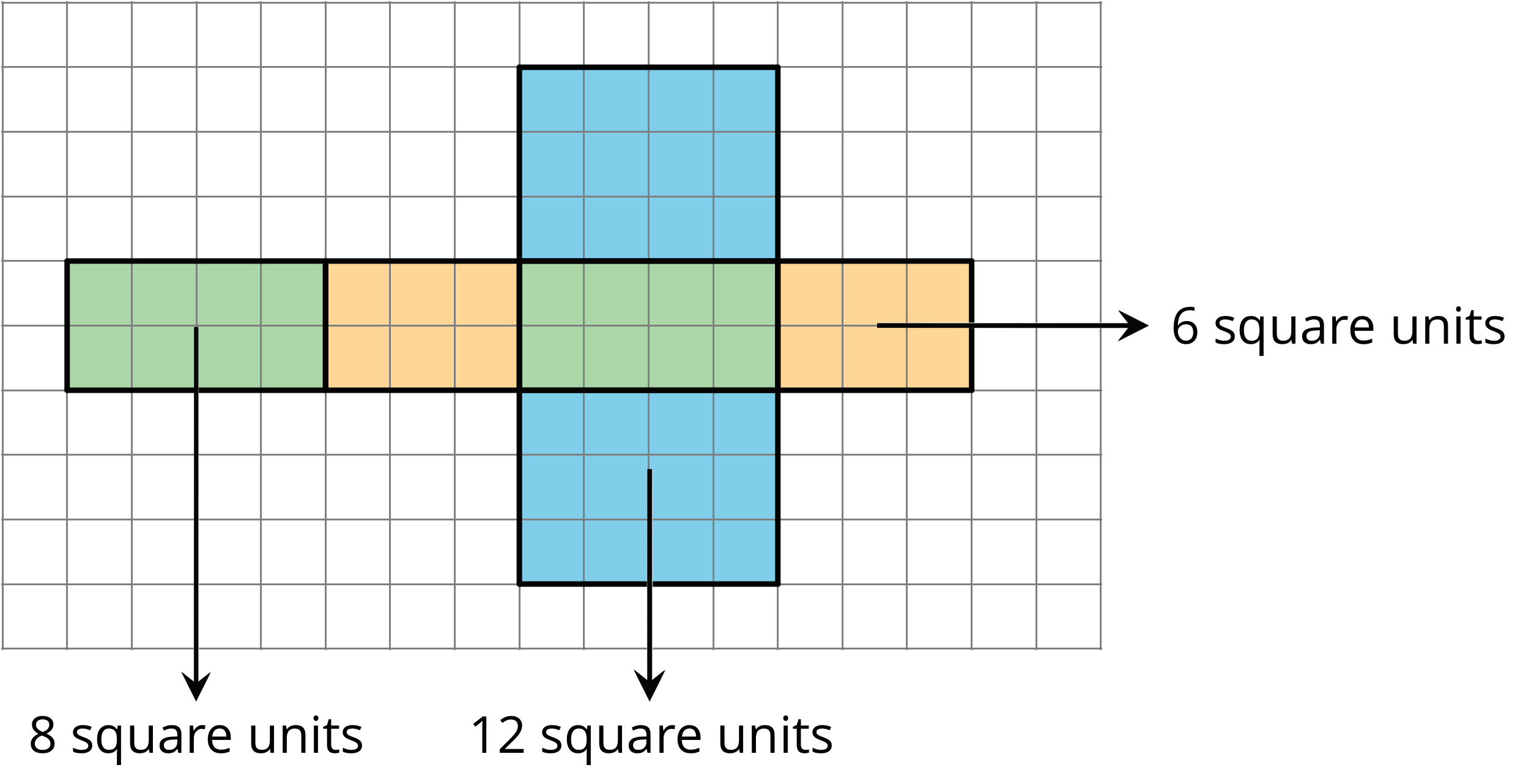


A **pyramid** is a type of polyhedron that has one special face called the base. All of the other faces are triangles that all meet at a single vertex. A pyramid is named for the shape of its base. For example, if the base is a pentagon, then it is called a “pentagonal pyramid.”

A net of a pyramid has one polygon that is the base. The rest of the polygons are triangles. A pentagonal pyramid and its net are shown here.



Because a net shows all the faces of a polyhedron, we can use it to find its surface area. For instance, the net of a rectangular prism shows three pairs of rectangles: 4 units by 2 units, 3 units by 2 units, and 4 units by 3 units.



The **surface area** of the rectangular prism is 52 square units because . 

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