Warm Up

Lesson Presentation

Lesson Quiz

Warm Up

Classify each polygon.

1. a polygon with three congruent sides
 equilateral triangle

2. a polygon with six congruent sides and six congruent angles regular hexagon

3. a polygon with four sides and with opposite sides parallel and congruent
 parallelogram

Objectives

Classify three-dimensional figures according to their properties.

Use nets and cross sections to analyze three-dimensional figures.

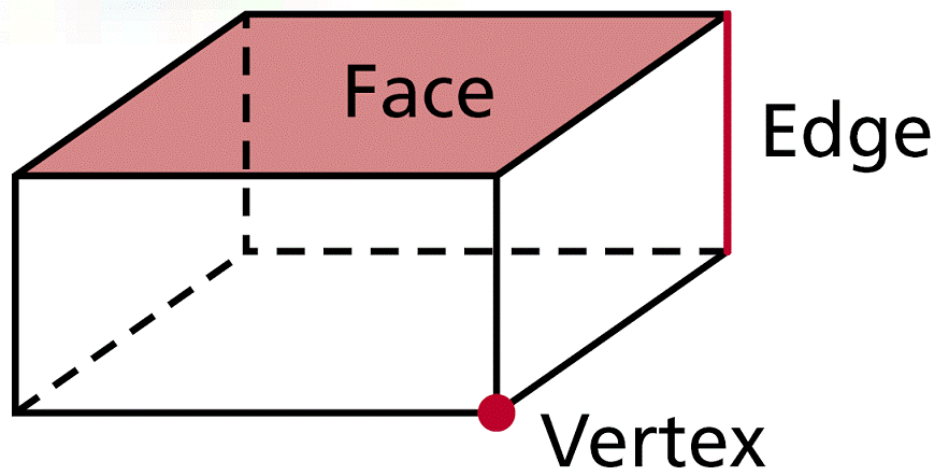# *Vocabulary*

face

edge

vertex
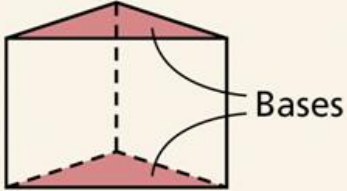
prism

cylinder

pyramid

cone

cube

net

cross section
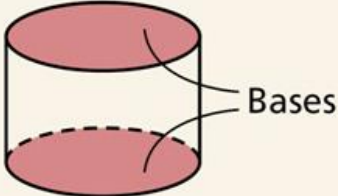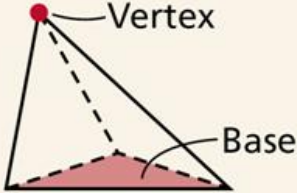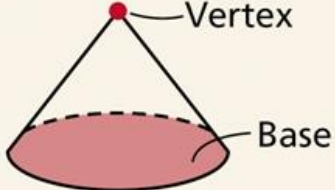
Three-dimensional figures, or solids, can be made up of flat or curved surfaces. Each flat surface is called a **face**. An **edge** is the segment that is the intersection of two faces. A **vertex** is the point that is the intersection of three or more faces.
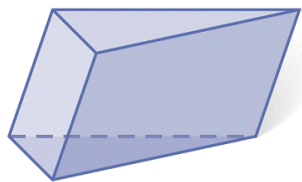
Three-Dimensional Figures

| TERM	EXAMPLE
A **prism** is formed by two parallel congruent polygonal faces called *bases* connected by faces that are parallelograms.	Bases
A **cylinder** is formed by two parallel congruent circular bases and a curved surface that connects the bases.	Bases
A **pyramid** is formed by a polygonal base and triangular faces that meet at a common vertex.	Vertex / Base
A **cone** is formed by a circular base and a curved surface that connects the base to a vertex.	Vertex / Base

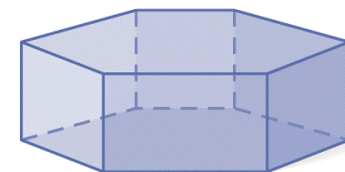A **<u>cube</u>** is a prism with six square faces. Other prisms and pyramids are named for the shape of their bases.
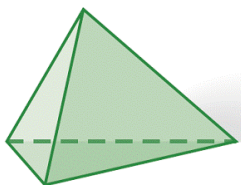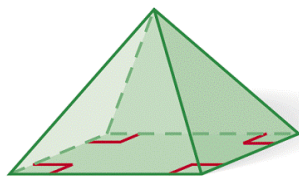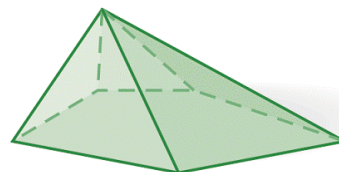
Triangular prism
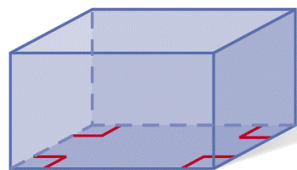
Rectangular prism
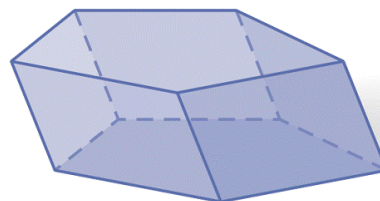
Pentagonal prism

Hexagonal prism

Triangular pyramid

Rectangular pyramid

Pentagonal pyramid
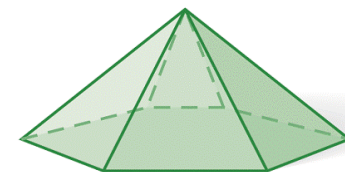
Hexagonal pyramid

Example 1A: Classifying Three-Dimensional Figures

Classify the figure. Name the vertices, edges, and bases.
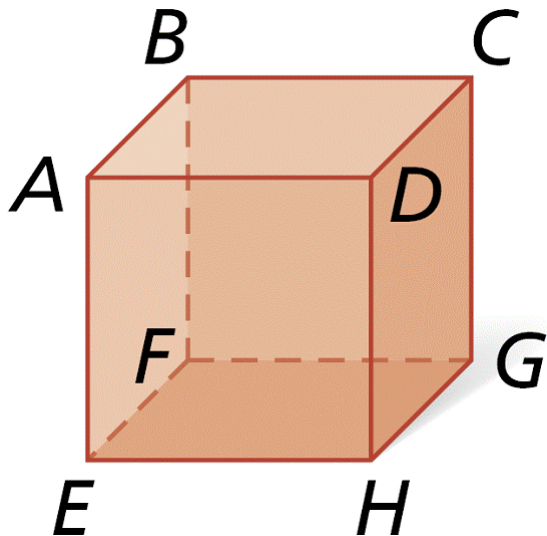
cube

vertices: A, B, C, D, E, F, G, H

edges: $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}, \overline{EF}, \overline{FG},$
$\overline{GH}, \overline{HE}, \overline{AE}, \overline{BF}, \overline{CG}, \overline{DH}$

bases: $ABCD, EFGH, ABFE,$
$DCGH, ADHE, BCGF$

Example 1B: Classifying Three-Dimensional Figures
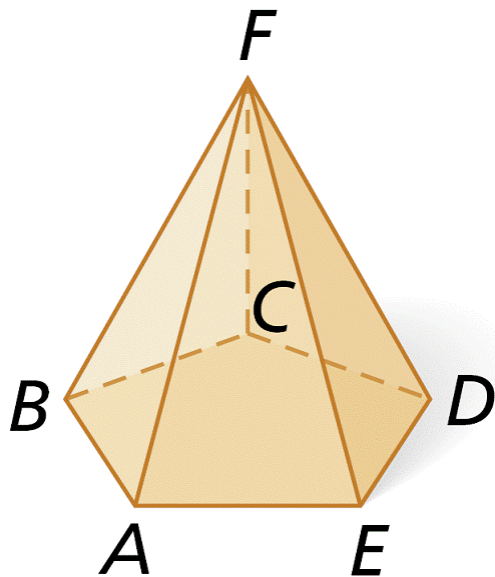
Classify the figure. Name the vertices, edges, and bases.

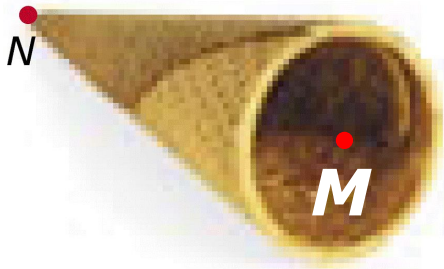**pentagonal pyramid**

vertices: *A, B, C, D, E, F*

edges: $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DE}, \overline{EA},$
$\overline{AF}, \overline{BF}, \overline{CF}, \overline{DF}, \overline{EF}$

base: *ABCDE*

Check It Out! Example 1a

Classify the figure. Name the vertices, edges, and bases.

cone

vertex: *N*

edges: none

base: •*M*

Check It Out! Example 1b

Classify the figure. Name the vertices, edges, and bases.
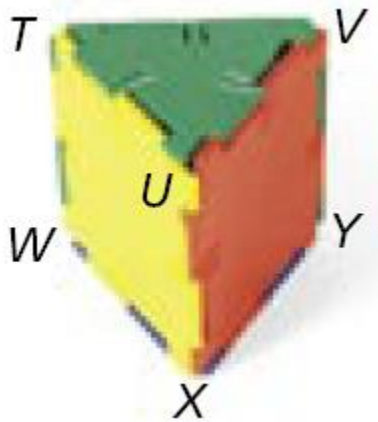
triangular prism

vertices: *T, U, V, W, X, Y*

edges: $\overline{TU}, \overline{TV}, \overline{UV}, \overline{TW}, \overline{UX},$
$\overline{VY}, \overline{WX}, \overline{WY}, \overline{XY}$

bases: $\triangle TUV$, $\triangle WXY$
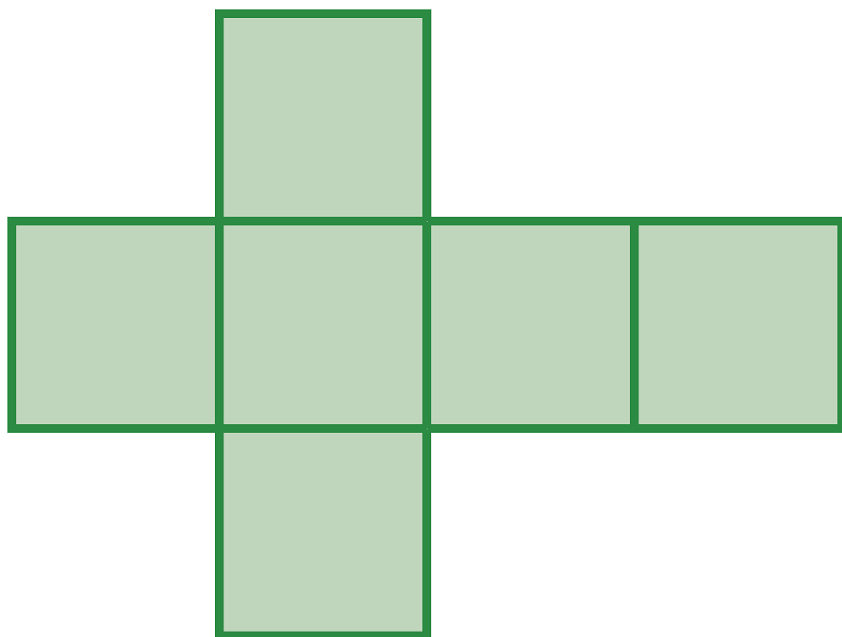
A **net** is a diagram of the surfaces of a three-dimensional figure that can be folded to form the three-dimensional figure. To identify a three-dimensional figure from a net, look at the number of faces and the shape of each face.

Example 2A: Identifying a Three-Dimensional Figure From a Net

Describe the three-dimensional figure that can be made from the given net.

The net has six congruent square faces. So the net forms a cube.

Example 2B: Identifying a Three-Dimensional Figure From a Net

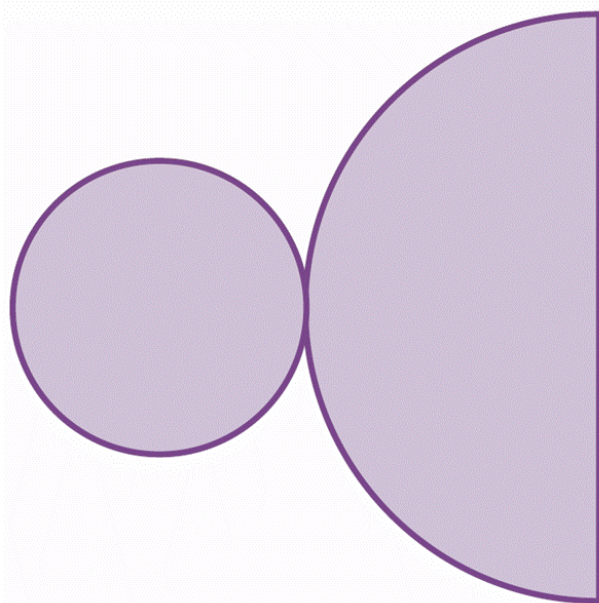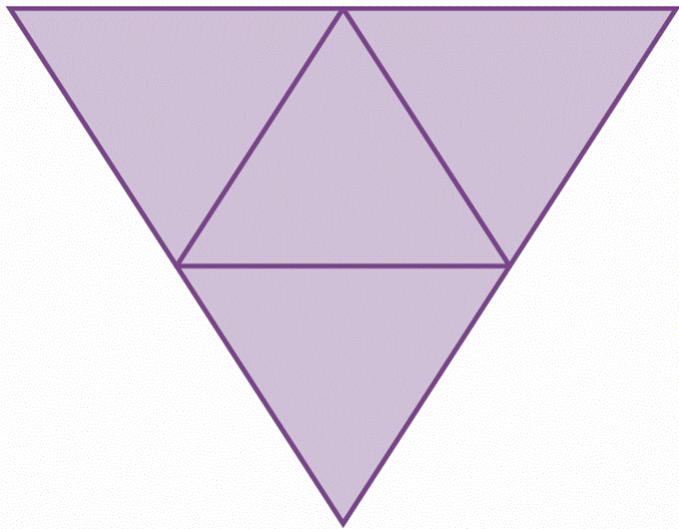**Describe the three-dimensional figure that can be made from the given net.**

The net has one circular face and one semicircular face. These are the base and sloping face of a cone. So the net forms a cone.

Check It Out! Example 2a

Describe the three-dimensional figure that can be made from the given net.

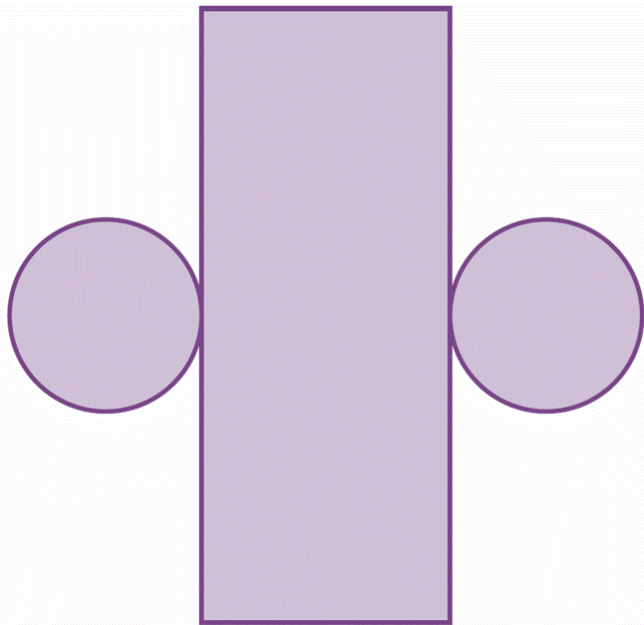
The net has four congruent triangular faces. So the net forms a triangular pyramid.

Check It Out! Example 2b

Describe the three-dimensional figure that can be made from the given net.

The net has two circular faces and one rectangular face. These are the bases and curved surface of a cylinder. So the net forms a cylinder.
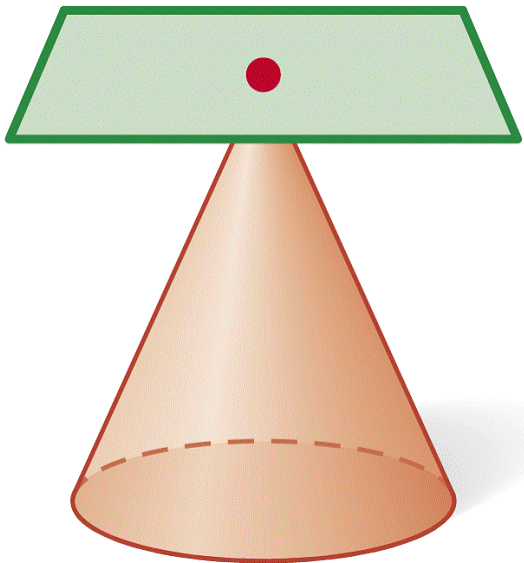
A **cross section** is the intersection of a three-dimensional figure and a plane.

Example 3A: Describing Cross Sections of Three-Dimensional Figures

Describe the cross section.

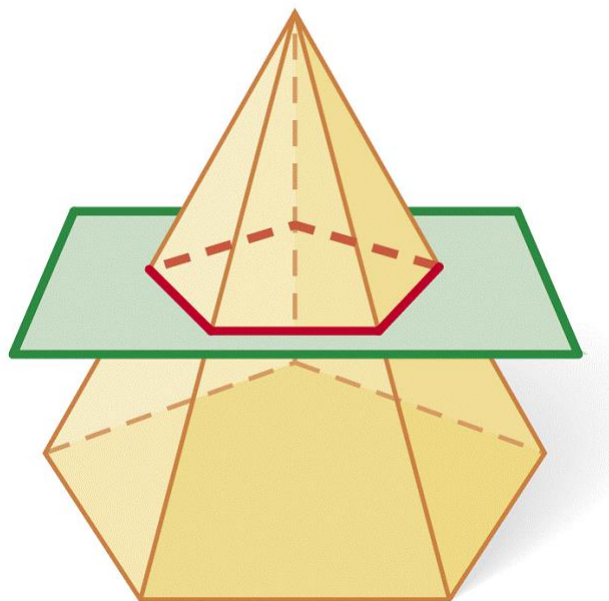The cross section is a point.

Example 3B: Describing Cross Sections of Three-Dimensional Figures

Describe the cross section.

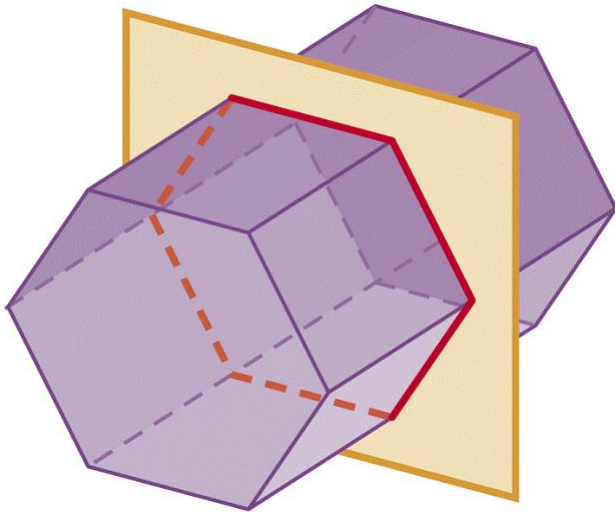The cross section is a pentagon.

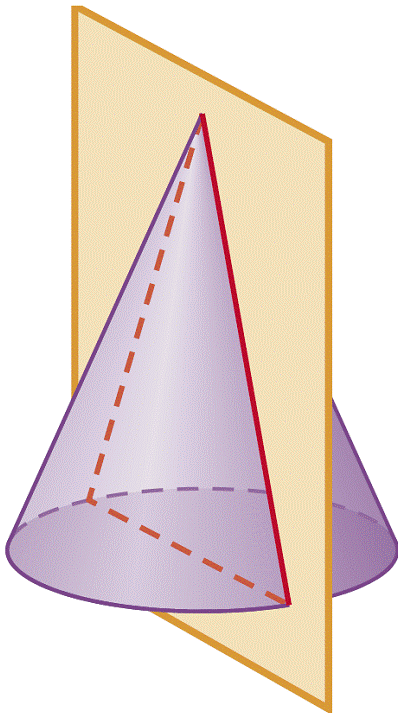**Check It Out! Example 3a**

Describe the cross section.

The cross section is a hexagon.

Check It Out! Example 3b

Describe the cross section.
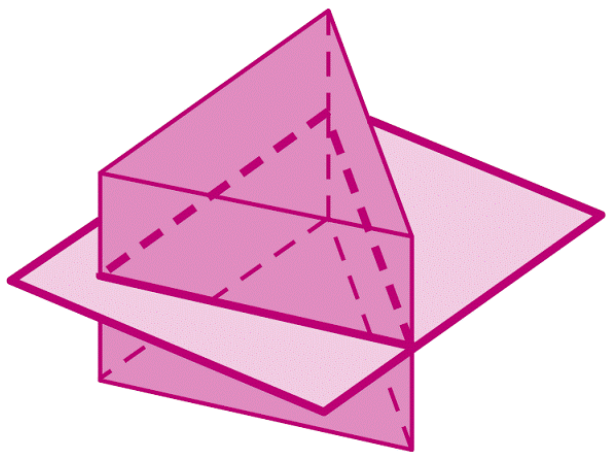

The cross section is a triangle.

Example 4A: Food Application

A piece of cheese is a prism with equilateral triangular bases. How can you slice the cheese to make each shape?
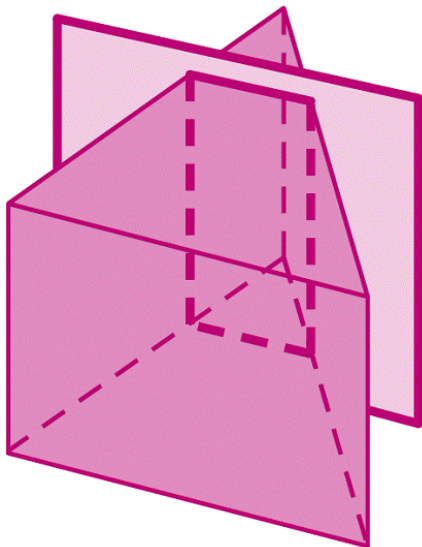
an equilateral triangle

Cut parallel to the bases.

Example 4B: Food Application

A piece of cheese is a prism with equilateral triangular bases. How can you slice the cheese to make each shape?
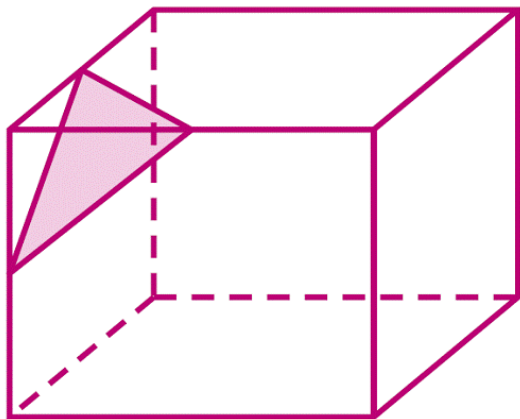
a rectangle

Cut perpendicular to the bases.

Check It Out! Example 4

How can a chef cut a cube-shaped watermelon to make slices with triangular faces?
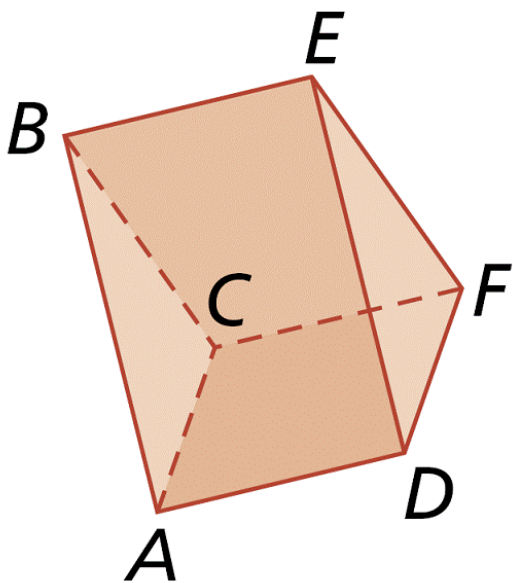
Cut through the midpoints of 3 edges that meet at 1 vertex.

Lesson Quiz: Part I

1. Classify the figure. Name the vertices, edges, and bases.

triangular prism;
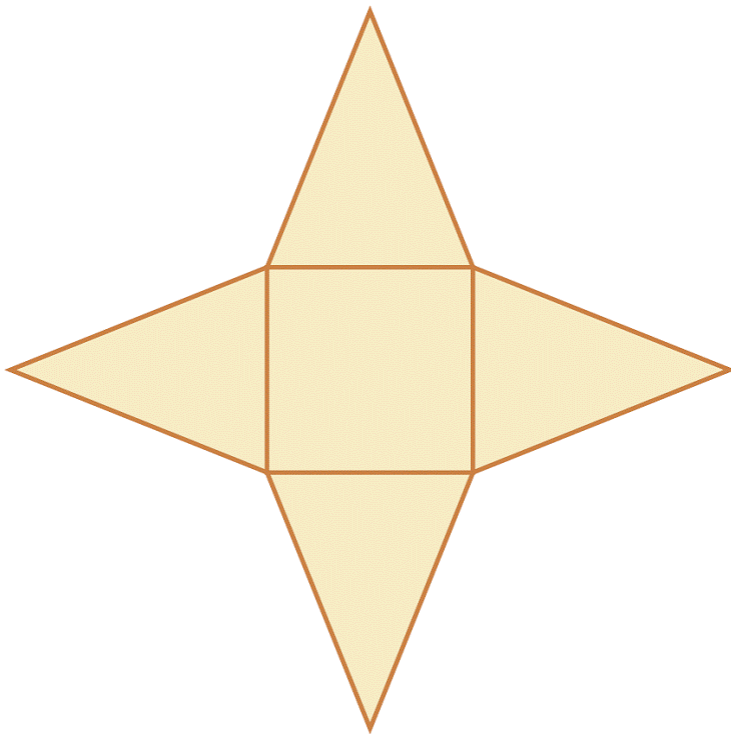vertices: *A, B, C, D, E, F*;

edges: $\overline{AD}, \overline{CF}, \overline{BE}, \overline{FD}, \overline{EF},$
$\overline{AC}, \overline{DE}, \overline{AB}, \overline{BC}$

bases: Δ*ABC* and Δ*DEF*

Lesson Quiz: Part II

2. Describe the three-dimensional figure that can be made from this net.

square pyramid

Lesson Quiz: Part III

3. Describe the cross section.

a rectangle