Chapter 12
Lesson 1

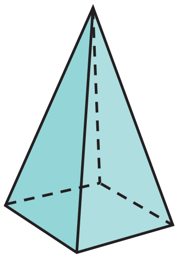
Name ______________________ Date ____________

Transforming Two-Dimensional Nets into Three-Dimensional Figures

NCTM Standards 3, 7, 8, 9, 10

Look at each three-dimensional figure and answer the questions by writing *yes* or *no*.

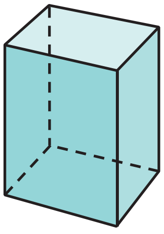
1



Does this three-dimensional figure appear to have any faces that are

parallelograms?	______	perpendicular?	______
triangles?	______	congruent?	______
trapezoids?	______	parallel?	______

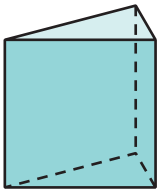
2



Does this three-dimensional figure appear to have any faces that are

parallelograms?	______	perpendicular?	______
triangles?	______	congruent?	______
trapezoids?	______	parallel?	______

3



Does this three-dimensional figure appear to have any faces that are

parallelograms?	______	perpendicular?	______
triangles?	______	congruent?	______
trapezoids?	______	parallel?	______

Use the small copy of your net.

4 Tape or glue the net here.

5 Describe your net.

6 **Challenge** Tell how you could find the total area of the net.

Chapter 12
Lesson 2

Name ______________________ Date ____________

Describing Three-Dimensional Figures

NCTM Standards 2, 3, 7, 8, 9, 10

1 Choose a three-dimensional figure and record its letter here: ______

Describe the faces of your three-dimensional figure and tell if any faces appear to be *congruent*, *parallel*, or *perpendicular*.

____

____

____

____

____

____

____

____

____

____

____

2 Complete the chart to show how many faces, vertices, and edges your three-dimensional figure has.

Faces	
Vertices	
Edges	

Add the number of faces and vertices:

F + V ______

From that sum, subtract the number of edges:

F + V − E = ______

3 Find out what other students got as their answer for Problem 2. Are you surprised? Based on what you find out, write a sentence or two stating a possible conclusion about polyhedra.

4 Pick any prism. Choose one vertex of that prism. Count how many faces meet at that vertex.

A Is there any vertex of that prism at which a *different* number of faces meet?

B Would your answer be different if you chose a prism with a different base? Explain why.

5 Pick any pyramid that has one non-triangular face. Choose one vertex of that pyramid. Count how many faces meet at that vertex.

A Is there any vertex of that pyramid at which a *different* number of faces meet?

B Would your answer be different if you chose a pyramid with a different non-triangular base? Explain why.

6 **Challenge** Sketch one of the three-dimensional figures you used on this page.

Chapter 12
Lesson 3

Name ______________________ Date __________

Sorting Three-Dimensional Figures

NCTM Standards 3, 7, 8, 9, 10

For each three-dimensional figure, write the letters of *all* attributes that apply. Some attributes apply to more than one figure.

1. Pyramid ______________
2. Cone ______________
3. Prism ______________
4. Sphere ______________
5. Cylinder ______________

Attributes

A All its faces are polygons.

B It has at least one circular base and one other surface.

C It has more vertices than faces.

D The number of vertices equals the number of faces.

E It is a polyhedron.

F All its faces are polygons, and all but one of the faces share a vertex.

G It has two parallel, congruent bases.

H It has no vertices or faces.

I One of its faces can be any polygon. The rest are triangles.

J All points on this figure are the same distance from a single point.

K It is two-dimensional.

L It is three-dimensional.

M All its faces must be rectangles.

N All its faces must be triangles.

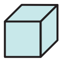
6 Describe the differences between pyramids and prisms. Be sure to use attributes such as *congruent*, *parallel*, and *perpendicular*.

7 **Challenge** Look at the polyhedra your class sorted that are neither prisms nor pyramids. Describe some of the attributes of these three-dimensional figures (G, H, I, J, M, Y) that make them neither prisms nor pyramids.

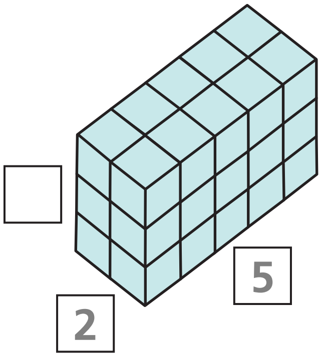
Name ______________________ Date ____________

Volume of Rectangular Prisms

NCTM Standards 1, 3, 4, 7, 8, 9 10

Find the area of the base and the volume of each rectangular prism built out of inch cubes.  **= 1 cu in.**

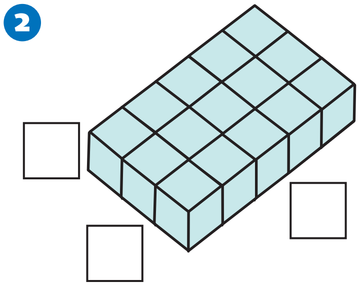
1



Area of base: ____ sq in.

Volume: ____ cu in.

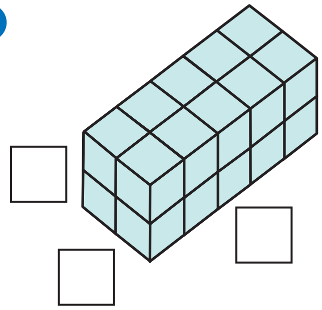
2



Area of base: __________

Volume: __________

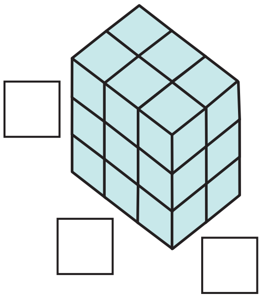
3



Area of base: __________

Volume: __________

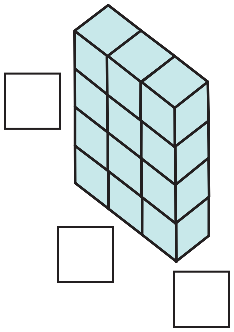
4



Area of base: __________

Volume: __________

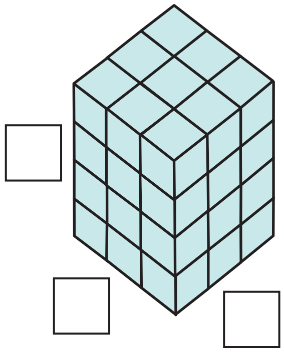
5



Area of base: __________

Volume: __________

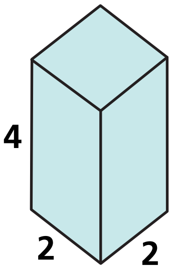
6



Area of base: __________

Volume: __________

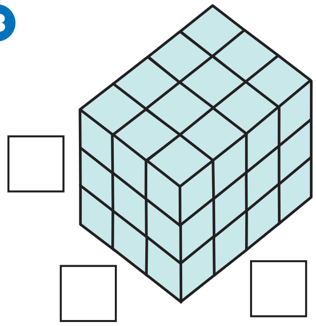
7



Area of base: __________

Volume: __________

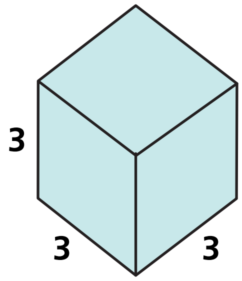
8



Area of base: __________

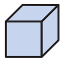
Volume: __________

9

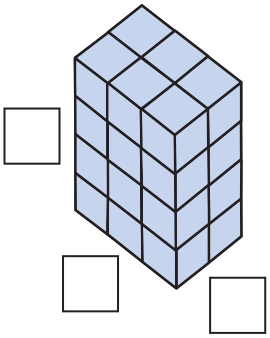


Area of base: __________

Volume: __________

Find the area of the base and the volume of each rectangular prism built out of inch cubes.  **= 1 cu in.**

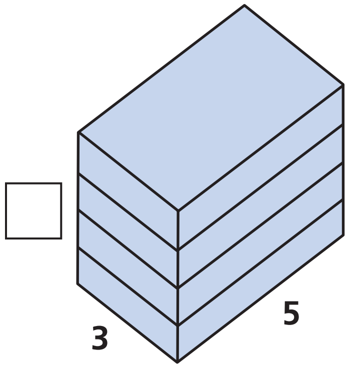
10



Area of base: ___________

Volume: ___________

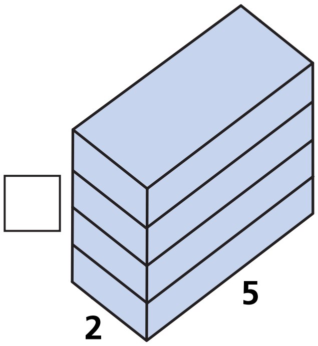
11



Area of base: ___________

Volume: ___________

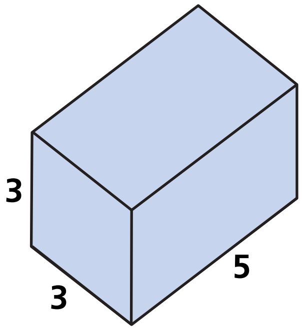
12



Area of base: ___________

Volume: ___________

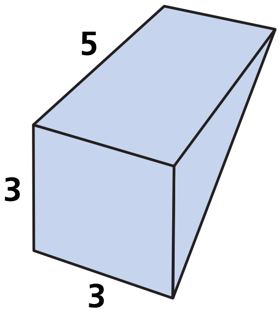
13



Area of base: ___________

Volume: ___________

14 **Challenge** This shape is different. It is related to the rectangular prism shown in Problem 13. Figure out its volume and explain your thinking.



Volume: ___________________________

Name ______________________ Date ____________

Chapter 12

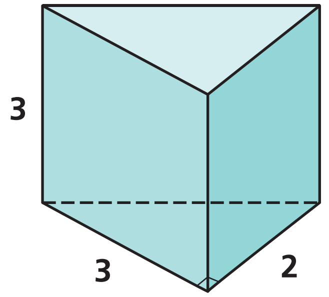
Lesson 5

Volume of Prisms

NCTM Standards 1, 3, 4, 7, 9, 10

Each right triangular prism is sitting on its base. Use the dimensions to compute the volume.

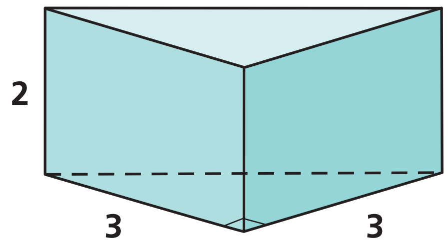
1



Volume: ____________

Show your work.

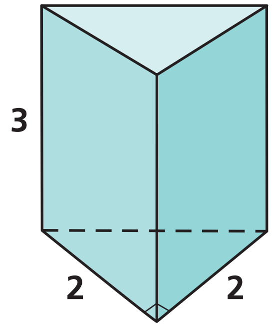
2



Volume: ____________

Show your work.

3

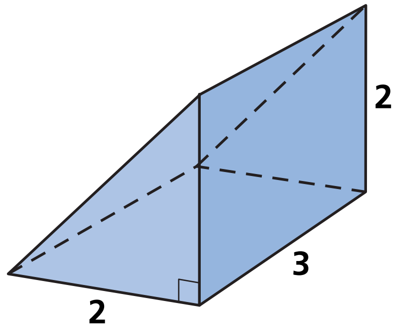


Volume: ____________

Show your work.

Each right triangular prism is sitting on a face that is not its base. Use the dimensions to compute the volume.

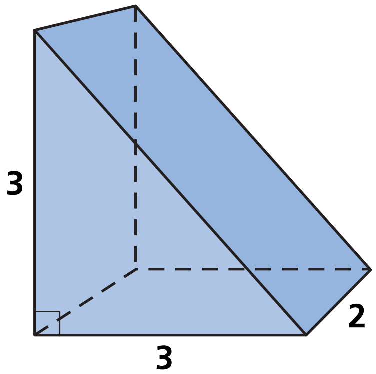
4



Volume: ______________

Show your work.

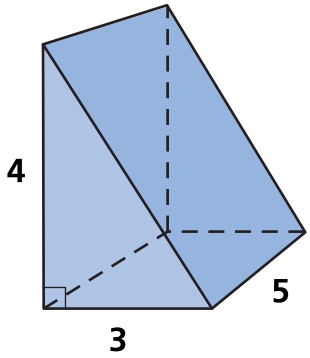
5

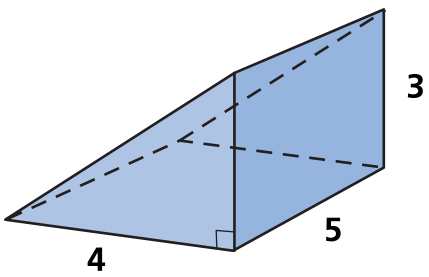


Volume: ______________

Show your work.

6 **Challenge** Show two ways to calculate the volume of this right triangular prism.





Volume: ______________

Chapter 12

Lesson 6

Name ______________________ Date __________

Area of Nets

NCTM Standards 1, 3, 4, 6, 7, 8, 9, 10

Use a net for Figures AA, BB, or CC.

1. Tape or paste the small copy of the net here.

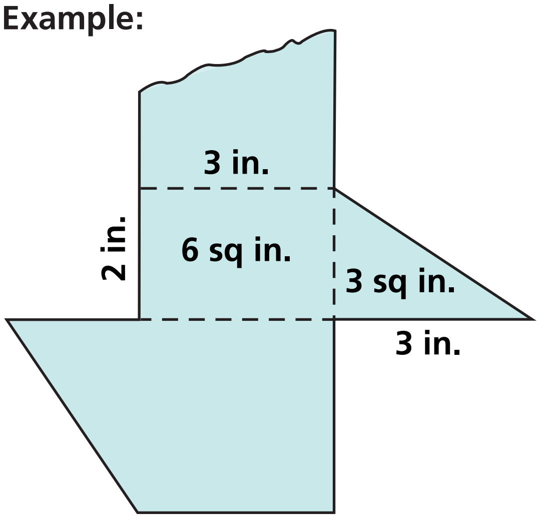
2. Label your small net to show the true dimensions (full-size) of each face of your three-dimensional figure. Measure to the nearest half-inch.

3. Label your small net to show the area of each face of your three-dimensional figure.

4. What is the total area of your large net?

____

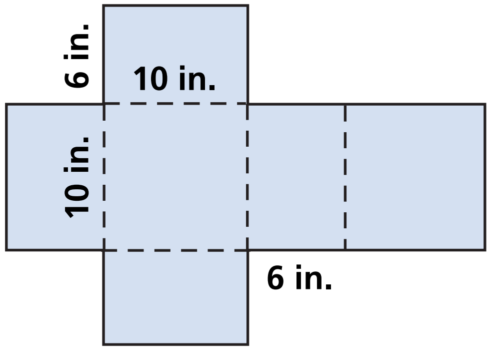
Example:



Solve the problems.

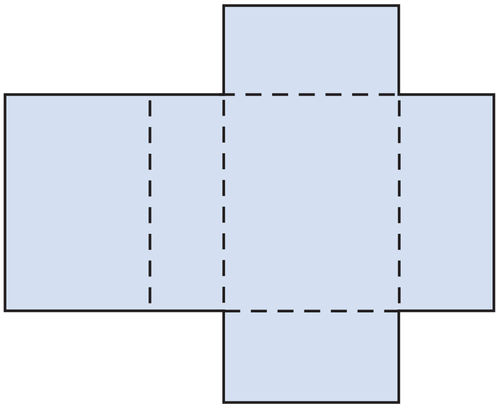
5 Jonah was not sure he had enough wrapping paper to wrap a gift box. He measured the box and wrote the measurements on a net sketch. How much wrapping paper does he need to cover the box?

____



6 Courtney made only a few measurements to figure out how much wrapping paper she needed to wrap a tall, rectangular prism-shaped box. The small rectangular base measured 5 in. by 10 in. The height of the box is 12 in. How much wrapping paper does she need?

____



Use this net if you wish.

7 **Challenge** Tell how you would find the total area of a net of a triangular prism. Tell all the measurements you would make and how you would compute the area with those measurements.

____
____
____
____
____
____
____
____

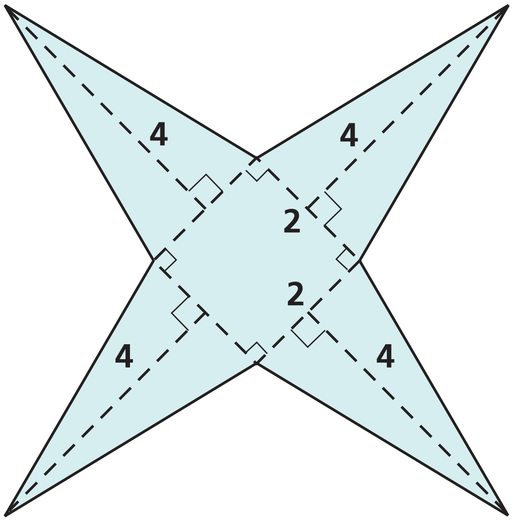
Name ______________________ Date ____________

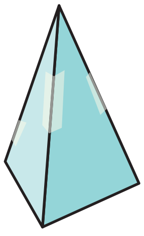
Surface Area Polyhedra

NCTM Standards 1, 3, 4, 6, 7, 8, 9, 10

Find the surface area of each polyhedron using the measurements (in inches) shown on the nets.

1

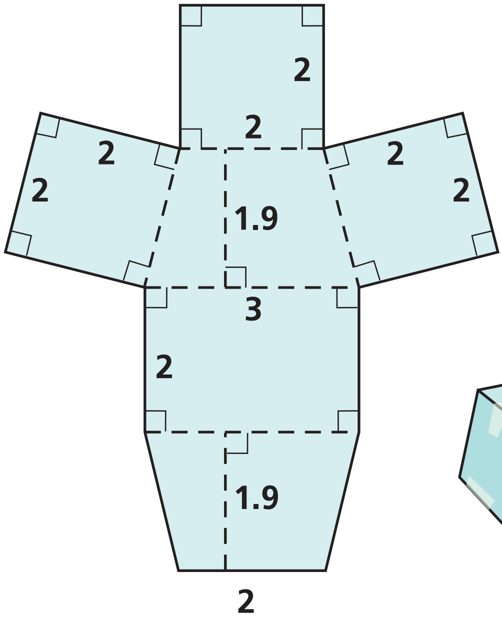


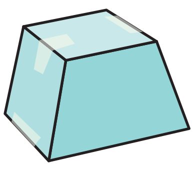


Surface area: ____ sq in.

Show your work.

2



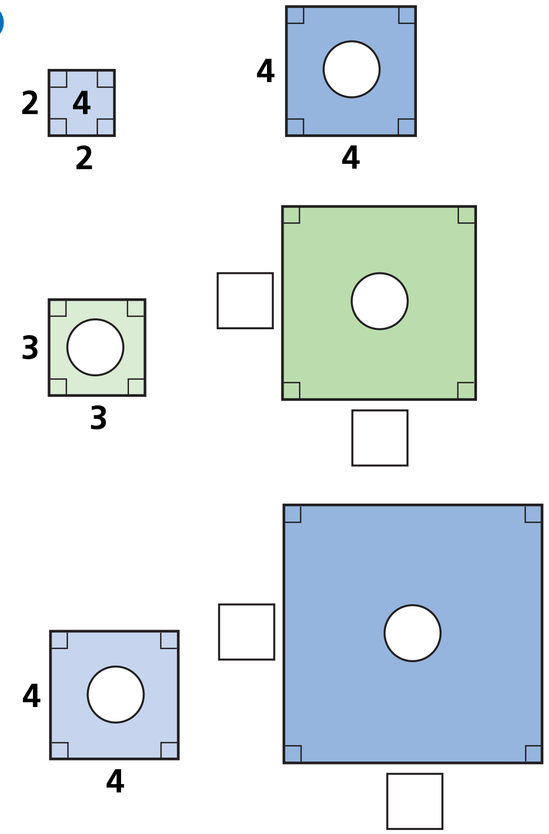


Surface area: ____________

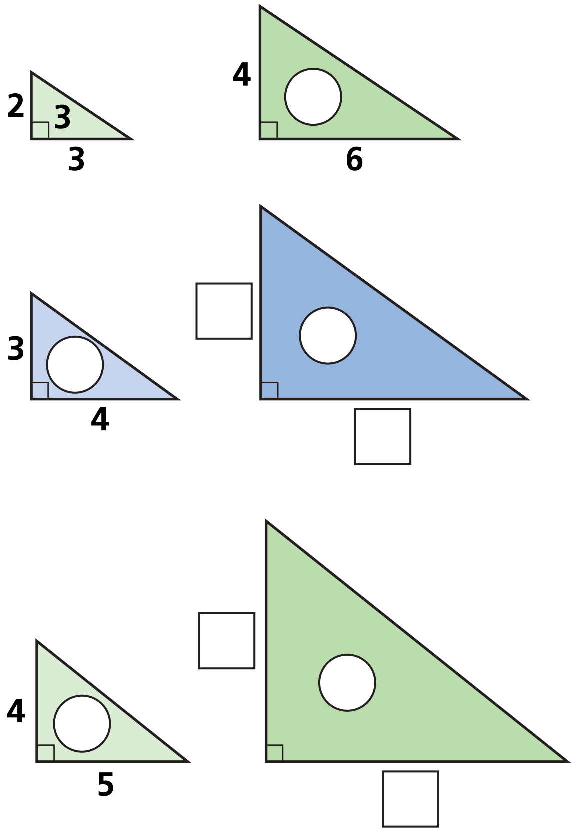
Show your work.

Double the length of each dimension of each polygon. Record the area inside each polygon.

3



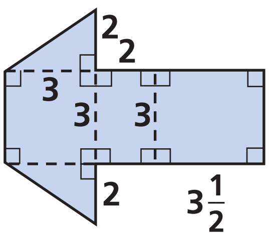
4

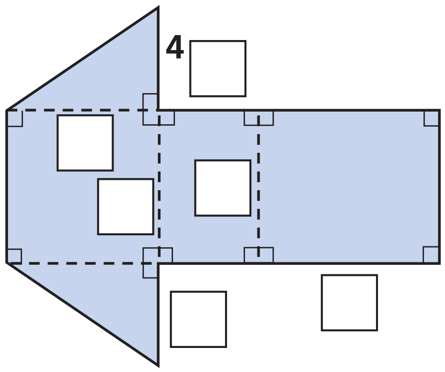


5 You know what happened to the dimensions in each case: they doubled. What happened to the area in each case?

____

6 **Challenge** What happens to the surface area of a polyhedron when you double each dimension of each face? Record the doubled dimensions and find both surface areas.





Surface area: ______________

Surface area: ______________

How do the two surface areas compare?

____

Name ______________________ Date ____________

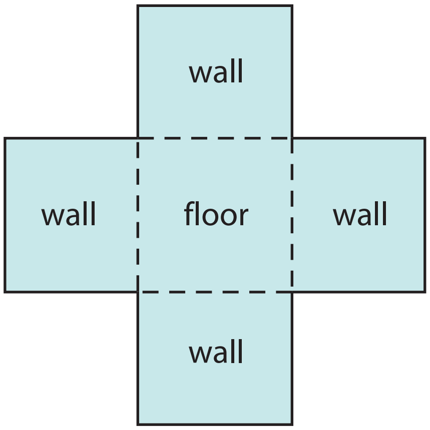
Chapter 12

Lesson 8

Comparing Volume and Surface Area

NCTM Standards 1, 3, 4, 6, 7, 9, 10

The floor of Taylor's room measures 12 ft by 12 ft. The height from floor to ceiling is 10 ft.



1. Taylor wants to paint the four walls of his room with some paint he already owns. It says on the can that a gallon of paint will cover 450 sq ft. If the can is full, does he have enough paint to paint the four walls?

____

Show how you know.

2. If he buys another gallon of the same paint, will he have enough to paint the walls and ceiling?

____

Show how you know.

3. Opening a window will give Taylor enough ventilation so that he is not bothered by the paint fumes, but he wants to know how much air is in the room itself. How many cubic feet of air does the room contain?

____

Show your computations.

Solve the problems. Draw a diagram if you wish.

The volume of a room is 1,200 cu ft, and the height from floor to ceiling is 10 ft.

4. What is the area of the floor?

____

Show your computations.

---

5. What is the area of the flat ceiling?

____

How do you know?

---

6. What might be the measurements of the floor?

______ by ______

---

7. Using those measurements, what is the area of each wall?

Wall: ____________ Wall: ____________

Wall: ____________ Wall: ____________

8. **Challenge** If all the dimensions of the room were doubled, how would the volume change? Explain.

____

____

Chapter 12
Lesson 9

Name ______________________ Date ____________

Problem Solving Strategy

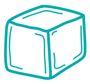
Guess and Check

NCTM Standards 1, 2, 3, 4, 6, 7, 8, 9, 10

Understand
Plan
Solve
Check

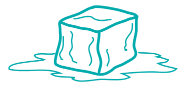
You may use a calculator and the tables to help you solve the problems.

1. Hope has a cube-shaped box. Its volume is 500 cubic units. About how many units long is each edge?



Edge n	Volume n^3	> or < Target Volume
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500
		○ 500

2. The volume of a large ice cube is 100 cubic centimeters. What is the approximate length of one edge?



Edge n	Volume n^3	> or < Target Volume
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100
		○ 100

Problem Solving Test Prep

1. Henry, Jamie, and Sam are three friends. Their ages are consecutive numbers. The product of their ages is 2,145 more than the sum of their ages. Sam is the oldest. How old is Sam?

   A. 12
   B. 13
   C. 14
   D. 15

2. The surface area of a cube is 150 square inches. What is the volume of the cube?

   A. 150 cubic inches
   B. 125 cubic inches
   C. 100 cubic inches
   D. 75 cubic inches

Show What You Know

Solve each problem. Explain your answer.

3. Darla has a square beach towel that measures 96 inches on each side. She folds it in half, then folds it in half again, and finally folds it in half again. What is the area that the folded towel would cover? Explain how you solved the problem.

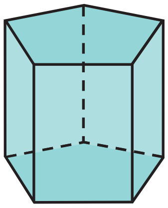
4. Students in the architecture club are using cubes to build a model of an apartment house. Each cube represents one room. Every outside wall of a cube will have one window. If the students use 27 cubes, what is the least number of windows that is possible? What is the greatest? Explain how you solved the problem.

Name ____________________ Date ____________

Review/Assessment

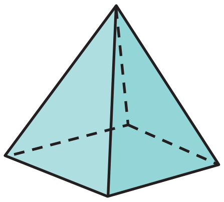
NCTM Standards 1, 2, 3, 4, 6, 7, 9, 10

Look at each three-dimensional figure and answer the question by writing yes or no. Lesson 1

1 

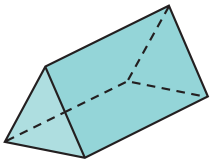
Does this figure appear to have any faces that are

parallelograms?	______	perpendicular?	______
triangles?	______	congruent?	______
trapezoids?	______	parallel?	______

2 

Does this figure appear to have any faces that are

parallelograms?	______	perpendicular?	______
triangles?	______	congruent?	______
trapezoids?	______	parallel?	______

3 

How may faces, vertices, and edges does a triangular prism have? Lesson 2

______ faces ______ vertices ______ edges

For each three-dimensional figure, write the letters of all attributes that apply. Some attributes apply to more than one three-dimensional figure. Lesson 3

4 Pyramid ____________________

5 Cone ____________________

6 Cylinder ____________________

7 Prism ____________________

Attributes

A All its faces are polygons.

B It has at least one circular base.

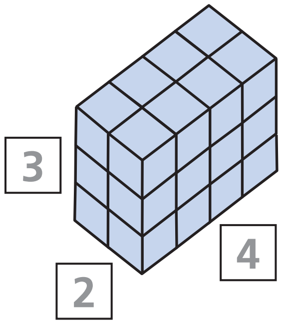
C It has two parallel, congruent bases.

D All of its faces but two must be parallelograms. The remaining two faces can be any polygon.

E All of its faces but one must be triangles. The remaining face can be any polygon.

Find the area of the base and the volume of each rectangular prism built out of cubes. Lesson 4

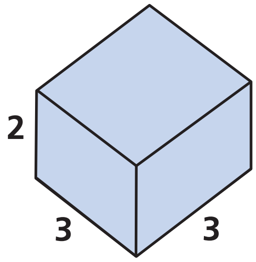
8



Area of base: ________

Volume: ________

9

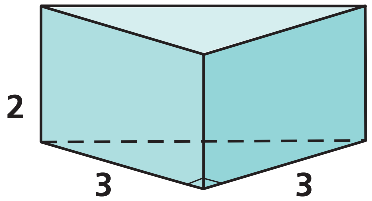


Area of base: ________

Volume: ________

This right triangular prism is sitting on its base. Use the dimensions to compute the volume. Lesson 5

10

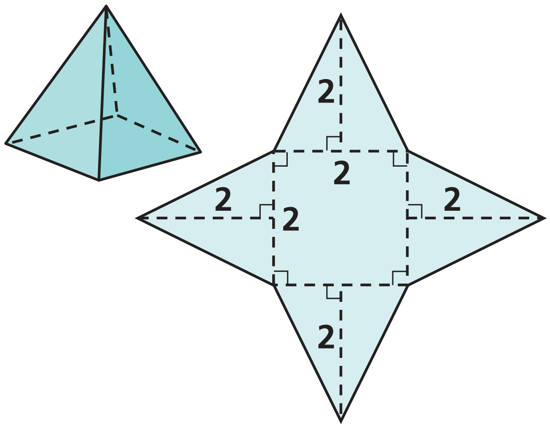


Volume: ________

Show your work.

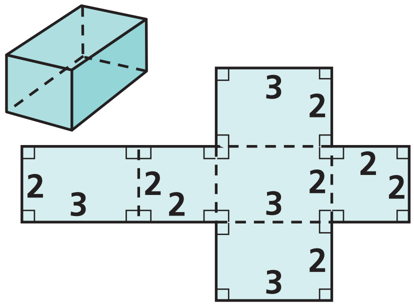
Use the dimensions shown on the net to find the surface area of each three-dimensional figure. Lessons 6 and 7

11



____

12



____

Solve the problem. Lesson 9

13 Brad has a cube-shaped box. Its volume is 400 cubic centimeters. To the nearest whole centimeter, how long is each edge of the box?

____

14 Keaton wants to plant a square garden with an area of 50 square feet. To the nearest foot, how long should she make each side of the garden?

____