CHAPTER 4

WORDS TO KNOW

net

face

edge

prism

base

pyramid

Lesson 27

REPRESENT SOLIDS USING NETS 6.G.A.4

INTRODUCTION

Real-World Connection

Lucy bought a snow globe that measures 4 inches at its widest and is 5 inches tall. She wants to put it in a decorated box as a surprise for her sister. Her mother has a container with many boxes, but all of them are opened up to lay flat. In which box will her snow globe fit? Let's practice the skills in the **Guided Practice** and **Independent Practice** and see how Lucy solves her problem at the end of the lesson!
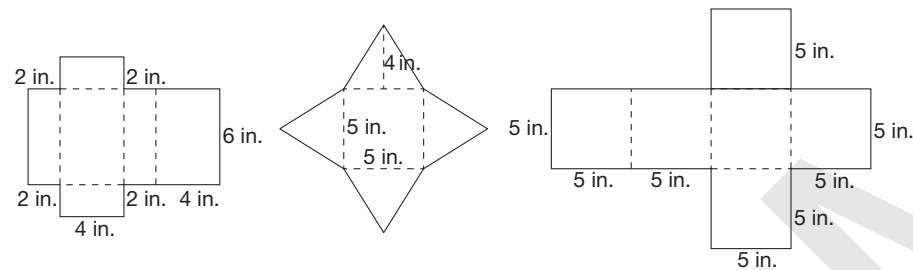
What I Am Going to Learn

- How three-dimensional figures can be represented with two-dimensional drawings called nets
- The different components of nets
- How to determine which solids (or three-dimensional figures) are represented by different nets

## What I May Already Know 2.G.A.1, 4.MD.A.3

- I know the parts and characteristics of two- and three-dimensional figures.
- I can find the area of two-dimensional figures.
- I can find the volume of three-dimensional figures.

Vocabulary in Action

- A three-dimensional figure can be represented with a two-dimensional drawing called a **net**.
  - The net must have the correct number of **faces**, or flat surfaces, and each face needs to be the correct shape.
  - **Edges** are where the faces meet and dashed lines are sometimes used to show edges that will fold. Solid lines show where the edges meet.
- A **prism** is made up of two bases joined by rectangular sides, or faces.
  - The **bases** of a prism are two faces of a prism and are both the same shape.
  - The bases give the prism its name and it will have as many rectangular sides as there are sides to the base.
- A **pyramid** has a polygonal base and triangular sides that meet at a point.
  - Whenever you see a net whose sides are all triangular, it is a pyramid.

EXAMPLE

A triangular prism has two triangular bases, joined by three rectangular sides. The net for a triangular prism shows the 2 triangular bases and 3 rectangular faces.
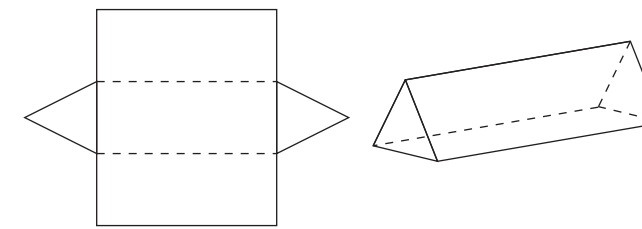
This cheese is cut in the shape of a triangular prism.

THINK ABOUT IT

What examples of triangular prisms have you seen in your everyday life?

Just as you can draw a net for a three-dimensional figure, you can use a net to determine what type of solid it makes.
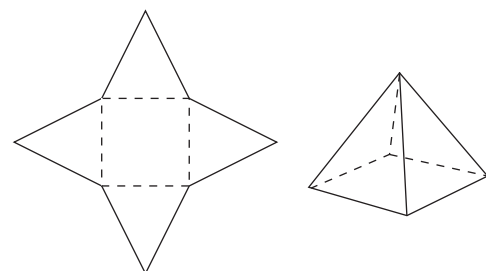
▶ **TURN AND TALK**

Think about Lucy's problem from the beginning of the lesson. Do you think a box in the shape of a square pyramid might solve her problem?

EXAMPLE

The net shows 4 triangles. If all triangles are folded up, they meet at one point, so this is a pyramid. The base is a square, so this is a square pyramid.

The Palace of Peace and Reconciliation in Astana, Kazakhstan is in the shape of a square pyramid.
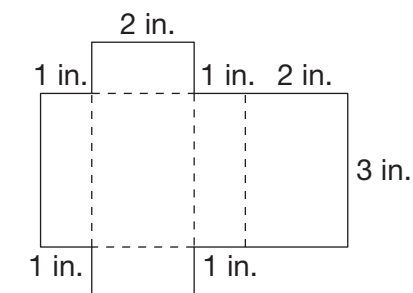
GUIDED INSTRUCTION

A cereal box is an example of a rectangular prism. Have you ever opened a cereal box at the seams? If you did this, you would see the net of a rectangular prism.

1. Draw the net for the rectangular prism.
A three-dimensional figure can be represented with a two-dimensional drawing called a net. Think of the prism as a box, and you can cut and unfold it to make a net.

Step One List all the faces of the figure and their dimensions. All faces must be included in the net.

A rectangular prism is made up of 6 rectangular faces:

2 rectangles: 2 cm by 1 cm (sides, long)
2 rectangles: 3 cm by 1 cm (bases)
2 rectangles: 3 cm by 2 cm (sides, short)

1 in.

3 in.

2 in.

▶ **TIPS AND TRICKS**

This is just one method for drawing nets. Try starting with one side to "unroll" the figure.

Step Two Start by drawing the bottom base of the figure. Use dashed lines for the edges of the base because these are edges that would be folds if you created the shape by folding a net. Label the edges with their lengths.

2 in.

3 in.
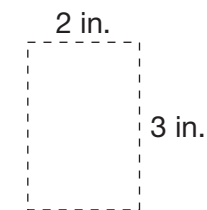
Step Three Add the faces that attach directly to the base. In this case, those are the front, back, left, and right sides of the prism. Label their dimensions.
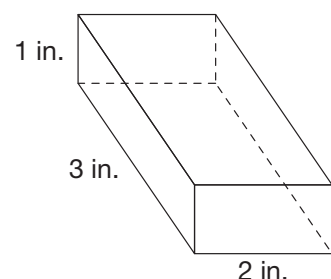
2 in.

1 in.   1 in.

3 in.

1 in.   1 in.
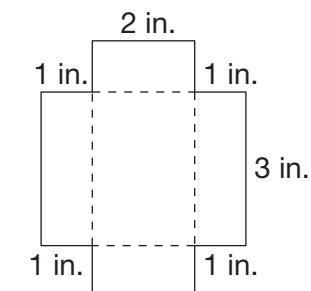
Step Four Draw the top base. Remember: You can think about this net as a shape you will fold together into the three-dimensional prism. That will help you decide where to attach the final face.

Attach the top base so that it would fold over from one of the sides. Label the face's dimensions.

2 in.

1 in.   1 in.   2 in.

3 in.

1 in.   1 in.

2. Which of the following nets would **not** form a triangular prism when folded?

Ⓐ

Ⓑ

Ⓒ

Ⓓ
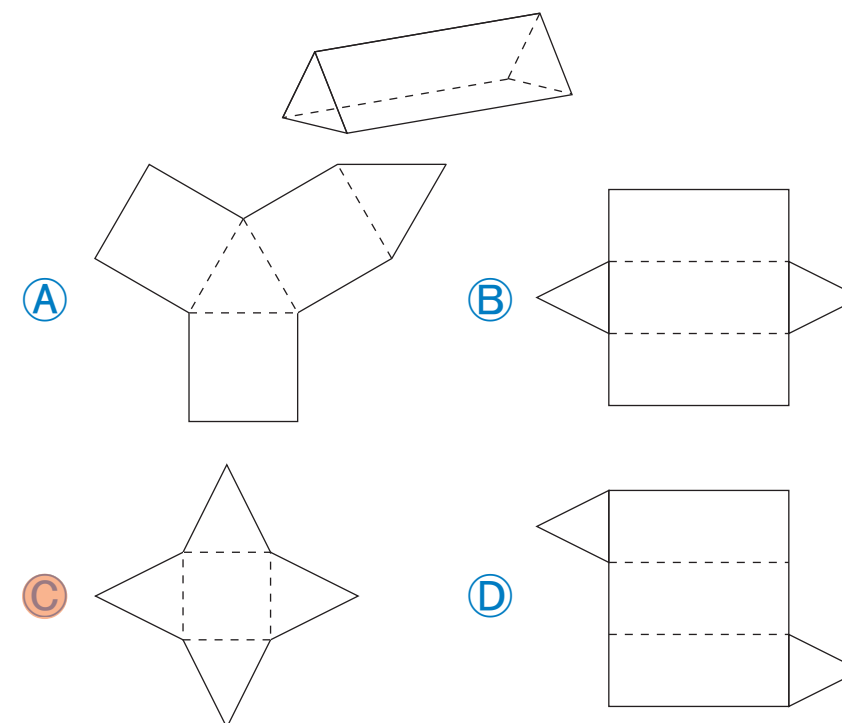
◀ **HINT, HINT**

Think of the net that does not have two triangular bases and three rectangular sides.

▶ SKETCH IT

Can you draw a net of an item you see in the room right now?

How Am I Doing?

_____

What questions do you have?

_____
_____
_____
_____
_____
_____
_____

What is an example of a pyramid, rectangular prism, or triangular prism you see or use every day? Do you think the designers used a net when coming up with the design?
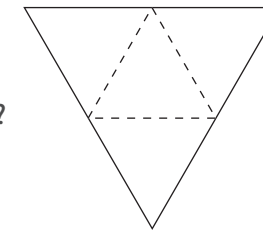
_____
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Color in the traffic signal that shows how you are doing with the skill.

I am stuck.

I almost have it.

I understand the skill.

INDEPENDENT PRACTICE

WORK SPACE

Answer the questions.

1. Which figure could be formed with this net?

Ⓐ

Ⓑ

Ⓒ

Ⓓ
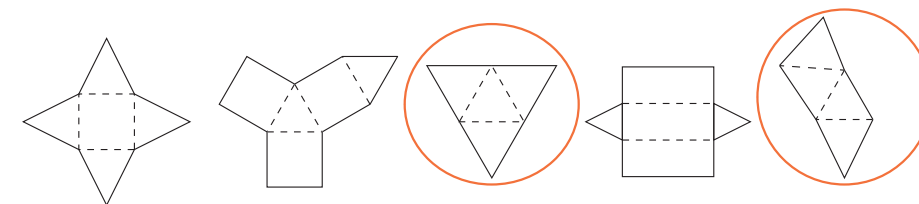
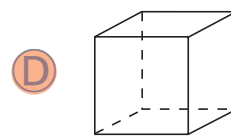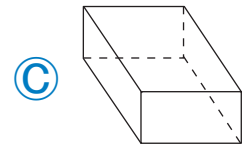2. Circle the word that correctly completes the statement.
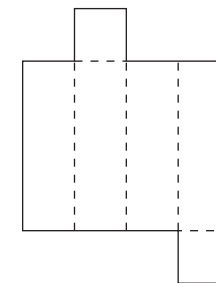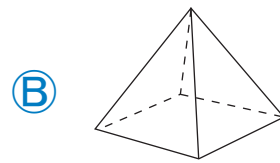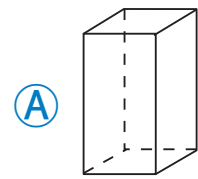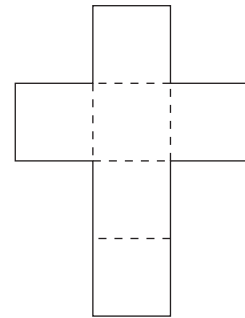
This net represents a
- pentagonal prism
- *square prism* ⟵ (circled)
- triangular prism

3. Circle the **two** nets that represent a triangular pyramid.
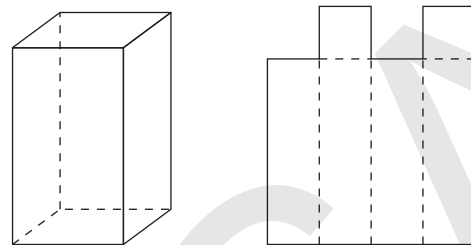
4. Which figure will this net make?

(A)

(B)

(C)

(D)

5. Part A

Travis drew the net of a square prism below. Explain why his net is incorrect.

Sample answer: The net that Travis drew has two square bases and four rectangular faces, but he put the two bases on the same end. The two squares will overlap and the other side will be open.

Part B

Use the grid to draw a net that corrects Travis's mistake. Make the net for a square prism with base edges of 2 cm and a height of 4 cm. Let each box in the grid measure 1 cm on each side.

WORK SPACE
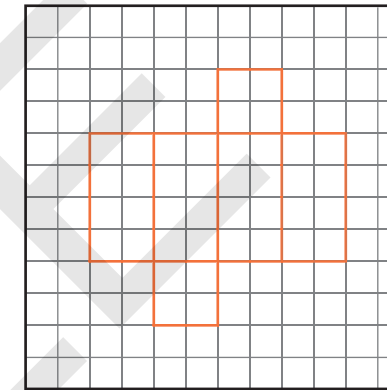
6. Describe how to construct a net for a triangular prism. Include the number of faces you would use and the shape of each face.

Sample answer: A triangular prism is made up of triangles and rectangles. The net will have 2 matching triangles for the bases and 3 rectangles for the sides.

TIPS AND TRICKS

On a computer-based test, you may be asked to drag shapes into an area to make the net. If the shapes do not snap together, be careful to place them as close together as possible.

7. Use the rectangles in the box to make a net for a rectangular prism with dimensions 2 cm by 4 cm by 1 cm. Use the space below to draw and label the net.

Objects can be used more than once.

4 cm / 2 cm, 2 cm / 1 cm, 4 cm / 1 cm

Sample answer:

1 cm, 1 cm, 4 cm, 2 cm 1 cm, 1 cm, 2 cm
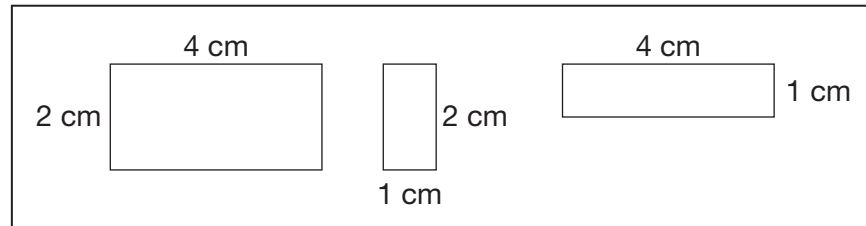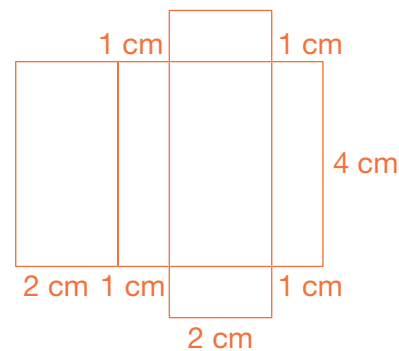
8. How is the number of rectangular faces of a prism related to its base? Explain your answer and give an example.

Sample answer: There are as many rectangular faces in a prism as there are sides in the base. Each side of the base will be an edge of each rectangular face. For example, a prism with a pentagonal base would have 5 rectangular faces.

9. Which of the following nets would represent a square pyramid? Select the **two** correct answers.


A B C D E
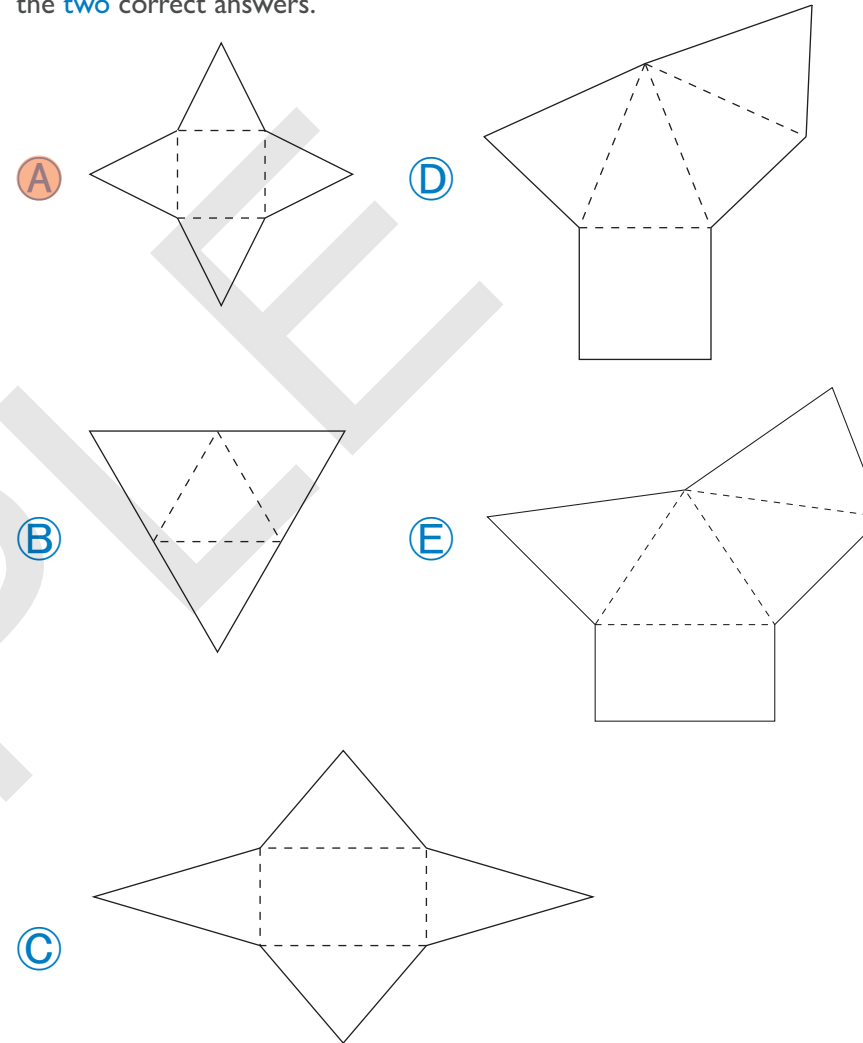
WORK SPACE

EXIT TICKET

6.G.A.4

Now that you've mastered the representing three-dimensional figures with two-dimensional nets, let's solve the problem in the Real-World Connection.

Lucy made a snow globe that measures 4 inches at its widest and is 5 inches tall. She wants to put it in a decorated box as a surprise for her sister. Her mother has a container with many boxes, but all of the boxes are opened and lay flat. Lucy needs to pick one box and fold it. In which package will her snow globe fit?
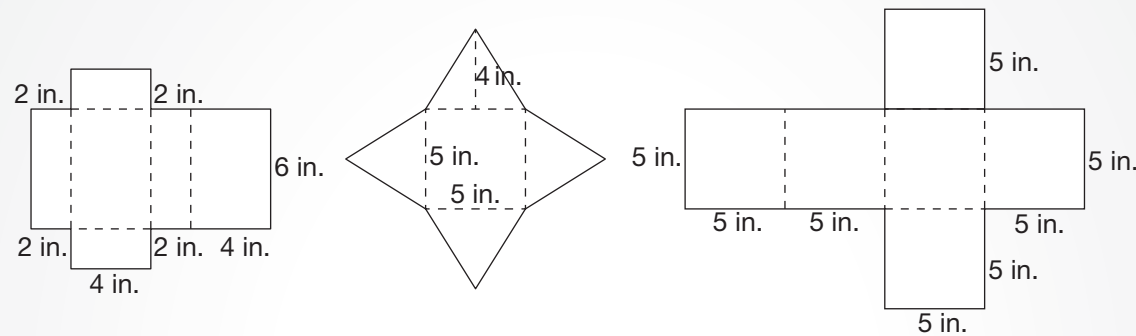
The snow globe is a ball, or sphere, so it will be 4 inches wide in each direction. Which package will Lucy use? Explain why you chose this package and why the other two packages will not work.

The first package shows rectangles for all sides, so this is a rectangular prism. The prism is only 2 inches deep.

The middle package shows 4 triangles and 1 square, which is a square pyramid. When this folds into a point, the snow globe won't fit inside.

The last package has 6 squares, which is a cube. When this folds up, the length, width, and height of the cube will be 5 inches, so the snow globe will fit inside this box. This is the box Lucy should use.