3

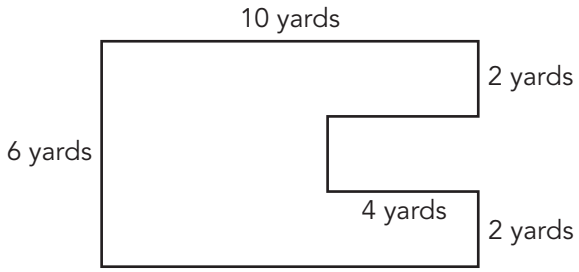
Breaking the Fourth Wall

Surface Area of Rectangular Prisms and Pyramids

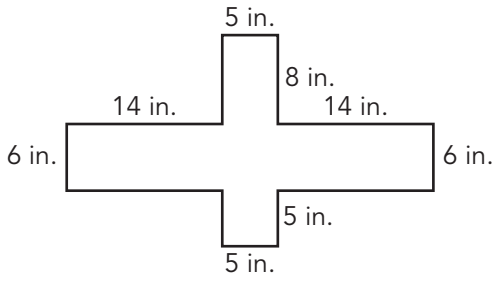
WARM UP

Calculate the area of each composite figure.

1.



2.



LEARNING GOALS

- Represent solid figures using two-dimensional nets made up of rectangles and triangles.
- Use nets of solid figures to determine the surface areas of the figures.
- Solve real-world and mathematical problems involving surface area.
- Fluently multiply and divide multi-digit decimals using standard algorithms.

KEY TERMS

- net
- surface area
- pyramid
- slant height

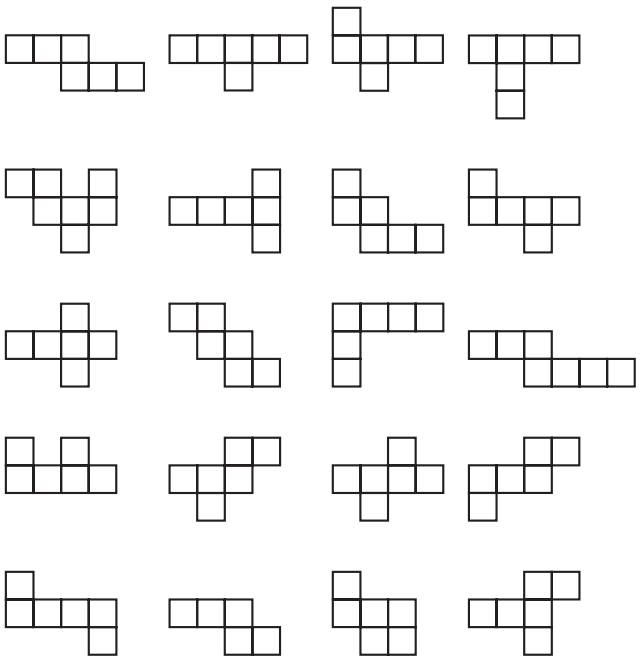
You know how to determine how many cubic units fill a rectangular prism. How can you calculate the number of square units it takes to cover the outside of a prism?

Breaking Down a Cube

A **net** is a two-dimensional representation of a three-dimensional geometric figure. A net is cut out, folded, and taped to create a model of a geometric solid.

1. **Cut, fold, and tape the cube net found at the end of the lesson.**

2. **Are there other nets that form a cube? Circle the 11 cutouts that can form a cube.**



3. **How did you determine which are nets of cubes?**

4. **What do all of the nets for a cube have in common? Consider the number of faces, edges, and vertices in your explanation.**

ACTIVITY
3.1

Nets of Rectangular Prisms

A net has all these properties:

- The net is cut out as a single piece.
- All of the faces of the geometric solid are represented in the net.
- The faces of the geometric solid are drawn such that they share common edges.

The **surface area** of a polyhedron is the total area of all its two-dimensional faces.

Consider the cube you created.

1. **How is the area of a face of a cube measured? Analyze the two responses and explain why Leticia is incorrect in her reasoning.**

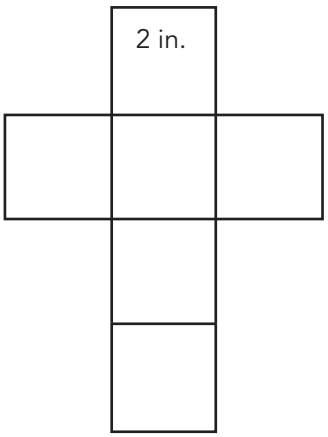
Leticia

This is a 3D figure, which means that its measurements are cubic units.

Isaiah

Surface area is still measuring area, which is always measured in square units.

2. Describe a strategy that you can use to determine the surface area of a cube.

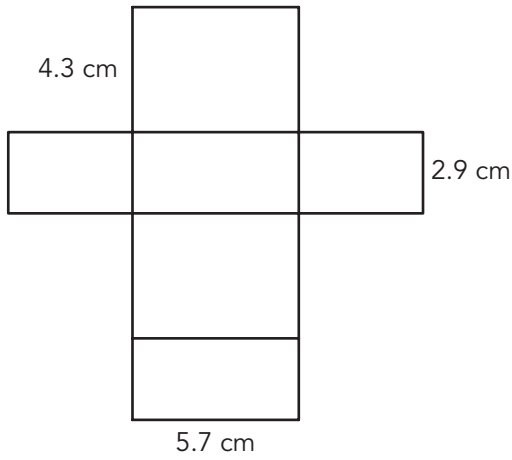


3. Consider the cube net shown. Calculate the surface area.

4. What is the surface area of a unit cube?

5. Let's consider a different rectangular prism.

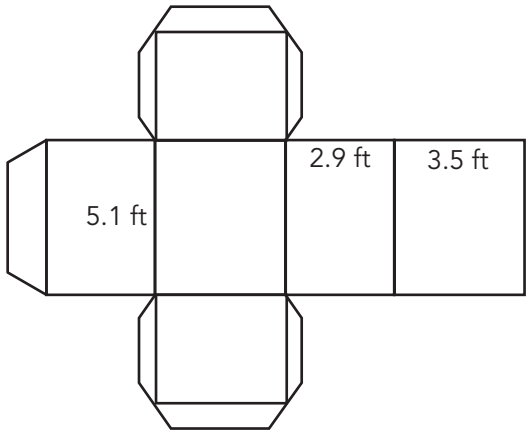
   a. Use the net to estimate the surface area of the right rectangular prism.



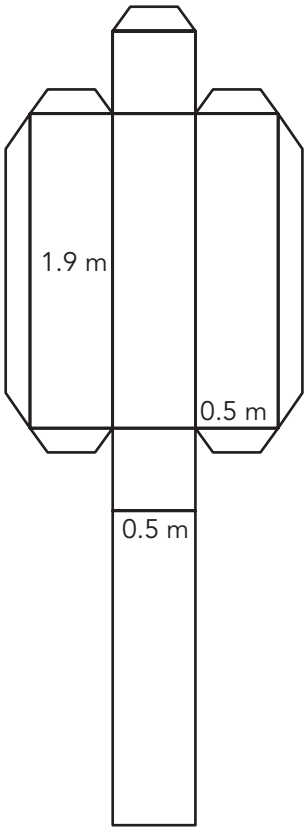
   b. Calculate the surface area of the right rectangular prism. Explain your calculation.

6. Calculate the surface area of the solid figure represented by each net.

a.

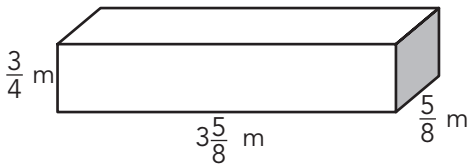


b.

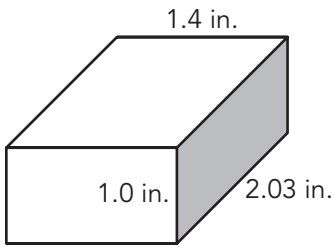


7. Draw a net to represent each solid figure. Label each net with measurements, and then calculate the surface area of the solid figure.

a.

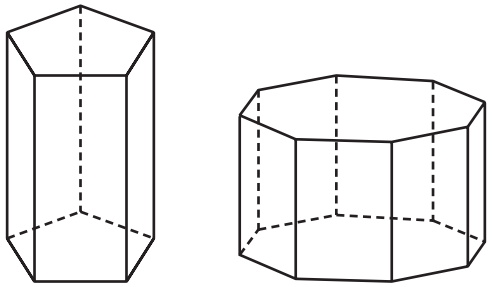


b.



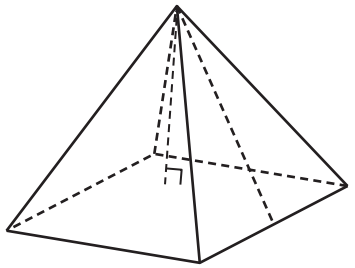
ACTIVITY
3.2 Prisms and Pyramids

The base of a prism does not have to be rectangular. The base of a prism can be a triangle, pentagon, hexagon, and so on.



A **pyramid** is a polyhedron with one base and the same number of triangular faces as there are sides of the base. The vertex of a pyramid is the point at which all the triangular faces intersect.

A **slant height** of a pyramid is the distance measured along a triangular face from the vertex of the pyramid to the midpoint of an edge of the base.



1. Analyze the figures shown. Then, complete the table using the figures.

Figure A

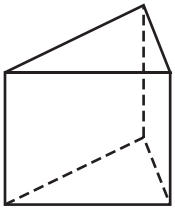


Figure B

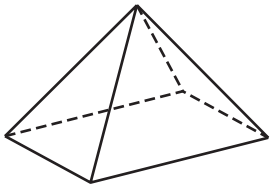


Figure C

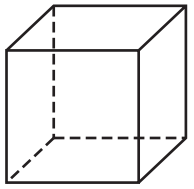


Figure D

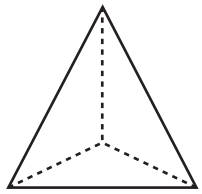


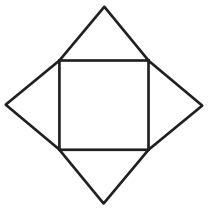
Figure	Is it a Prism or Pyramid?	Shape of Base	Number of Faces	Number of Vertices	Number of Edges
A					
B					
C					
D					

NOTES

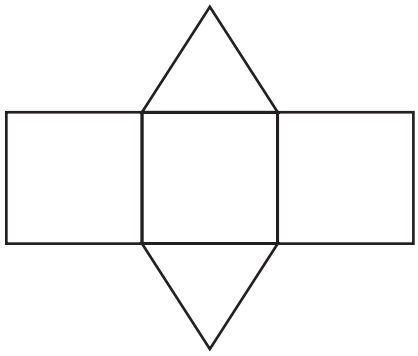
2. Write the names of Figures A, B, C, and D from your completed table.

3. Label each net with the name of the solid figure it forms.

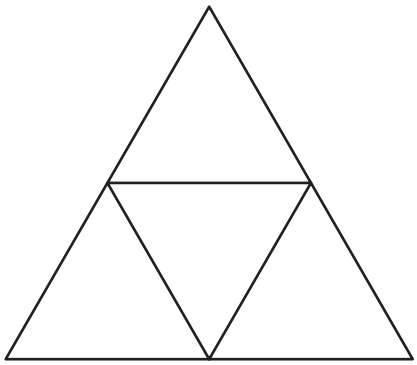
a.



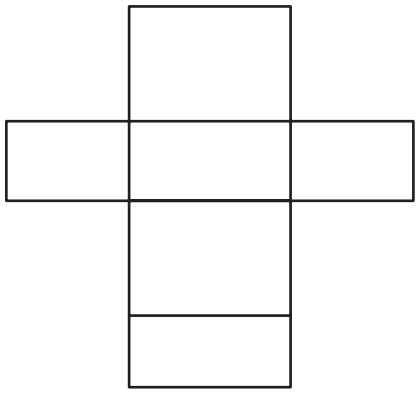
b.



c.



d.



ACTIVITY
3.3 Nets of Other Solids

1. **Locate the nets for the triangular prism and triangular pyramid at the end of the lesson.**

   a. **Measure the edge lengths of each net with a centimeter ruler. Label the lengths.**

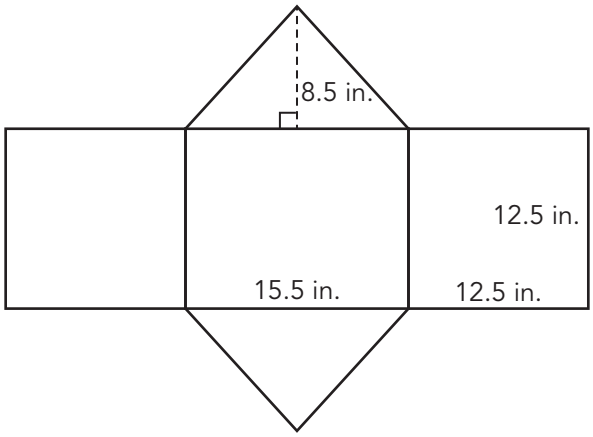
   b. **Calculate the surface area of each solid figure.**

   c. **Cut out, fold, and tape each net.**

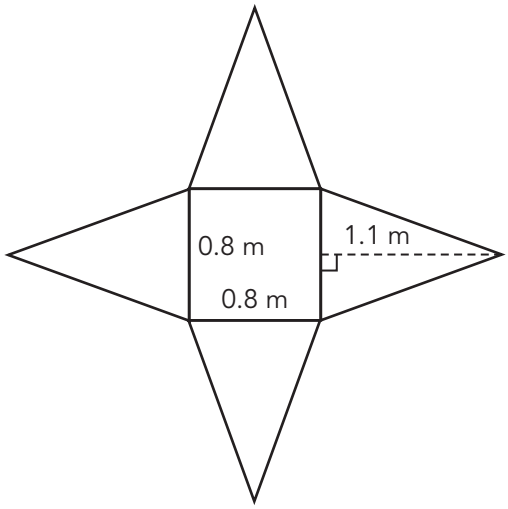
   d. **Name each solid figure.**

2. **Calculate the surface area of the solid figure represented by each net.**

   a.

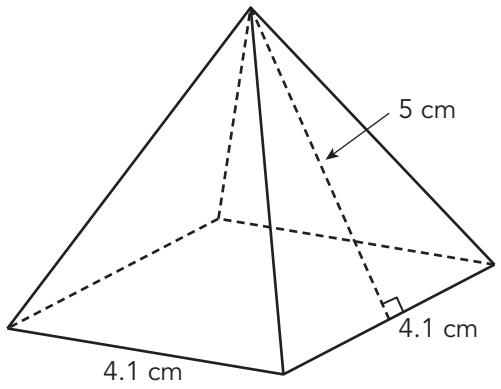


   b.

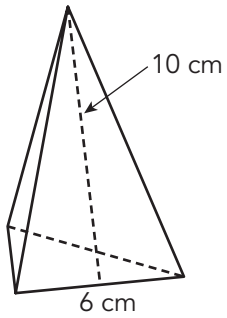


3. **Draw a net to represent each solid figure. Label each net with measurements, and then calculate the surface area of the solid figure.**

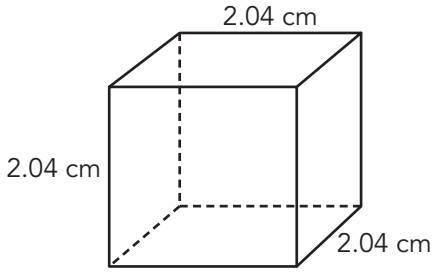
a.



b. The slant heights are all equal. The height of the base is 5.2 cm.



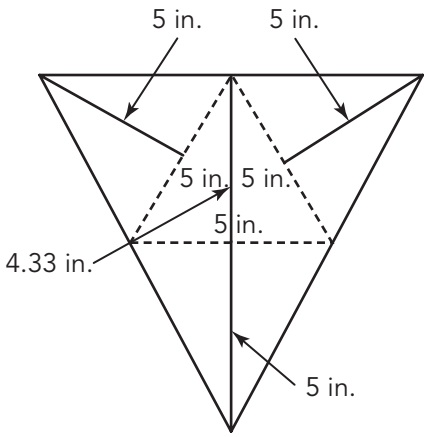
c.



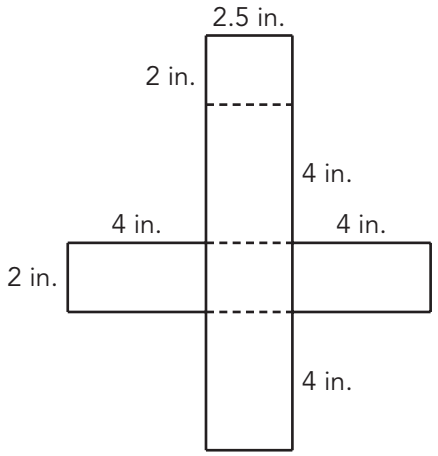
ACTIVITY
3.4 Surface Area Problems

Scents-R-Us produces candles in a variety of shapes. To produce each candle, the company first creates a mold, then pours hot wax into the mold. When the hot wax cools and solidifies, the mold is removed.

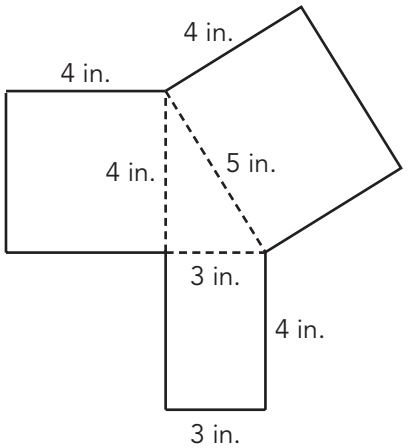
Candle Mold A



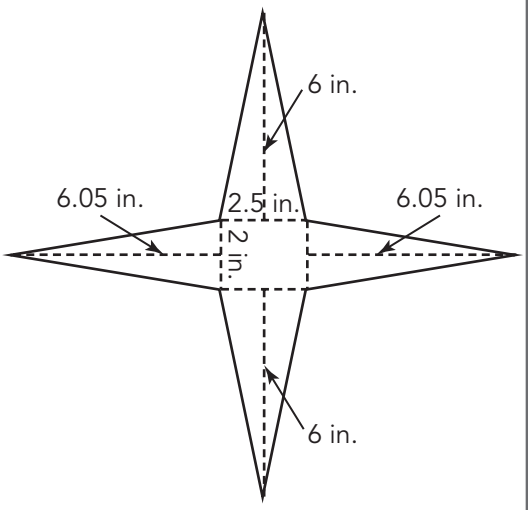
Candle Mold B



Candle Mold C



Candle Mold D



1. **Classify the shape of each candle, based on the candle mold.**

   a. **Candle Mold A**

   b. **Candle Mold B**

   c. **Candle Mold C**

   d. **Candle Mold D**

2. **Use each candle mold to answer each question.**

   a. **Calculate the surface area of each candle.**

   b. **How could Scents-R-Us use the surface area of the candles to determine how to price each candle?**

NOTES

TALK the TALK

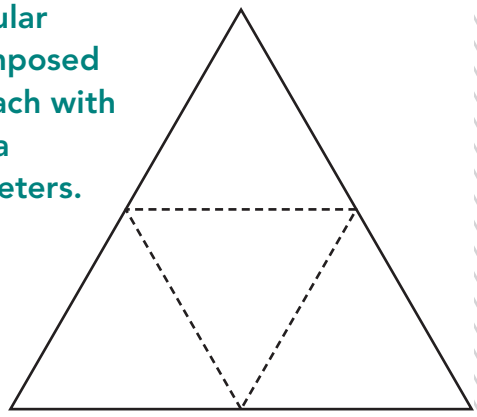
Nothing but Net

1. A rectangular prism has a height of 6 feet, a length of 7.5 feet, and a width of 5 feet.

   a. Draw a net of the rectangular prism and label its measurements.

   b. Calculate the surface area of the prism.

2. Consider the net of the triangular pyramid shown. The net is composed of four equilateral triangles, each with a side length of 4 meters and a height of approximately 3.5 meters.

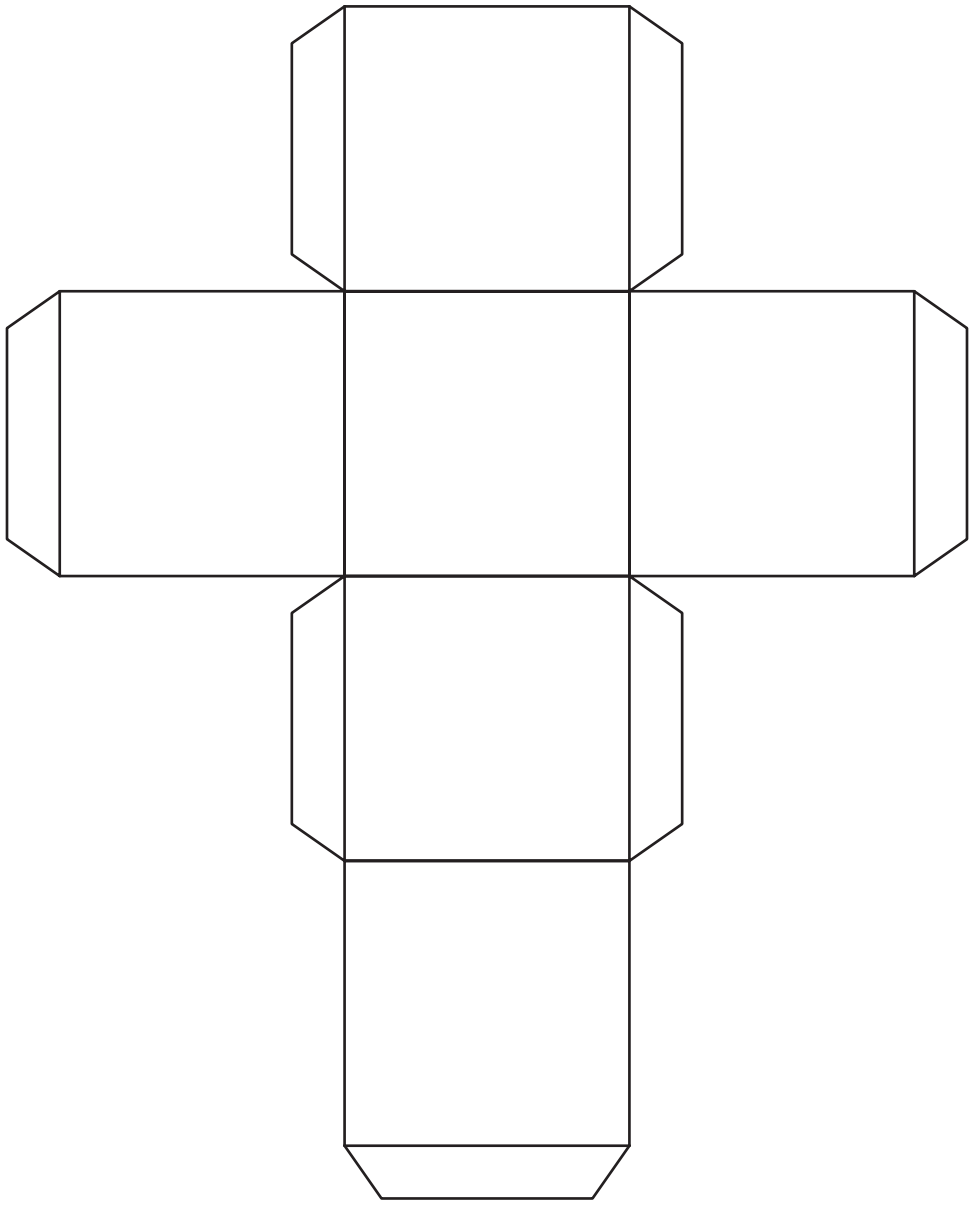


   a. Label the pyramid with its measurements.

   b. Calculate the surface area of the pyramid.

3. Explain in your own words how to determine the surface area of a pyramid.

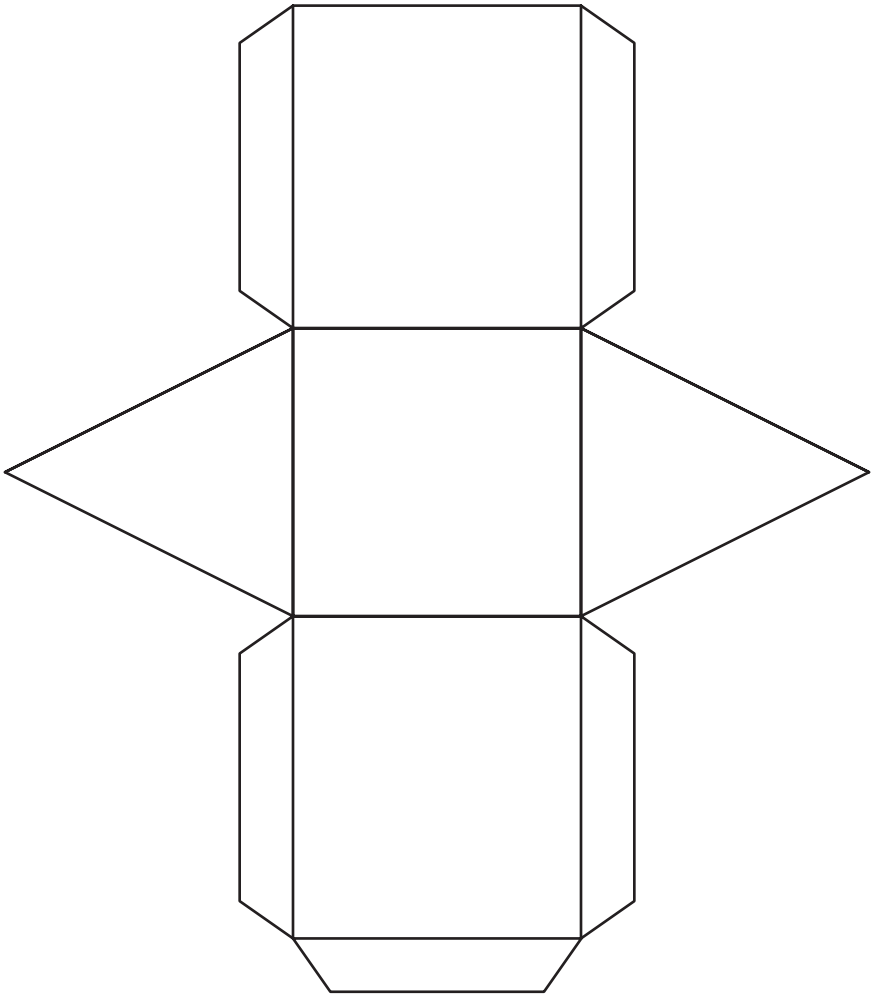
Cube Net



Why is this page blank?

So you can cut out the net on the other side.

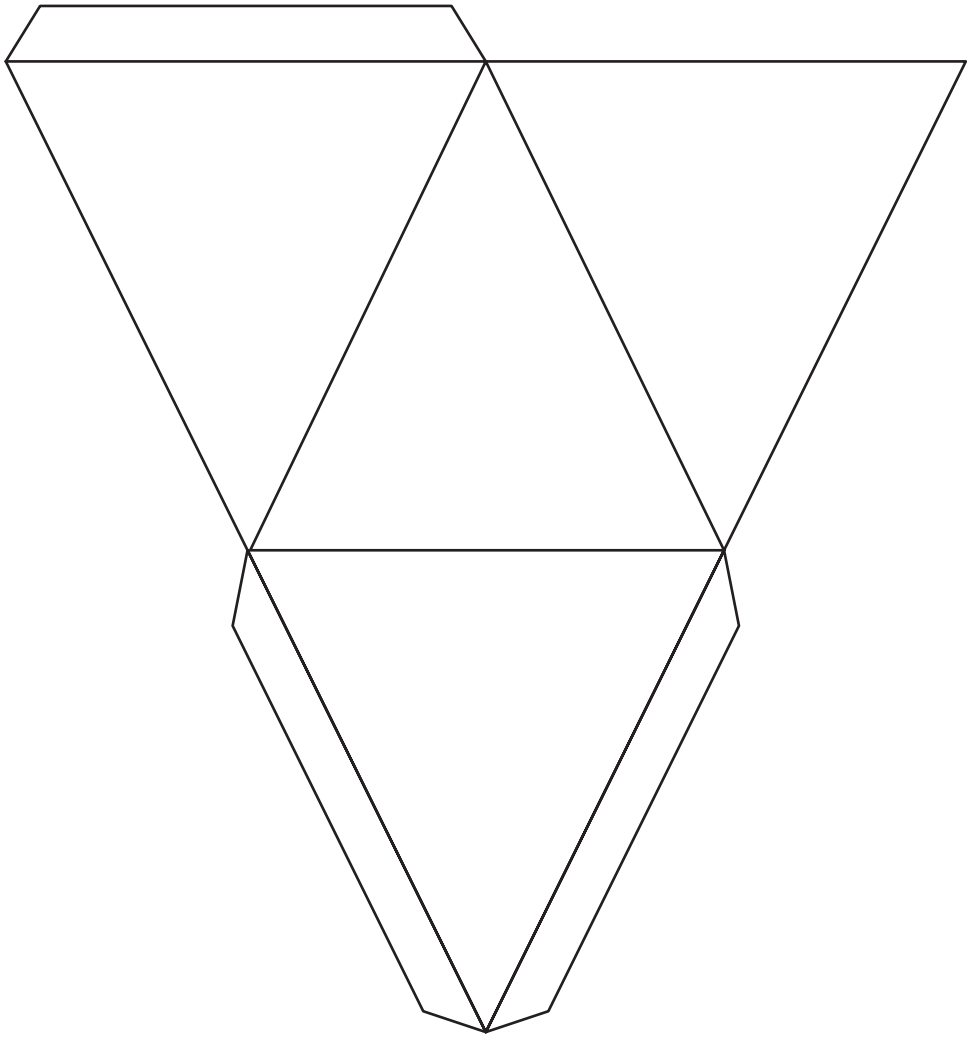
Triangular Prism Net



Why is this page blank?

So you can cut out the net on the other side.

Triangular Pyramid Net



Why is this page blank?

So you can cut out the net on the other side.