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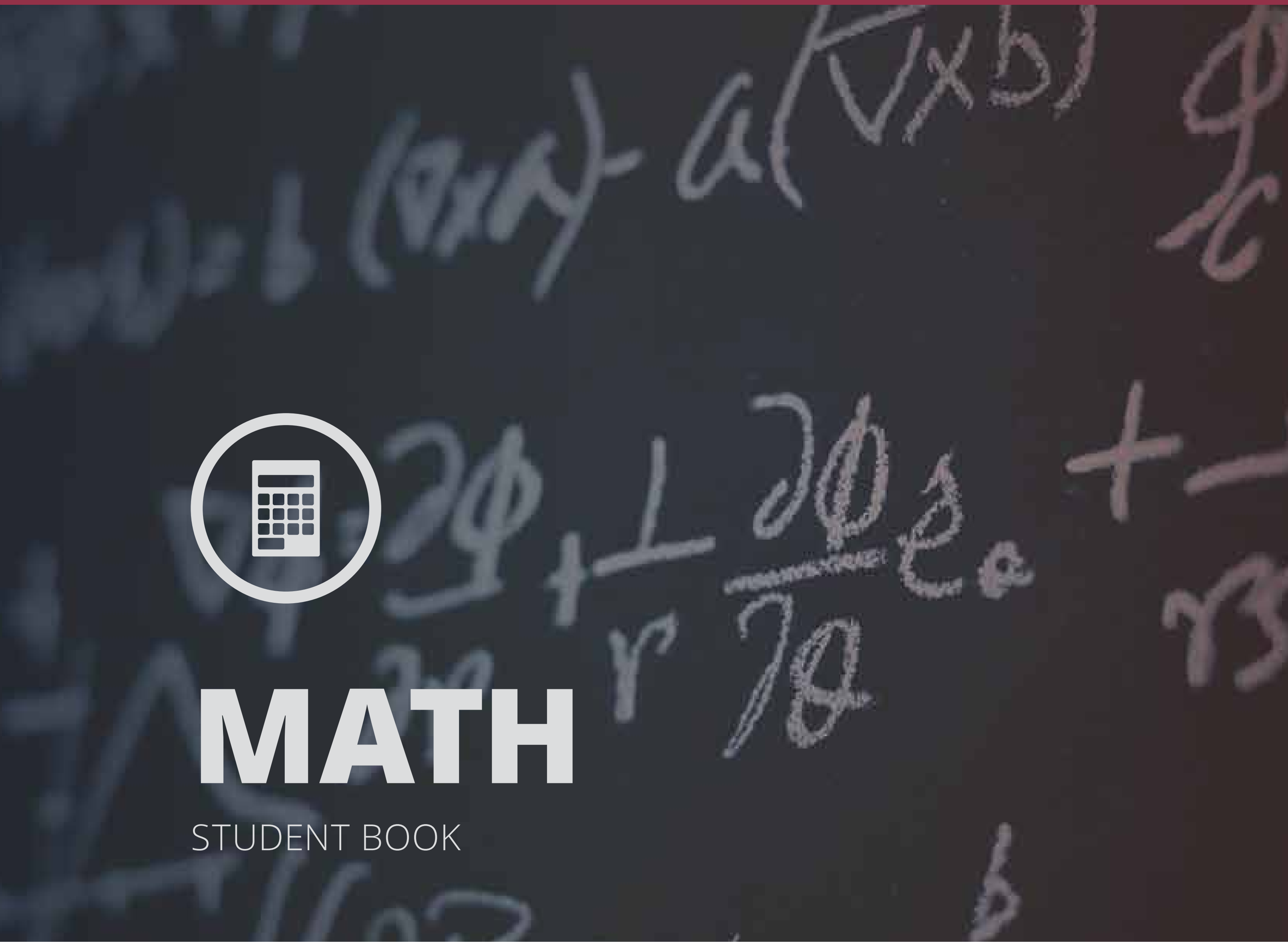

MATH

STUDENT BOOK

7th Grade | Unit 10

Alpha Omega
PUBLICATIONS

Math 710
Surface Area and Volume

LIFEPAC Test is located in the center of the booklet. Please remove before starting the unit.

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Surface Area and Volume

Introduction

In this unit, students will explore solid, or three-dimensional, figures. They will learn how to classify and identify these solids, as well as represent them two-dimensionally. They will also learn to determine the surface area and volume of many solids, including rectangular prisms, triangular prisms, and cylinders.

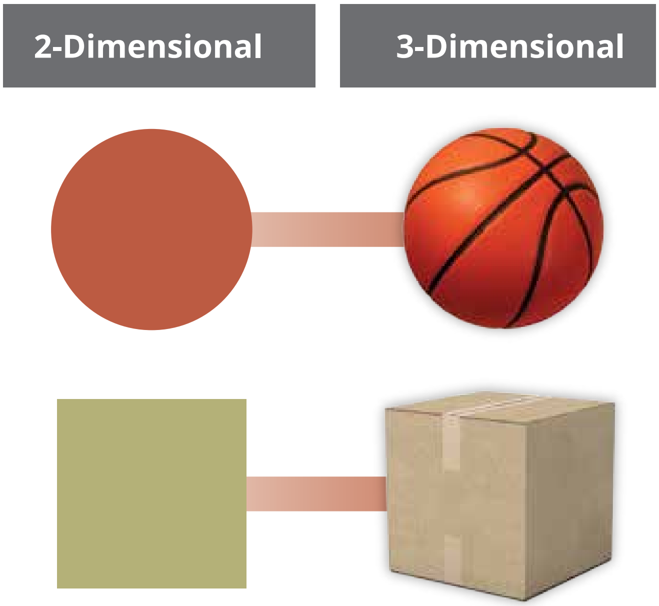
Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAC. When you have finished this LIFEPAC, you should be able to:

- Classify, identify, and draw the net of solid figures.
- Define surface area and volume.
- Find the surface area and volume of solid figures using their nets.
- Apply the surface area formulas for rectangular prisms, triangular prisms and cylinders.
- Apply the volume formulas for rectangular prisms, triangular prisms, and cylinders.
- Determine the effects of dimension changes on the surface area and volume of solid figures.

Survey the LIFEPAC. Ask yourself some questions about this study and write your questions here.

1. Solids



Classifying and Identifying Solids

In this lesson, you'll begin exploring three-dimensional figures and their characteristics.

Objectives

- Classify and identify solid figures.

Vocabulary

apex—the point at the tip of a cone or pyramid

base—a special face of a solid figure

cone—a three-dimensional figure with a circular base

cube—a three-dimensional figure made of six congruent squares

cylinder—a three-dimensional figure with two parallel, congruent, circular bases and a curved surface

edge—a line segment where two faces meet

face—a plane figure that is one side of a solid figure

lateral face—any face that is not a base

lateral surface—any surface that is not a base

plane figure—geometric figure with two dimensions (2D)

prism—three-dimensional figure with two parallel, congruent, polygonal faces and parallelograms for all other faces

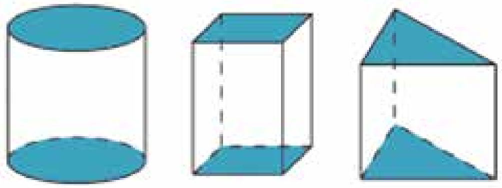
solid figure—geometric figure with three dimensions (3D)

vertex—point where three or more edges meet

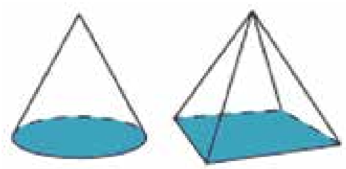
You already know a lot about two-dimensional figures, or *plane figures*. Plane figures have height and width and include quadrilaterals, triangles, circles, and other such shapes. Now you're going to start looking at geometric figures that have a third dimension—depth. These three-dimensional figures are called *solid figures* (or just solids).

Every solid figure has a *base*, which is usually the bottom of it. On a plane figure, the base of the figure is just a line segment. But on a solid figure, the base of the figure is an entire two-dimensional shape, or plane figure. Bases are used to help name the figure. If the solid has another side that is congruent *and* parallel to the base, then the figure actually has two bases. Take a look at some solids that have two bases. The bases are shaded so that you can easily see them. Notice that each base is a flat, plane figure.

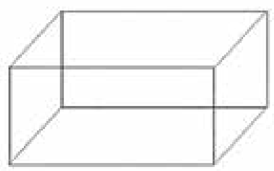
Vocabulary! Remember that to be congruent, two figures have to have the same size and shape. Being parallel means that the figures have no points in common.



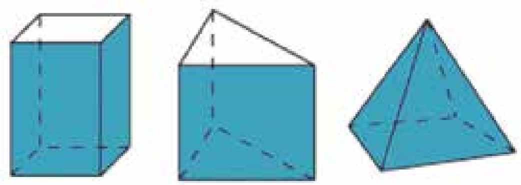
Here are some examples of solid figures that have only one base.



All of the sides of a solid figure that are plane figures, including the bases, are called *faces*. Each line segment where two faces meet is called an *edge*. Each point where three or more edges meet is called a *vertex*. The solid figure in the following illustration has six faces, twelve edges, and eight vertices.

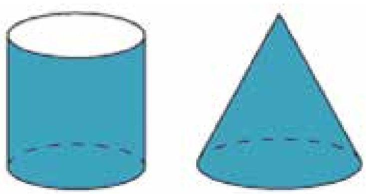


The faces that aren't bases of the solid are called *lateral faces*. The lateral faces are shaded in the following solid figures. Take note that the base on the bottom of each figure is not considered a lateral face; just the sides are lateral faces.



Remember that plane figures are flat. Some solid figures have sides that are not flat, so they're not considered faces. These sides are called *lateral surfaces*, rather than lateral faces. The lateral surfaces are shaded in the following two solids. As in the previous examples, remember that the bases of each figure are not considered part of the lateral surface; only the side of the figure is.

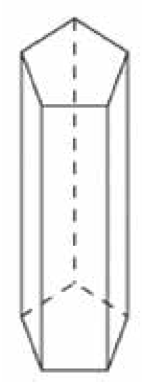
Vocabulary! In geometry, the word lateral always refers to the sides of a solid. It doesn't include the base(s) of a solid. So whenever you see the word lateral, remember to just include the sides.



What do you notice about the figures that have lateral faces compared to the figures that have lateral *surfaces*? The bases of the solids that have lateral faces are polygons, and the bases of the solids that have lateral surfaces are circles! That's because if the base of the solid is circular, then the sides have to be curved in order to accommodate the shape of the base.

Example:

- Answer the following questions based on the following solid figure.



Solution:

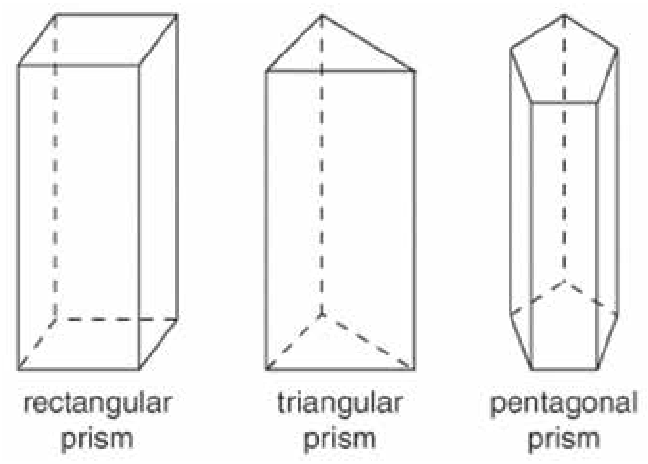
- Question: Does the solid have one or two bases?
  Answer: The base, or bottom, of the solid is a pentagon. Since there is another congruent pentagon that is parallel to the bottom of the solid, it has two bases.
- Question: Does the solid have lateral faces or lateral surfaces?
  Answer: The sides of the solid are plane figures (flat), so the sides are lateral faces.
- Question: How many faces does the solid have?
  Answer: There are seven faces (including the bases).
- Question: How many lateral faces does the solid have?
  Answer: There are five lateral faces (not including the bases).
- Question: How many edges does the solid have?
  Answer: There are fifteen edges (five vertical edges and five on each base).
- Question: How many vertices does the solid have?
  Answer: There are ten vertices (five on each base).

Now take a look at the names of some of the most common solid figures.

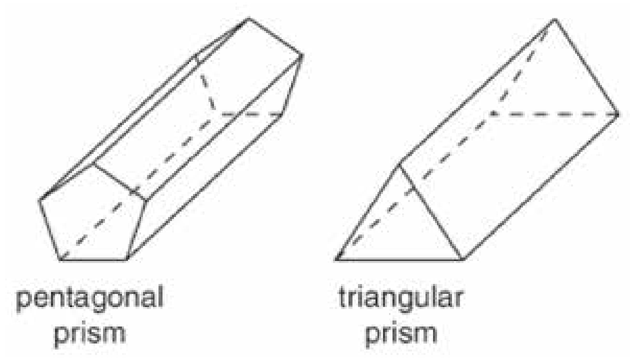
Prisms

A *prism* is a type of solid figure that has two bases. The bases of a prism are always polygons. The lateral faces of a prism are always parallelograms. Prisms are named by the shape of their bases. For example, a prism that has two congruent rectangular bases is called a rectangular prism. A prism that has two congruent triangular bases is called a triangular prism. And a prism that has two congruent pentagonal bases is called a pentagonal prism. Here are some examples.

This might help! On all of the solid figures in this unit, dashed lines are used to represent the edges that can't actually be seen from the given point of view. Solid lines are used for the edges that can be seen from the given point of view.

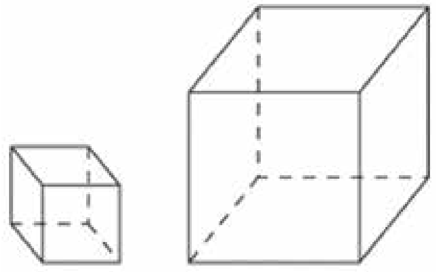


Sometimes a prism may be lying on its side. However, the name of the prism remains the same because the base remains the same—even though it technically isn't the bottom anymore. That's because the definition of a prism is that there are always two congruent polygonal bases, and the rest of the faces are *always* parallelograms. So a triangular or pentagonal prism may be lying on its side, but the triangles and pentagons are still considered the bases of the figure.



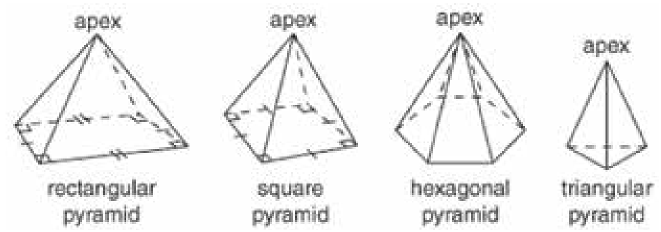
There is one special type of rectangular prism that you need to look at. A *cube* is a prism that has six congruent, square faces.

Make note! The cube is an important solid figure in geometry. It can be used to find the volume (or capacity) of solid figures.



Pyramids

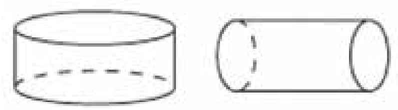
A *pyramid* is similar to a prism in that it has a polygon-shaped base. However, instead of two bases, a pyramid only has one base. The lateral sides of a pyramid are always triangles, which meet at a single point, called an *apex*. Like prisms, pyramids are named based on the shape of their base.



Keep in mind! If there are no measurements given, how can you tell whether the base of a prism or pyramid is a rectangle or a square? Often, the geometric markings that you've learned will be used. Remember that tick marks are used to show which sides have the same length, and a square in the corner of an angle represents a right angle.

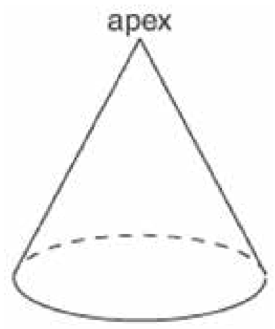
Cylinders

A *cylinder* has two bases like a prism, but its bases are always circles, rather than polygons. The side of a cylinder is curved, rather than flat, so it is called a lateral surface. In fact, the cylinder only has two faces—the bases. As you can see from the following figures, cylinders can also lay on their sides.



Cones

A *cone* is similar to a cylinder in that it has a circular base and the side is curved rather than flat. It's different, though, in that it only has *one* base. The lateral surface comes to a point at the top of the cone. So like a pyramid, the cone has an apex.



Let's Review

Before going on to the practice problems, make sure you understand the main points of this lesson:

- Solid figures are three-dimensional shapes—having height, width, and depth.
- Solid figures can have one or two bases. Pyramids and cones have one base. Prisms and cylinders have two bases.
- If the base of the solid is a polygon, the base is used to name the figure.
- Lateral faces or surfaces are the sides of a solid figure.

Complete the following activities.

1.1 The only solid figure that has two circular bases is a _____ .
- ☐ pyramid ☐ cone ☐ cylinder ☐ prism

1.2 A _____ does not have an apex.
- ☐ cone ☐ prism ☐ pyramid

1.3 A _____ prism has two congruent, parallel bases and three lateral sides.
- ☐ triangular ☐ rectangular ☐ pentagonal

1.4 A prism that has six congruent, square faces is called _____ .
- ☐ a cube ☐ an apex ☐ a pyramid

1.5 A triangular pyramid has _____ faces.
- ☐ two ☐ three ☐ four ☐ five

1.6 A cone is composed of two congruent bases and a lateral surface.
- ○ True
- ○ False

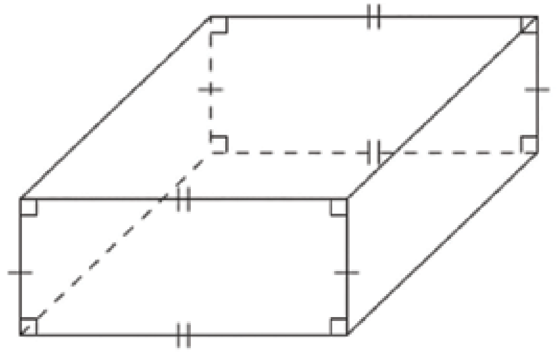
1.7 A cylinder has no lateral faces.

- ○ True
- ○ False

1.8 All of the following solid figures *except* _____ have two congruent, parallel bases.

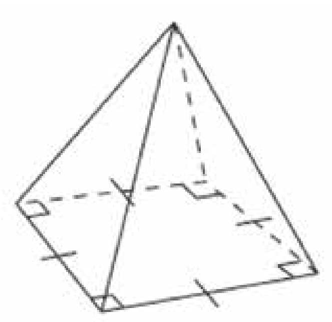
- ☐ rectangular pyramid
- ☐ cylinder
- ☐ heptagonal prism
- ☐ cube

1.9 What is the name of the following solid figure?



- ☐ square prism
- ☐ rectangular prism
- ☐ cube
- ☐ rectangular pyramid

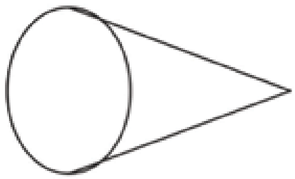
1.10 What is the name of the following solid figure?



- ☐ square prism
- ☐ cube
- ☐ square pyramid
- ☐ rectangular prism

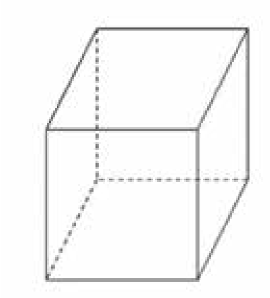
Identify the figures below.

1.11 ______________________________

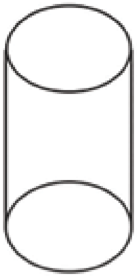


1.12 ______________________________

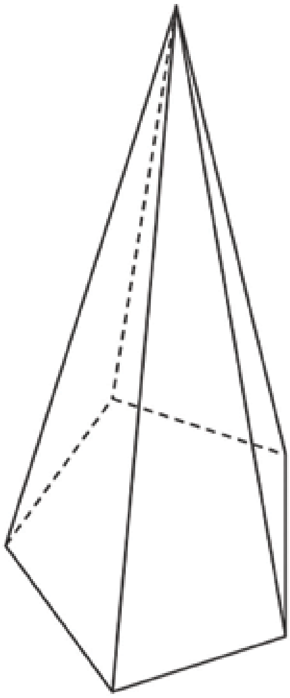
1.13 All edges are equal. ______________



1.14 ______________________________



1.15 ______________________________



Nets

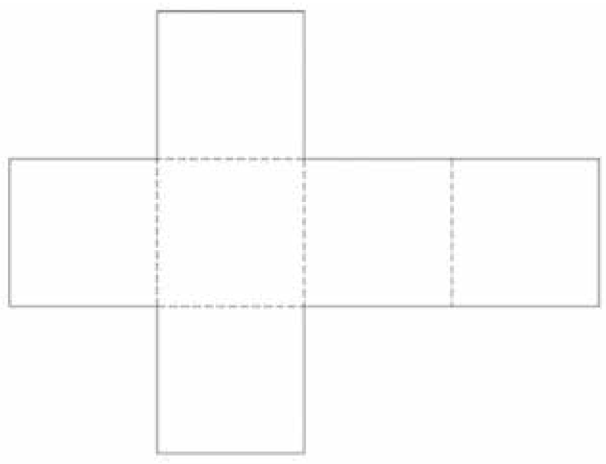
For the following activity, you'll need a sheet of graphs paper, scissors, and tape:

Draw a figure on the graph paper like the one to the right. All of the individual squares must be the same size.

Cut out the t-shaped figure. You should end up with a single T-shaped piece.

Fold along all the dotted lines inside the figure.

Assemble the figure into a cube and secure the edges with tape.



You have now formed a three-dimensional figure using two-dimensional shapes! In this lesson, you'll continue to learn how prisms, pyramids, cones, and cylinders can be created out of plane figures.

Objectives

- Identify and sketch the net of a solid figure.

Vocabulary

net—a two-dimensional representation of a three-dimensional shape when unfolded

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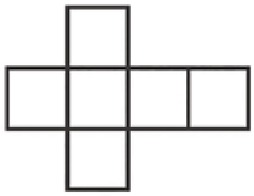
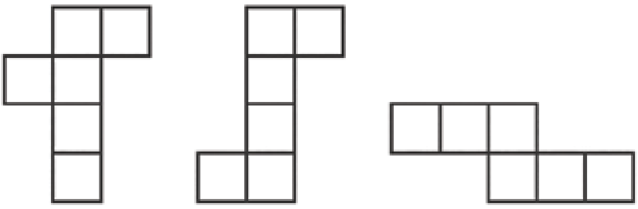
In the activity above, you created a three-dimensional cube from a two-dimensional cut-out. That cut-out is a two-dimensional representation of a cube and is called its *net*. The representation shows what a cube would look like if it was unfolded. Here is the net for a cube again.

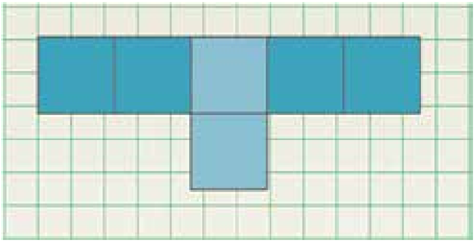


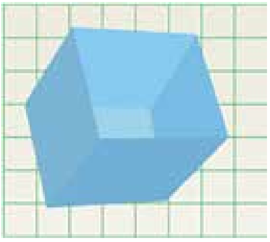
You may be wondering if there is more than one possible net for a cube. The answer is yes! There are actually eleven possible two-dimensional representations of a cube. Here are a few of them:



There are a couple of things to notice about the nets of a cube. Because a cube is composed of six congruent squares, each net must have six congruent squares. However, not every representation with six congruent squares is the net of a cube. Visualizing how the representation looks as it is folded will help you determine if it is a net or not. In a net, none of the parts will overlap, just meet. For example, if you try to fold a representation of a cube that has more than four squares in a row, the squares will overlap. Look at the following illustration that has five cubes in the same row. Notice that two of the squares overlap and there is no top base on the cube.

Key point! In a net, none of the parts will overlap, just meet.

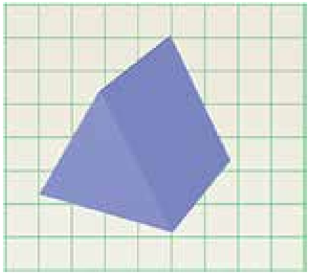


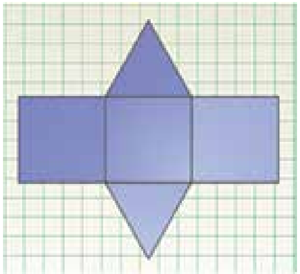


Prisms

You can also draw, or sketch, the net of other prisms. Take a look at the net of a triangular prism in the next illustration. First, you will see the solid figure itself so you can determine how many and what kinds of shapes it's composed of. Then the prism is unfolded so you can see what the net looks like.

Keep in mind! Prisms and pyramids are named for the shape of their bases. So a triangular prism has a triangular-shaped base. Remember, the bases of a figure are the faces on the top and bottom of the figure, and the lateral sides or surfaces are the sides of the figure.

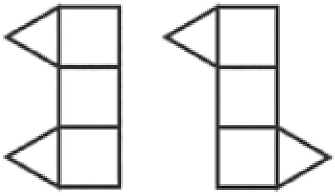




So the triangular prism is composed of two triangles (the bases) and three rectangles (the lateral faces).

Example:

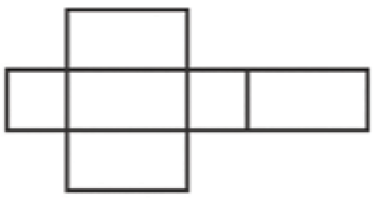
- Which of the following representations is another version of the net of a triangular prism?



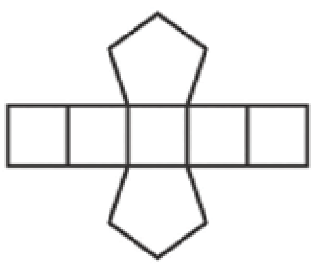
Solution:

- To be the net of a triangular prism, the representation must contain two triangles for the bases and three rectangles for the lateral faces. Both of the representations contain the correct quantity and shape of parts. However, the representation on the left has both triangular bases on the same side of the faces. When the left representation is folded, those two triangles will overlap. In comparison, the representation on the right has one triangular base on each side of the lateral faces. So the two bases will not overlap. The representation on the right is the net of a triangular prism.

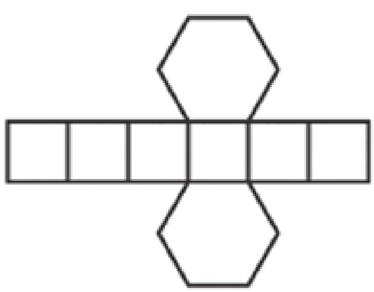
Here are the nets of a few more common prisms. Remember that different versions of these nets are possible, but they must contain the right number and kinds of shapes. In addition, none of the parts can overlap when the net is folded.



rectangular prism



pentagonal prism

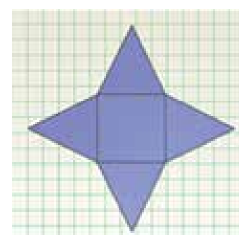


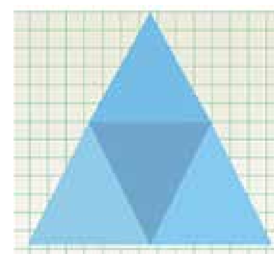
hexagonal prism

Pyramids

You've explored the nets of different type of prisms. Can you build a net for other solids, too? What about pyramids, cylinders, and cones? Yes! All of these solid figures can be drawn using a two-dimensional representation. To follow are the nets of a square pyramid and a triangular pyramid.

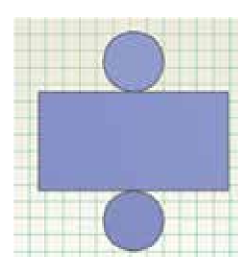
This might help! Notice that the nets of a pyramid are composed of the base of the pyramid and the same number of triangles as there are sides on the base. For example, the square pyramid is made up of a square (for the base) and four triangles (for the lateral faces). Each of the lateral faces must be connected to one side of the base.





Cylinders

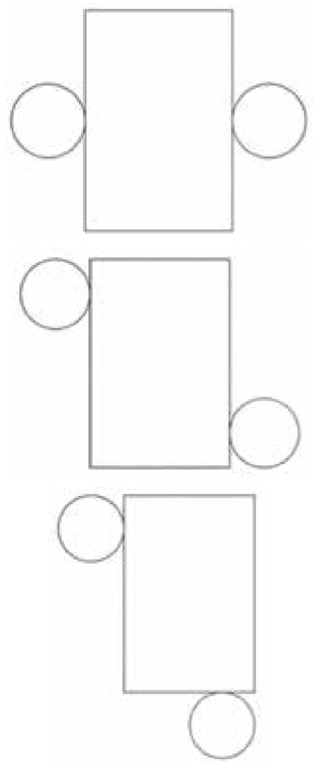
The next figure you'll look at is the cylinder. The net of a cylinder is different than you might think. Remember that a cylinder is composed of two circular bases and a lateral surface. The bases are easy—you can use two circles (on opposite sides of the lateral surface) to represent them. But what about the lateral surface of a cylinder? Take a look.



So if you cut the lateral surface vertically, it will unroll into a rectangle!

Example:

- Which of the following representations is a version of the net of a cylinder?

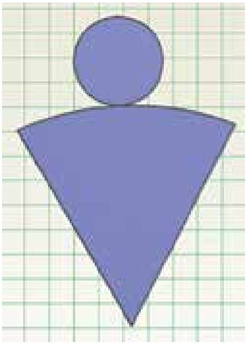


Solution:

- To be the net of a cylinder, the representation must contain two circles for the bases and one rectangle for the lateral surface. All of the diagrams contain the required parts. However, the bases must be on opposite sides of the lateral surface. The first two diagrams are true nets for a cylinder, but the third diagram would have a circle sticking out the side if you tried to assemble it.

Cones

The net of a cone is similar to the net of a cylinder. However, a cone has only one circular base, so the net will have only one circular base. Also, when you cut the lateral surface vertically and unroll it, it will unroll into a wedge (similar to the shape of a piece of pie).



Let's Review

Before going on to the practice problems, make sure you understand the main points of this lesson:

- A net is a two-dimensional representation of a three-dimensional figure.
- To be the net of a solid, a representation must have the same number and kinds of faces or surfaces as the solid.
- When folded, none of the parts of a net should overlap.

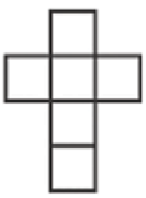
Complete the following activities.

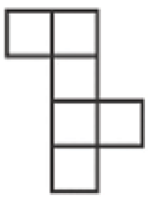
1.16 The net of a rectangular prism is composed of six rectangular pieces.
- ○ True
- ○ False

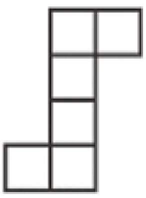
1.17 The net of a triangular pyramid is composed of one triangle and three rectangles.
- ○ True
- ○ False

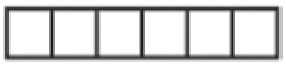
1.18 Choose all of the shapes that are used to create the net of a cylinder.
- ☐ circle
- ☐ triangle
- ☐ wedge
- ☐ rectangle

1.19 Which of the following representations is not the net of a cube?

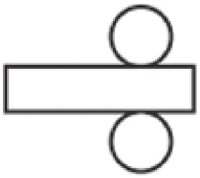
☐ 

☐ 

☐ 

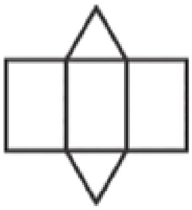
☐ 

1.20 What shape can be created by the given net?



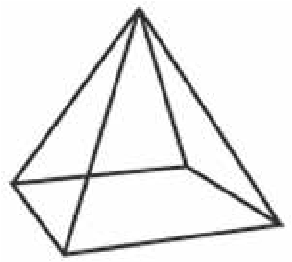
- ☐ cylinder
- ☐ cone
- ☐ cube
- ☐ circular prism

1.21 What shape can be created by the given net?

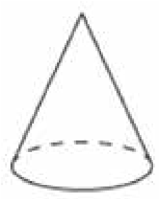


- ☐ wedge
- ☐ triangular prism
- ☐ cone
- ☐ triangular pyramid

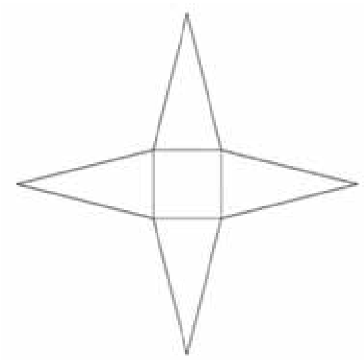
1.22 Sketch the net of the following figure on a sheet of paper and give it to your teacher or describe in words what the net would look like.



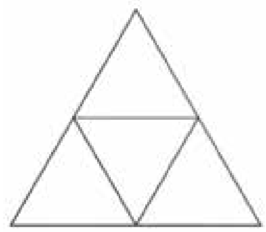
1.23 Sketch the net of the following figure on a sheet of paper and give it to your teacher or describe in words what the net would look like.



1.24 What figure would this net make?



1.25 What figure would this net make?



1.26 What shapes would be included in the net of a pentagonal prism?

1.27 What shapes would be included in the net of a hexagonal pyramid?

1.28 What shapes would be included in the net of a cylinder?

Surface Area and Volume

In this lesson, you'll be exploring how to measure and describe solid figures using *surface area* and *volume*.

Objectives

- Explain what surface area and volume mean.
- Use an algorithm to find the surface area or volume of a solid figure.

Vocabulary

cubic units—units used to measure the volume of a three-dimensional figure
square units—units used to measure the surface area of a three-dimensional figure
surface area—the total area of all the faces or surfaces of a three-dimensional figure
volume—the amount of space inside a three-dimensional figure

There are two ways to describe solid figures using measurement—surface area and volume. Surface area measures the total area on the *outside* of the figure. For example, the surface area of an aluminum can could be used to determine the least amount of paint that would be needed to paint the entire outside of the can. As you saw in the clip at the beginning of the lesson, surface area is measured in *square units* because it describes how many unit squares are needed to cover the space. Square units are labeled with an exponent of 2. For example, square inches can be written as $in.^2$, and square centimeters can be written as cm^2.

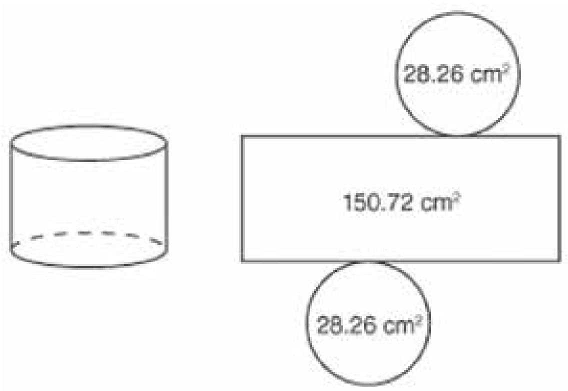
Volume measures the amount of space that's inside a solid figure. For example, the volume of an aluminum can could be used to determine the greatest amount of liquid that can be stored inside the can. Volume is measured in *cubic units* because it describes how many unit cubes are needed to fill the space. Cubic units are labeled with an exponent of 3. For example, cubic feet can be written as ft^3, and cubic meters can be written as m^3.

Key point! Surface area describes the area on the outside of the solid figure and is measured using square units. Volume describes the space inside the solid figure and is measured using cubic units.

Surface Area

So how do you find the surface area of a solid? You can actually use the net of a solid figure to help you! Remember that a net is a two-dimensional representation of a three-dimensional figure. For example, the net of a cylinder is composed of two circular bases and a rectangle for the lateral surface.

Since the net represents every surface of the cylinder, you can find the total area of all the surfaces (or the surface area) by adding up the areas of each surface. Find the surface area of the following cylinder.



Notice that the area of each base is 28.26 cm^2 and the area of the lateral surface is 150.72 cm^2. So the surface area of the cylinder is the sum of the three surfaces:

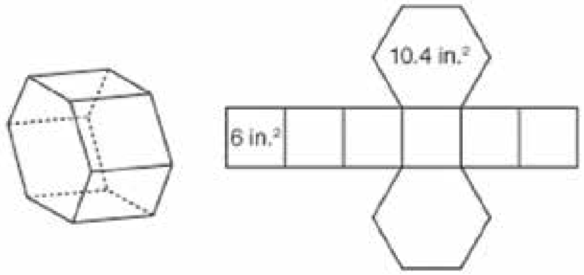
$$28.26\ cm^2 + 150.72\ cm^2 + 28.26\ cm^2 = 207.24\ cm^2$$

Be Careful! Area and surface area are both measured in square units. When you add square units to square units, the result is also in square units because adding values together doesn't change the unit of measurement. So make sure you don't change the exponent in the label.

RULE: The surface area of any solid figure can be found by adding the areas of each individual surface of the figure.

Example:

- Find the surface area of the following hexagonal prism using its net. Each of the rectangles has the same area, and both bases have the same area.



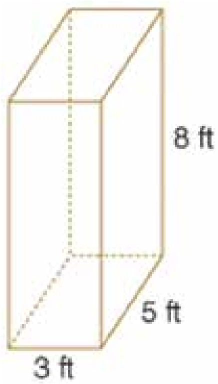
Solution:

- To find the surface area of this prism, you need to add the areas of all its faces. The net shows that there are two hexagonal bases (each with an area of 10.4 in.^{2}) and six rectangular lateral faces (each with an area of 6 in.^{2}).
- surface area = 10.4 + 10.4 + 6 + 6 + 6 + 6 + 6 + 6
- surface area = 56.8
- The surface area of the hexagonal prism is 56.8 in.^{2}

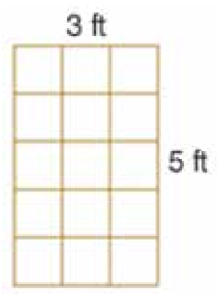
Volume

Do you remember from the beginning of the lesson that volume is really describing how many unit cubes will fit inside a solid figure? For example, to find the number of unit cubes that fit inside a rectangular box, you could physically fill the box with unit cubes and then count the number of cubes that it took to fill the box. That method probably won't be practical in every situation, though. So you're going to use multiplication to help you. If you know the number of cubes that are necessary to cover the bottom of the figure, then you can multiply that by the number of layers that would be needed to fill the entire figure. Take a look at an example. Find the volume of the following box by determining the number of cubes needed to cover the bottom of the box and multiplying that by the number of layers of cubes needed to fill the box.

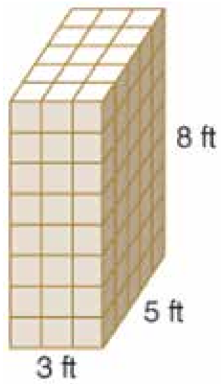
This might help! Remember that a unit cube is a cube in which every side is 1 unit in length. The volume of a unit cube is 1 cubic unit. Whatever unit of measure the dimensions of the figure are given in is the unit of measure that you'll use for the unit cube. For example, the box is measured in feet, so the length of every side of each unit cube is 1 foot, and the volume of each unit cube is 1 ft^3.



Fill the bottom of the box with unit cubes that are 1 foot in length on every edge. Then count the number of cubes used to cover the bottom. Rather than counting, you could also multiply the length of the bottom by the width of the bottom to determine the number of cubes. So there are $3 \cdot 5$, or 15 cubes needed to cover the bottom layer of the box.



Since the height of the box is 8 feet, it will take 8 layers of cubes to fill the box. Each layer will contain 15 cubes. Multiply 15 cubes by 8 layers to find the total number of cubes that would be needed to fill the box. So 120 cubes are needed to fill the box. Since each cube represents a volume of 1 cubic foot, the volume of the box is 120 ft^3.



So look back at what you did to find the volume of the box. You first determined the number of unit cubes that were needed to cover the bottom of the figure. That same value also represents the area of the bottom (or base) of the figure. Then you multiplied that value by the number of layers needed to fill the box, which is also the height of the figure. So all you really did was multiply the area of the base (or the bottom face) by the height of the figure. The same method can be used to find the volume of any solid figure that has two congruent, parallel bases.

Example:

- What is the volume of a cube that has a base with an area of 16 square inches?

Solution:

- A cube is made of six squares. If the area of one square is 16 square inches, then the length of each side of the square is 4 inches because 4 x 4 = 16.
- Because the length, width, and height are all equal on a cube, you now

know the dimensions of the cube. To find the volume of the cube, multiply the area of the base by the height.

$$V = (16 \text{ sq. in.})(4 \text{ in.})$$
$$V = 64 \text{ cu. in.}$$

Keep in mind! All cylinders and prisms have two congruent, parallel bases.

RULE: The volume of any solid figure that has two congruent, parallel bases can be found by multiplying the area of the base by the height of the figure.

Example:

- What is the volume of a prism that has a height of 9 feet and the following base?

Solution:

- Multiply the area of the base, or 3.75 ft^2, by the height of the prism, or 9 ft:
- volume = (3.75)(9)
- volume = 33.75
- So the volume of the prism is 33.75 ft^3.

Let's Review

Before going on to the practice problems, make sure you understand the main points of this lesson:

- Surface area represents the amount of space that covers the outside of the figure, and volume represents the amount of space that fills the inside of the figure.
- The surface area of a solid figure is the sum of the areas of all its faces or surfaces. It is measured using square units.
- The volume of any solid figure with two congruent, parallel bases is the product of the area of its base times its height. It is measured using cubic units.

Complete the following activities.

1.29 Jillian wants to figure out how much water will fit inside the water tower that is by her house. So she wants to find the volume of the water tower.

- ○ True
- ○ False

1.30 Miguel is staining a wooden box. To determine how much stain he needs, he'll need to find the surface area of the box.

- ○ True
- ○ False

1.31 Dawson is covering a large cylinder with brown paper. He'll need to find the volume of the cylinder in order to determine how much paper he needs.

- ○ True
- ○ False

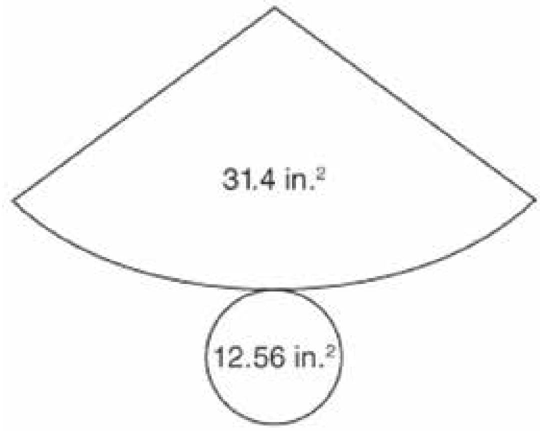
1.32 Surface area is always measured in square units.

- ○ True
- ○ False

1.33 The volume of the following solid figure could be found by multiplying the area of its circular base by the height of the cone.

- ○ True
- ○ False

1.34 Find the surface area of the cone represented by the net below.

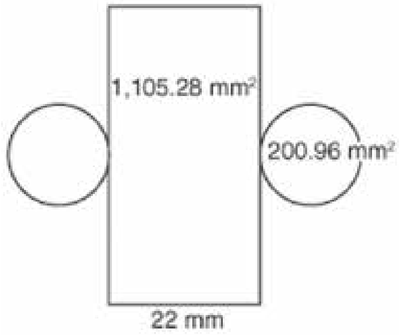


- ☐ 31.4 $in.^2$
- ☐ 43.96 $in.^2$
- ☐ 394.38 $in.^2$
- ☐ 56.52 $in.^2$

1.35 What is the volume of a pentagonal prism that has a base area of 5.16 cm^2 and a height of 9 cm?

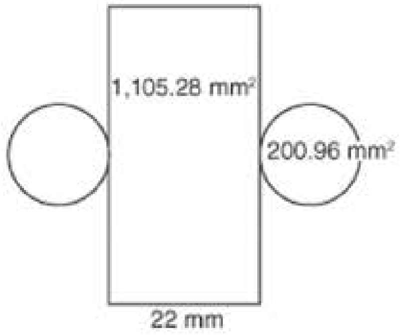
- ☐ 46.44 cm^3
- ☐ 14.16 cm^3
- ☐ 19.32 cm^3
- ☐ 55.32 cm^3

1.36 How would you find the surface area of the figure represented by the given net? (Note: The area of each circular base is the same.)



- ☐ Add 1,105.28 + 200.96 + 22.
- ☐ Multiply (22)(200.96).
- ☐ Multiply (1,105.28)(200.96).
- ☐ Add 1,105.28 + 200.96 + 200.96.

1.37 How would you find the volume of the figure represented by the given net? (Note: The area of each circular base is the same.)



- ☐ Add 1,105.28 + 200.96 + 22.
- ☐ Multiply (200.96)(22).
- ☐ Multiply (1,105.28)(200.96).
- ☐ Add 1,105.28 + 200.96 + 200.96.

1.38 What is the volume in ft^3 of the solid figure (with congruent, parallel bases) that has a height of 11 feet and the following base?

1.39 What is the surface area in cm^2 of a cube in which each face of the cube has an area of 7 cm^2?

1.40 What is the volume of a cylinder if each base is 12.56 square inches and the height is 3 inches?

1.41 What is the volume of a cube with each side 5 cm?

1.42 What is the volume of a prism with a base area of 2.1 m^2 and a height of 7 m?

1.43 What is the volume of a rectangular prism that is 4 feet long, 3 feet wide, and 2 feet high?

1.44 What is the surface area of a cube with each side 3 feet?

Review the material in this section in preparation for the Self Test. The Self Test will check your mastery of this particular section. The items missed on this Self Test will indicate specific areas where restudy is needed for mastery.

Self Test 1: Solids

Complete the following activities (5 points, each numbered activity).

1.01 A cone has an apex.
- ○ True
- ○ False

1.02 The bases of a cylinder must be polygons.
- ○ True
- ○ False

1.03 A square pyramid has five faces.
- ○ True
- ○ False

1.04 The net of a cylinder has two parts.
- ○ True
- ○ False

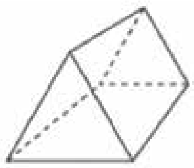
1.05 Surface area of a solid figure can be found by multiplying the area of the base by the height of the figure.
- ○ True
- ○ False

1.06 Volume is measured in cubic units.
- ○ True
- ○ False

1.07 A prism _____ has two congruent, parallel bases.
- ☐ never
- ☐ sometimes
- ☐ always

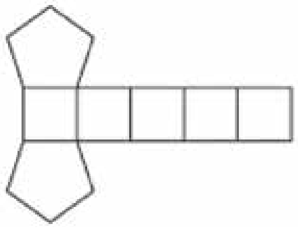
1.08 The net of a cone is composed of a circle and a _____ .
- ☐ triangle
- ☐ wedge
- ☐ rectangle

1.09 Identify the solid figure below.



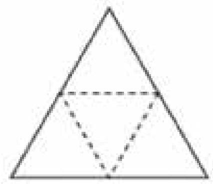
- ☐ triangular pyramid
- ☐ triangular prism
- ☐ rectangular prism
- ☐ rectangular pyramid

1.010 Which solid figure has the following net?



- ☐ pentagonal prism
- ☐ pentagonal pyramid
- ☐ hexagonal prism
- ☐ hexagonal pyramid

1.011 Which solid figure has the following net?



☐ triangular prism
☐ square pyramid
☐ triangular pyramid
☐ cone

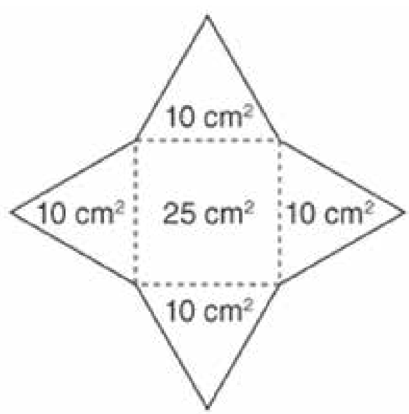
1.012 What is the surface area of a cylinder that has the following measurements?
area of each base: 50.24 ft^2
area of lateral surface: 75.36 ft^2
height of cylinder: 3 ft

☐ 125.6 ft^2 ☐ 150.72 ft^2 ☐ 128.6 ft^2 ☐ 175.84 ft^2

1.013 What is the volume of a cylinder that has the following measurements?
area of each base: 50.24 ft^2
area of lateral surface: 75.36 ft^2
height of cylinder: 3 ft

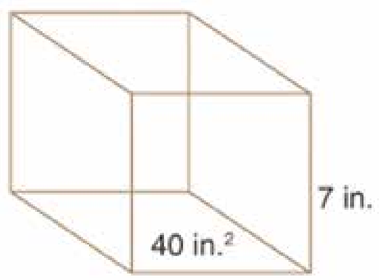
☐ 150.72 ft^3 ☐ 226.08 ft^3 ☐ 128.6 ft^3 ☐ 175.84 ft^3

1.014 Find the surface area of the solid figure represented by the given net.



☐ 250 cm^2
☐ 65 cm^2
☐ 90 cm^2
☐ 40 cm^2

1.015 Find the volume of the solid figure shown below. The area of the base is 40 square inches, and the height of the figure is 7 inches.



☐ 47 $in.^3$
☐ 108 $in.^3$
☐ 68 $in.^3$
☐ 280 $in.^3$

1.016 The area of the base of a prism is 19 square feet. What is the volume of the prism if the height is 3 feet?

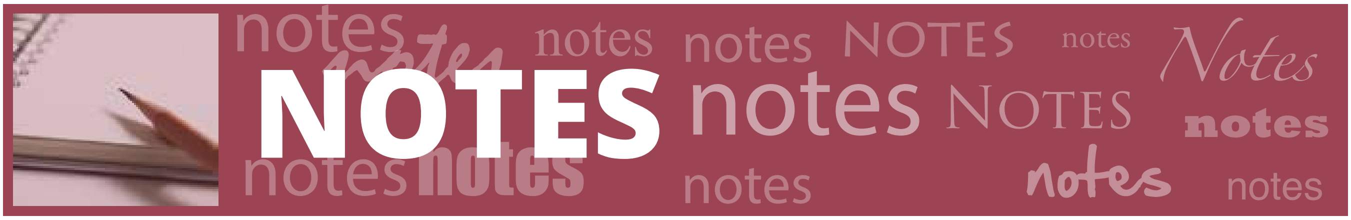
1.017 A cube has a side that is 6 cm long. What is the surface area of the cube?

1.018 A cube has a side that is 6 cm long. What is the volume of the cube?

1.019 A cylinder has a radius of 2 inches. The rectangle portion of its net is 24 square inches. What is the surface area of the cylinder?

1.020 A cylinder has a radius of 2 inches and a height of 4 inches. What is the volume of the cylinder?

80/100 **SCORE** ____________ **TEACHER** ____________ ____________
initials date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