Unit 6, Activity 1, Measuring Scavenger Hunt

Name: _____

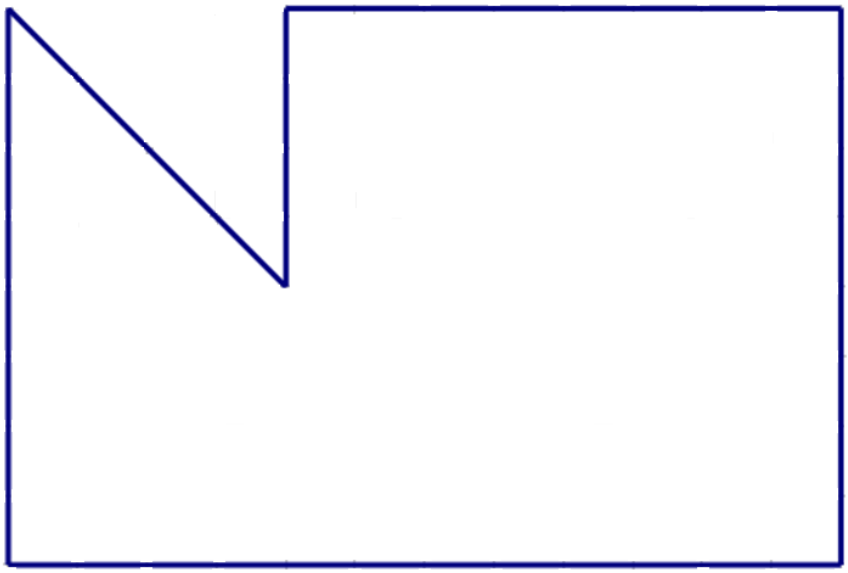
	Measurement Descriptions	Object
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Name_____ Date_____

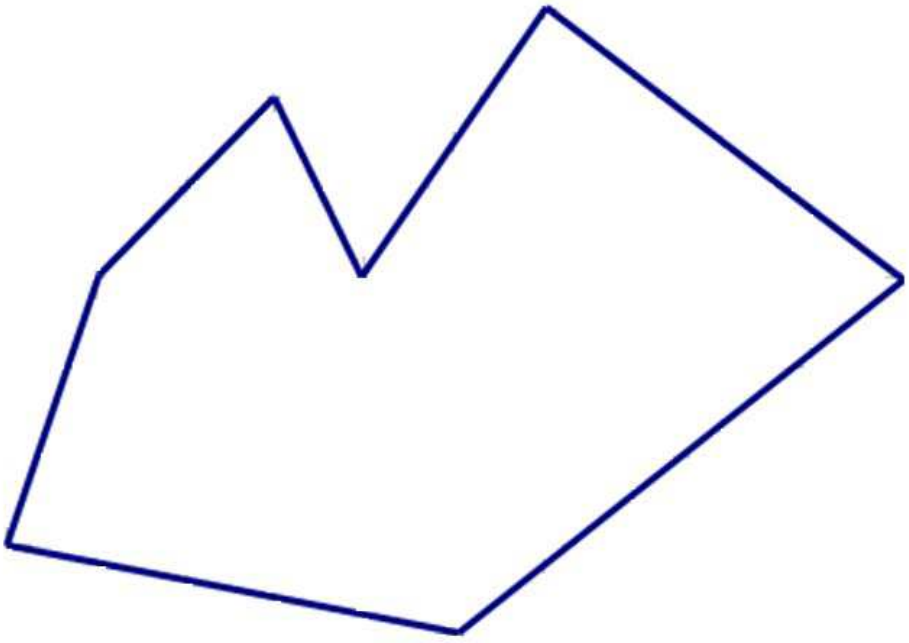
Break it Down

Use centimeter grid paper to determine the area of the shapes on this sheet. If necessary, you can trace the shapes onto the grid to help you with the measuring. Next, determine the area of Shapes A and B. Explain in the space next to the shape how you figured it out.

Shape A
Area _____
How did you figure it out?



Shape B
Area _____
How did you figure it out?



Break it Down with Answers

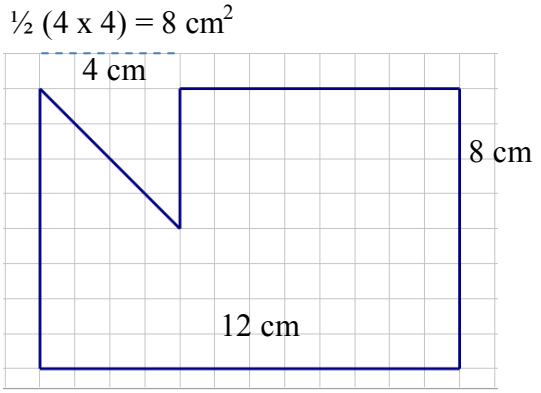
Use centimeter grid paper to determine the area of the shapes on this sheet. If necessary, you can trace the shapes onto the grid to help you with the measuring. Next, determine the area of Shapes A and B. Explain in the space next to the shape how you figured it out.

Shape A

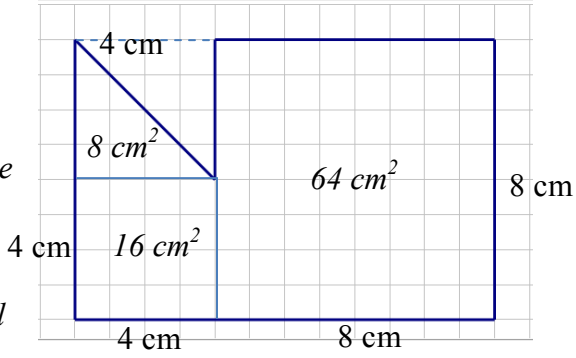
Area: 88 cm^2

How did you figure it out?

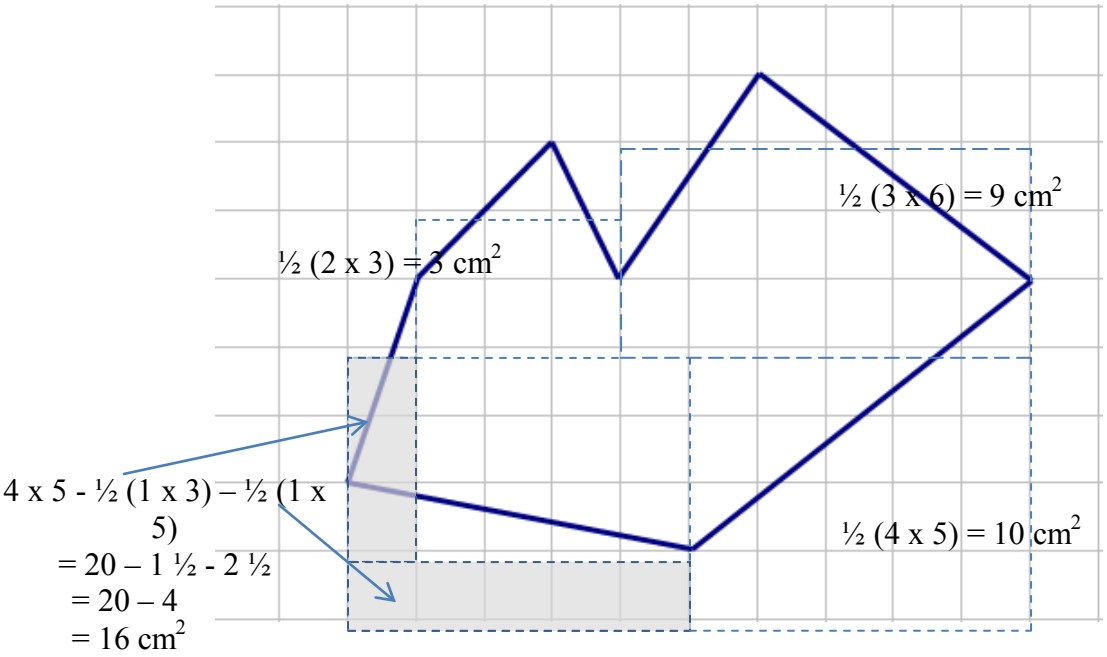
Method 1: Students may have completed the rectangle (8 x 12), and found its area to be 96 cm^2. Then they count the number of square centimeters in the section of the "cutout triangle" and subtract that value (8 cm^2) from 96 cm^2 to get an area of 88 cm^2.

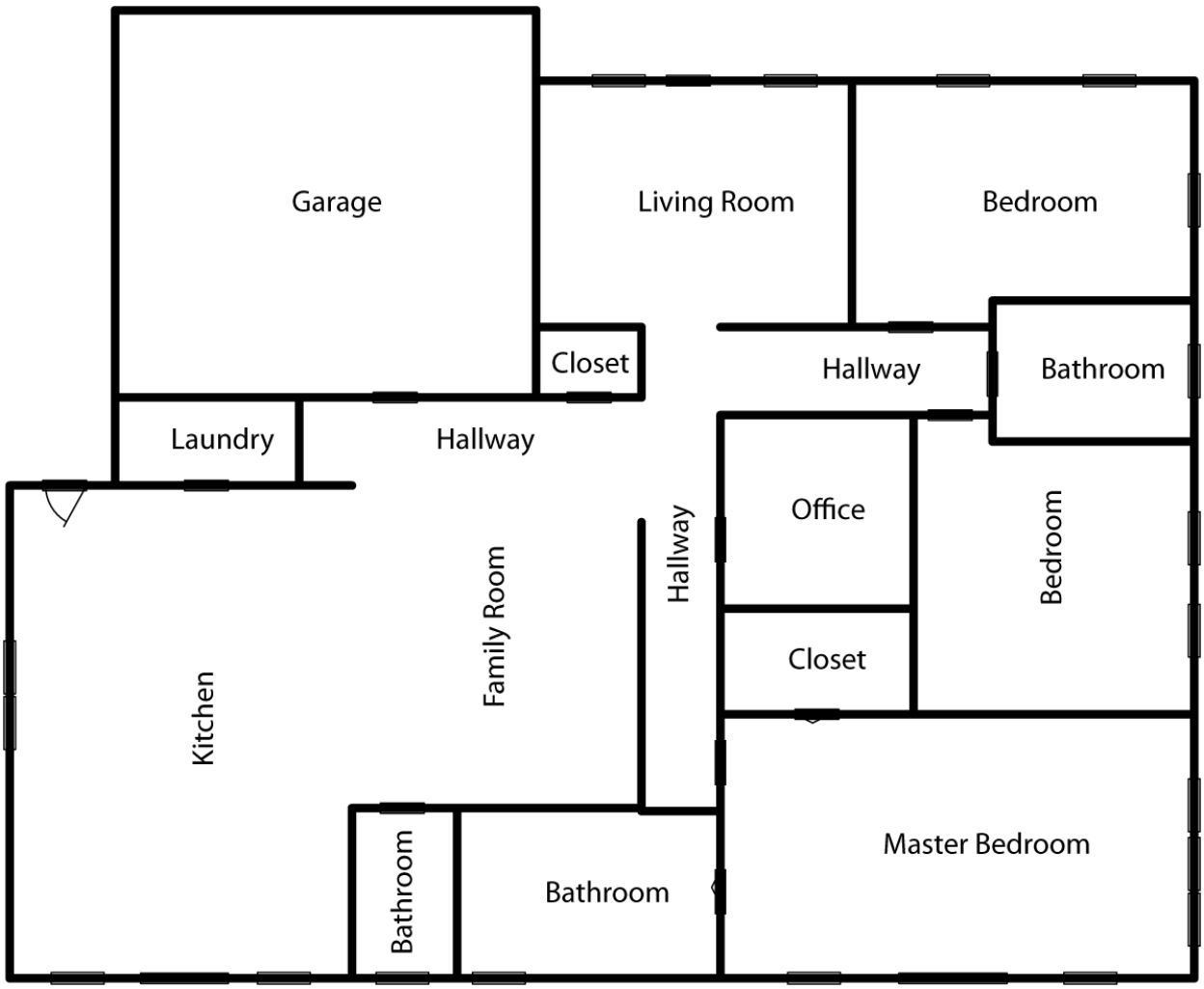


Method 2: Students may have decomposed the figure into smaller squares. The largest square is 8 cm by 8 cm, so its area is 64 square cm. The students divide the "strip" on the left into two smaller squares, each of which is 4 cm by 4 cm. The bottom square, then, has an area of 16 sq. cm. The total area equals the area of the large square (64 cm^2) plus the area of the bottom small square (16 cm^2) plus the area of the triangle (8 cm^2) for a total of 64 + 16 + 8, or 88cm^2.



Shape B
Area: *38 cm²*
How did you figure it out?
Students may have subdivided the figure into four parts, enclosing each part in a rectangle as shown below.

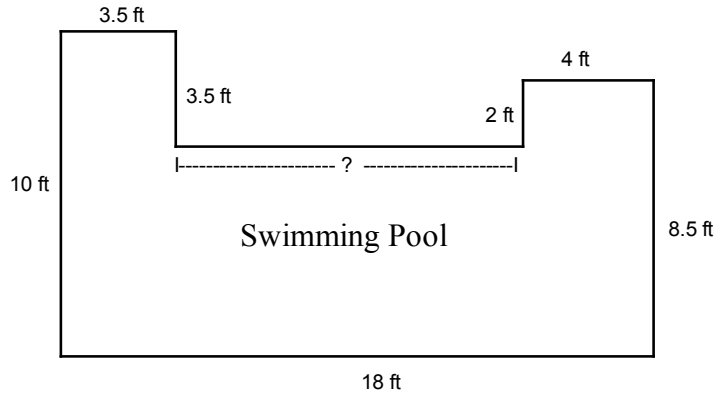



Garage
Living Room
Bedroom
Closet
Hallway
Bathroom
Laundry
Hallway
Office
Bedroom
Hallway
Family Room
Kitchen
Closet
Master Bedroom
Bathroom
Bathroom

Unit 6, Activity 6, Pool and Hot Tub Addition

Name: _____

The swimming pool that is to be put in a back yard has an irregular shape as shown below. A pool cover is needed to keep the leaves out this winter.



1. Find the area of the pool. All corners are 90º. Explain how you arrived at finding the area of the pool.

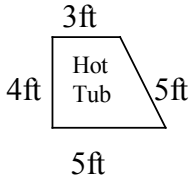
2. Pool covering material costs $4.95 per square yard. How many square yards will you need and how much will the pool cover cost? Explain how you found the cost of the pool cover.

3. You also need to know the perimeter of the pool, so that you can buy bricks to go around the edge of the pool. Find the perimeter. Justify your answer.

4. Bricks are 6 inches long. How many bricks will you need to buy to put one row of bricks end to end around the pool? Justify your answer.

5. Bricks cost 60¢ each. How much will you spend on bricks? Explain and show how you determined the cost of the bricks.

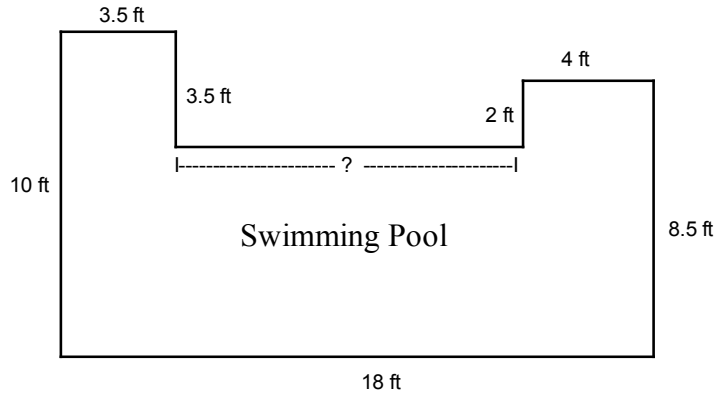
6. A hot tub in the shape of a trapezoid with the dimensions shown will be built along the right side of the pool and adjacent to the bricks. A top view of the hot tub is shown. Find the cost of making a cover for the hot tub.



7. Since the hot tub will be placed next to the swimming pool, the side with length 4 ft. will not be bricked. Find the cost of bricking the remaining three sides. Show all work for determining the cost of the cover and the bricks.

Unit 6, Activity 2, Pool & Hot Tub with Answers

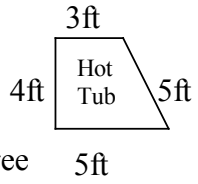
The swimming pool that is to be put in the back yard has an irregular shape as shown below. A pool cover is needed to keep the leaves out this winter.



1. Find the area of the pool. All corners are 90º. Explain how you arrived at finding the area of the pool.
   Divide the pool into smaller rectangles. $(3.5 \bullet 3.5)+(2 \bullet 4)+(6.5 \bullet 18)=137.25 ft^2$

2. Pool covering material costs $4.95 per square yard. How many square yards will you need and how much will the pool cover cost? Explain how you found the cost of the pool cover.
   There are 9 square feet in one square yard so 137.25 square feet = 15.25 square yds. Round 15.25 sq yd to 16 since you can't purchase ¼ yard. Solution: $79.20

3. You also need to know the perimeter of the pool, so that you can buy bricks to go around the edge of the pool. Find the perimeter. Justify your answer.
   ?=18-3.5-4=10.5ft
   10.5+2+4+8.5+18+10+3.5+3.5=60ft
   Perimeter=60ft
4. Bricks are 6 inches long. How many bricks will you need to buy to put one row of bricks end to end around the pool? Justify your answer.
   60ft=720 inches
   720 inches / 6 inches = 120 bricks
5. Bricks cost 60¢ each. How much will you spend on bricks? Explain and show how you determined the cost of the bricks.
   120 bricks ($0.60) = $72
6. A hot tub in the shape of a trapezoid with the dimensions shown will be built along the right side of the pool and adjacent to the bricks. A top view of the hot tub is shown. Find the cost of making a cover for the hot tub.
   Area=½ (4) (3+5) Area=16ft²
   Cost= 16 (4.95) Cost = $79.20



7. Since the hot tub will be placed next to the swimming pool, the side with length 4 ft. will not be bricked. Find the cost of bricking the remaining three sides. Show all work for determining the cost of the cover and the bricks.

   Perimeter=3+5+5 Perimeter=13ft 13ft = 156 inches
   156 inches / 6 inches = 26 bricks 26 bricks ($0.60) = $15.60

Name_____ Date_____

Designing a Park

Your task is to design a small park for your town that is family and pet friendly. You will submit a design package that includes a scale drawing with the specifications given below; a report that is neat, clear, and easy to follow; and a letter to the city council persuading them to choose your design.

The park design and scale drawing must satisfy the following constraints:

- The park should have a total of 2500 square yards and be a shape that you feel is most appropriate for your park design.
- The border of the park must be designed to be usable.
- No more than 30% of the area of the park can be used for the playground.
- No more than 25% of the area can be paved or cemented.

Your report should be organized so the reader can easily find information about items in the park. The report must contain the following information:

- The size (dimensions) of each item. These items should include, but are not limited to, gardens, picnic tables, playground equipment, and other play areas.
- The amount of land needed for each item and the calculations you used to determine the amount of land needed.

Note: Be selective about the measurements you include. For example, when you describe a border or fencing needed for your park, you only need to give the ***perimeter****. When you specify the amount of space needed for the picnic area, you only need to give the* ***area****.*
The letter to the city council should explain why your design should be chosen for the park. Include a justification for the choices you made about the size and quantity of items in your park.

Name_____ Date_____

Designing a Park

SCORING RUBRIC

A total of 50 points is possible for the project (23 for the scale drawing, 22 for the report, and 5 points for the letter to the city council.

Scale drawing

Dimensions and measurements—16 points

_____Dimensions are labeled (3 pts)
_____Dimensions are close to dimensions of actual items (9 pts)
_____Scale is included (2 pts)
_____Design meets problem constraints (2 pts)

Complete design—7 points

_____Design is reasonable and logical (4 pts)
_____Design is neat, well-organized, and includes required items (3 pts)

Report

Mathematics—16 points

_____Dimensions are given and correctly match scale drawing (4 pts)
_____Calculations are correct (6 points)
_____Necessary and correct measurements are given with explanations of what the measurements mean and why they are needed (6 pts)

Organization—6 points

_____Work is neat, easy to follow, and meets the requirements of the problem (3 pts)
_____Information is easy to find (3 pts)

Letter

Composition—3 points

_____Letter is easy to read and understand (1 pt)
_____Justifications are given for decisions (1 pt)
_____Reasons are given for why design should be chosen (1 pt)

Structure—2 points

_____Letter is neat (1 pt)
_____Grammar and spelling are correct (1 pt)

☐ TOTAL POINTS

Name_____ Date_____

Similarity and Scaling

Sketch each square described below on your grid paper. Determine the area, side length, and perimeter of each square and record in the table. Be ready to share with your group the reasoning you used to determine the square.

Square A

Square B: The ratio of the area of Square B to the area of Square A is 9 to 1.
Square C: The ratio of the length of an edge of Square B to the length of an edge of Square C is 1 to 2.
Square D: The ratio of the perimeter of Square D to the perimeter of Square A is 5 to 1.
Square E: The ratio of the area of Square D to the area of Square E is 1 to 4.
Square F: The ratio of the perimeter of Square F to the perimeter of Square B is 2 to 3.
Square G: The ratio of the area of Square B to the area of Square G is 1 to 100.
Square H: The ratio of the side length of Square C to the side length of square H is 3 to 7.
Square I: The ratio of the area of Square I to the area of Square C is 9 to 4.

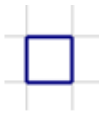
	Area	**Side Length**	**Perimeter**
Square A			
Square B			
Square C			
Square D			
Square E			
Square F			
Square G			
Square H			
Square I			

Name_____ Date_____

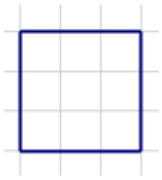
Similarity and Scaling *with Answers*

Sketch each square described below on your grid paper. Determine the area, side length, and perimeter of each square and record in the table. Be ready to share with your group the reasoning you used to determine the square.

Square A

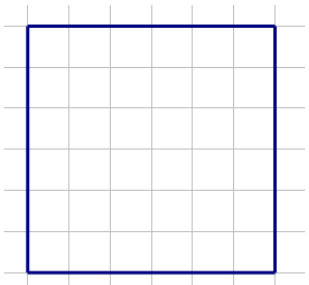


Square B:



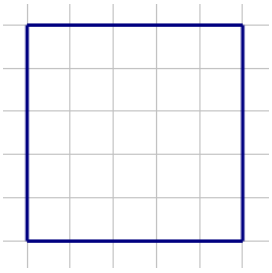
The ratio of the area of Square B to the area of Square A is 9 to 1.

Square C:



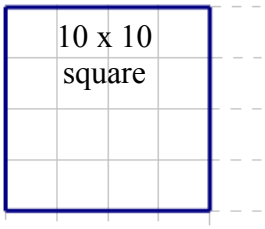
The ratio of the length of an edge of Square B to the length of an edge of Square C is 1 to 2.

Square D



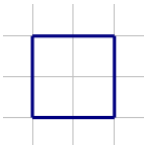
The ratio of the perimeter of Square D to the perimeter of Square A is 5 to 1.

Square E:



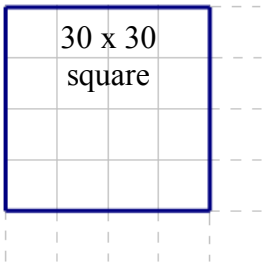
The ratio of the area of Square D to the area of Square E is 1 to 4.

Square F:



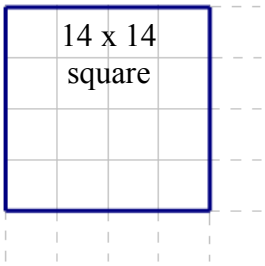
The ratio of the perimeter of Square F to the perimeter of Square B is 2 to 3.

Square G



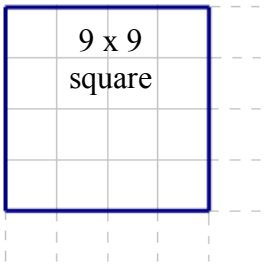
The ratio of the area of Square B to the area of Square G is 1 to 100.

Square H



The ratio of the side length of Square C to the side length of square H is 3 to 7.

Square I



The ratio of the area of Square I to the area of Square C is 9 to 4.

Name_____ Date_____

Similarity and Scaling

Sketch each square described below on your grid paper. Determine the area, side length, and perimeter of each square and record in the table. Be ready to share with your group the reasoning you used to determine the square.

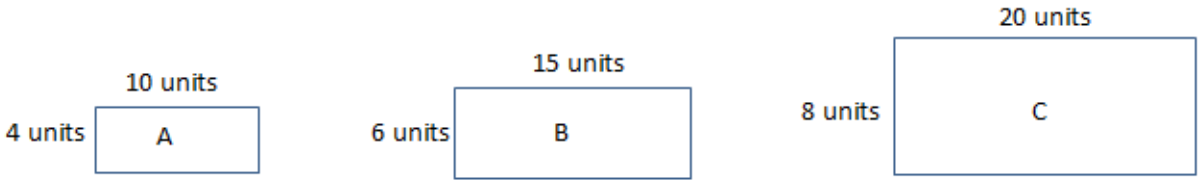
Square A

Square B: The ratio of the area of Square B to the area of Square A is 9 to 1.
Square C: The ratio of the length of an edge of Square B to the length of an edge of Square C is 1 to 2.
Square D: The ratio of the perimeter of Square D to the perimeter of Square A is 5 to 1.
Square E: The ratio of the area of Square D to the area of Square E is 1 to 4.
Square F: The ratio of the perimeter of Square F to the perimeter of Square B is 2 to 3.
Square G: The ratio of the area of Square B to the area of Square G is 1 to 100.
Square H: The ratio of the side length of Square C to the side length of square H is 3 to 7.
Square I: The ratio of the area of Square I to the area of Square C is 9 to 4.

	Area	**Side Length**	**Perimeter**
Square A	*1 sq unit*	*1 unit*	*4 units*
Square B	*9 sq units*	*3 units*	*12 units*
Square C	*36 sq units*	*6 units*	*24 units*
Square D	*25 sq units*	*5 units*	*20 units*
Square E	*100 sq units*	*10 units*	*40 units*
Square F	*4 sq units*	*2 units*	*8 units*
Square G	*900 sq units*	*30 units*	*120 units*
Square H	*196 sq units*	*14 units*	*56 units*
Square I	*81 sq units*	*9 units*	*36 units*

Name_____ Date_____

Scaling Shapes



1. Find the scale factor of each pair of rectangles by writing the ratio of the widths and lengths in the appropriate places in the chart. Then figure the scale factor of width and length. *Leave the last column in the chart blank for now.*

Rectangles	Ratios of Widths	Ratios of Lengths	Scale Factor of Width and Length	Scale Factor of Perimeters
A and B				
A and C				
B and C				

2. Find the perimeter of each rectangle. *Show your work below and write your final answer in the blanks provided.*

Rectangle A = _____ Rectangle B = _____ Rectangle C = _____

3. Find the scale factor for the perimeters of each pair of rectangles. *Show your work below and write your final answer in the last column of the chart above.*

4. How does the scale factor of the length and width compare with the scale factor of the perimeters? Explain why this is so.

5. Find the area of each rectangle. *Show your work below and write your final answer in the blanks provided.*

Rectangle A = _____ Rectangle B = _____ Rectangle C = _____

6. What is the scale factor of the areas of each pair of rectangles?

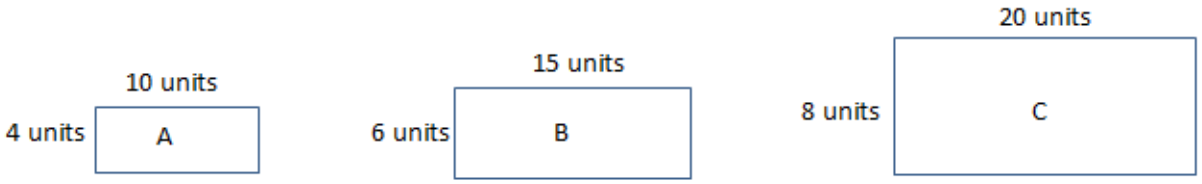
   A and B _____ A and C _____ B and C _____

7. What is the relationship between the scale factor of the areas and the scale factor of the linear measurements?

8. Explain why you think the relationship is true.

Name_____ Date_____

Scaling Shapes *with answers*



1. Find the scale factor of each pair of rectangles by writing the ratio of the widths and lengths in the appropriate places in the chart. Then figure the scale factor of width and length. *Leave the last column in the chart blank for now.*

Rectangles	Ratios of Widths	Ratios of Lengths	Scale Factor of Width and Length	Scale Factor of Perimeters
A and B $\frac{A}{B}$	$\frac{4}{6}$	$\frac{10}{15}$	$\frac{2}{3}$	$\frac{28}{42}$ or $\frac{2}{3}$
A and C $\frac{A}{C}$	$\frac{4}{8}$	$\frac{10}{20}$	$\frac{1}{2}$	$\frac{28}{56}$ or $\frac{1}{2}$
B and C $\frac{B}{C}$	$\frac{6}{8}$	$\frac{15}{20}$	$\frac{3}{4}$	$\frac{42}{56}$ or $\frac{3}{4}$

2. Find the perimeter of each rectangle. *Show your work below and write your final answer in the blanks provided.*

Rectangle A = *28 units* Rectangle B = *42 units* Rectangle C = *56 units*

3. Find the scale factor for the perimeters of each pair of rectangles. *Show your work below and write your final answer in the last column of the chart above.*

See chart for solutions. Look for evidence that the student knows that the scale factor is the ratio of the perimeters of each pair reduced to lowest form.

4. How does the scale factor of the sides compare with the scale factor of the perimeters?

The scale factor of the sides and the scale factors of the perimeters are equal.

5. Find the area of each rectangle. *Show your work below and write your final answer in the blanks provided.*

Rectangle A = *40 square units* Rectangle B = *90 square units* Rectangle C = *160 square units*

6. What is the scale factor of the areas of each pair of rectangles?

A and B _____ $\frac{A}{B} = \frac{40}{90} = \frac{4}{9}$

A and C _____ $\frac{A}{C} = \frac{40}{160} = \frac{4}{16} = \frac{1}{4}$

B and C _____ $\frac{B}{C} = \frac{90}{160} = \frac{9}{16}$

7. What is the relationship between the scale factor of the areas and the scale factor of the sides? *Scale factor of the area is the square of the corresponding scale factor of the linear measurements.*
8. Explain why you think the relationship is true.

Rectangle ratio	Scale factor of sides	Scale factor of areas	Relationship
$\frac{A}{B}$	$\frac{2}{3}$	$\frac{4}{9}$	$\frac{2}{3} \times \frac{2}{3} = (\frac{2}{3})^2$ or $\frac{4}{9}$
$\frac{A}{C}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2} \times \frac{1}{2} = (\frac{1}{2})^2$ or $\frac{1}{4}$
$\frac{B}{C}$	$\frac{3}{4}$	$\frac{9}{16}$	$\frac{3}{4} \times \frac{3}{4} = (\frac{3}{4})^2$ or $\frac{9}{16}$

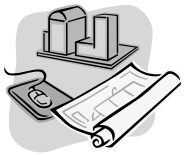
To help students see that the ratio of the areas is the square of the ratio of the perimeters, ask them to write the ratio of the areas in prime factors, as follows:

$\frac{AreaA}{AreaB} = \frac{40}{90} = \frac{2x2x2x5}{3x3x2x5}$

Students can simplify the ratio by canceling the common factors 2 and 5 as shown. Doing so will help them see that the ratio of the perimeters $\frac{2}{3}$ *appears twice in the ratio of the areas, and they can see that* $\frac{2}{3} \times \frac{2}{3} = (\frac{2}{3})^2$ *or* $\frac{4}{9}$.

Group Activity Cards BLM

A scale drawing shows all dimensions $\frac{1}{16}$ actual size. What is the length of a computer screen that is represented by a line segment $1\frac{3}{4}$ inches long?	A scale model of a building is $\frac{1}{48}$ the size of the actual building. If the actual building is 30 feet wide, how wide is the scale model?
A drawing of a city's downtown area uses a scale of 4 cm = 5 km. On the drawing, the length of a park is 1.8 cm. What is the actual length of the park?	Wanda is 5 feet tall, and her brother William is 6 feet tall. In a photograph of them standing side by side, William is 4.8 inches tall. How tall is Wanda in the photograph?
A map of the United States uses a scale of $\frac{1}{4}$ inch = 80 miles. If the map distance between two cities in Louisiana is $1\frac{5}{8}$ inches, what is the actual distance between the cities?	In a scale drawing of a garden, a distance of 35 feet is represented by a line segment 4 inches long. On the same drawing, what distance is represented by a line segment 14 inches long?



Scaling in the Real World

Name_____ Date_____

A scale drawing shows all dimensions $\frac{1}{16}$ actual size. What is the length of a computer screen that is represented by a line segment $1\frac{3}{4}$ inches long?	
A scale model of a building is $\frac{1}{48}$ the size of the actual building. If the actual building is 30 feet wide, how wide is the scale model?	
A drawing of a city's downtown area uses a scale of 4 cm = 5 km. On the drawing, the length of a park is 1.8 cm. What is the actual length of the park?	
Wanda is 5 feet tall, and her brother William is 6 feet tall. In a photograph of them standing side by side, William is 4.8 inches tall. How tall is Wanda in the photograph?	
A map of the United States uses a scale of $\frac{1}{4}$ inch = 80 miles. If the map distance between two cities in Louisiana is $1\frac{5}{8}$ inches, what is the actual distance between the cities?	
In a scale drawing of a garden, a distance of 35 feet is represented by a line segment 4 inches long. On the same drawing, what distance is represented by a line segment 14 inches long?	

Name_____ Date_____

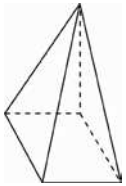
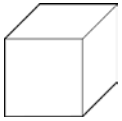
A scale drawing shows all dimensions $\frac{1}{16}$ actual size. What is the length of a computer screen that is represented by a line segment $1\frac{3}{4}$ inches long?	*Answer: The actual length of the computer screen is 28 inches.*
A scale model of a building is $\frac{1}{48}$ the size of the actual building. If the actual building is 30 feet wide, how wide is the scale model?	*Answer: The width of the scale model is $\frac{5}{8}$ of a foot or 7 $\frac{1}{2}$ inches.*
A drawing of a city's downtown area uses a scale of 4 cm = 5 km. On the drawing, the length of a park is 1.8 cm. What is the actual length of the park?	*Answer: The actual length of the park is $2\frac{1}{4}$ km.*
Wanda is 5 feet tall and her brother William is 6 feet tall. In a photograph of then standing side by side, William is 4.8 inches tall. How tall is Wanda in the photograph?	*Answer: The height of Wanda in the photograph is 4 inches.*

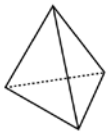
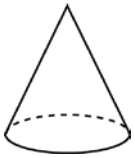
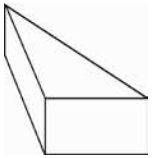
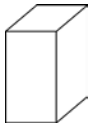
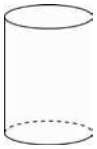
A map of the United States uses a scale of $\frac{1}{4}$ inch = 80 miles. If the map distance between two cities in Louisiana is $1\frac{5}{8}$ inches, what is the actual distance between the cities?	*Answer: The actual distance between the cities is 520 miles.*
In a scale drawing of a garden, a distance of 35 feet is represented by a line segment 4 inches long. On the same drawing, what distance is represented by a line segment 14 inches long?	*Answer: The actual distance represented is* $122\frac{1}{2}$ *feet.*

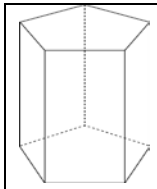
Scaling in the Real World
with Answers

Classifying Solids

Look at the solids shown in the chart below. Mark Xs in each row for the correct descriptions of the shape, then name the solid and describe the properties that helped you to classify them as such.

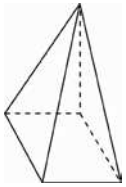
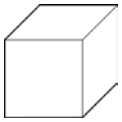
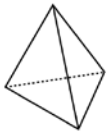
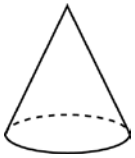
Solid	Polyhedron	Non-Polyhedron	Prism	Pyramid	Cylinder	Cone	Name of Solid and Properties
							
							

							
							
Solid	Polyhedron	Non-Polyhedron	Prism	Pyramid	Cylinder	Cone	Properties
							
							
							

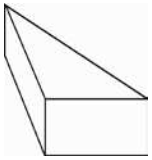
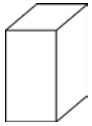
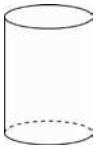
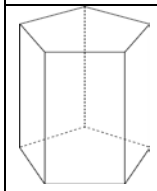
							

Classifying Solids

Look at the solids shown in the chart below. Mark Xs in each row for the correct descriptions of the shape, then name the solid and describe the properties that helped you to classify them as such.

Solid	Polyhedron	Non-Polyhedron	Prism	Pyramid	Cylinder	Cone	Name of Solid and Properties
	x			x			Rectangular pyramid; faces are polygons, lateral faces are triangles, base is a rectangle
	x		x				Cube; faces are polygons, opposite faces are parallel and congruent
	x			x			Triangular pyramid; faces are polygons, lateral faces are triangles, base is a triangle
		x				x	Cone; faces are not polygons, base is a circle

Unit 6, Activity 11, Classifying Solids with Answers

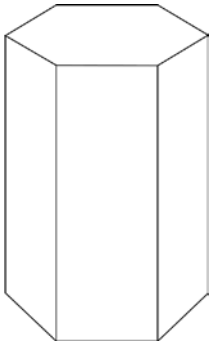
Solid	Polyhedron	Non-Polyhedron	Prism	Pyramid	Cylinder	Cone	Properties
	x		x				Triangular prism; faces are polygons, bases are triangles and are parallel
	x		x				Rectangular prism; faces are polygons, bases are rectangles or squares
		x			x		Cylinder; faces are not polygons, bases are circles and are parallel to one another
	x		x				Pentagonal prism; faces are polygons, bases are pentagons and other faces are rectangles

Name_____ Date_____

What Slice is It?

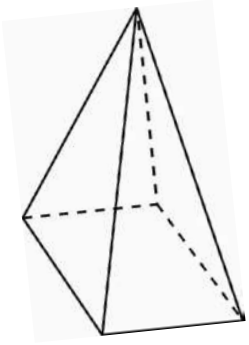
For each of the solids below, name the solid, then sketch two cross sections that can be formed by cuts that are parallel to a base and the other perpendicular to a base. Then identify each of the cross sections with a name (regular pentagon, triangle, rectangle, circle, etc.).

1.



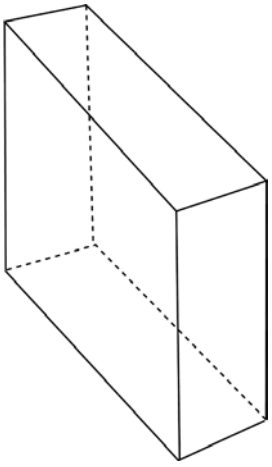
Cross Sections	Name of Cross Section
Parallel to base	
Perpendicular to base	

2.



Cross Sections	Name of Cross Section
Parallel to base	
Perpendicular to base	

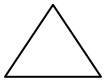
3.



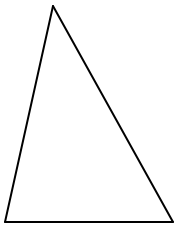
Cross Sections	Name of Cross Section
Parallel to base	
Perpendicular to base	

For each of the exercises below, sketch a solid which could have the given cross sections.

4. Cross section parallel to a base:

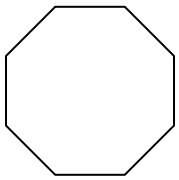


Cross section perpendicular to a base:



Name of Solid: _____
Sketch:

5. Cross section parallel to a base:



Cross section perpendicular to a base:

Name of Solid: _____
Sketch:

6. DESIGN YOUR OWN!

Cross section parallel to a base:

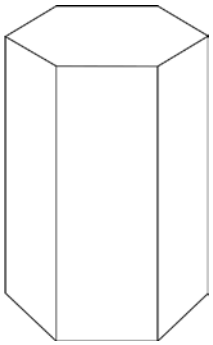
Cross section perpendicular to a base:

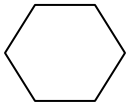
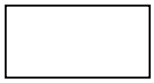
Name of Solid:
Sketch:

What Slice is It?

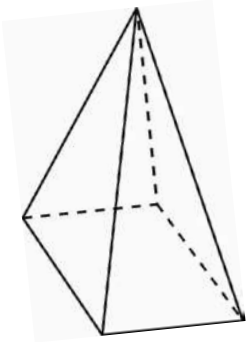
For each of the solids below, name the solid, then sketch two cross sections that can be formed by cuts that are parallel to a base and the other perpendicular to a base. Then identify each of the cross sections with a name (regular pentagon, triangle, rectangle, circle, etc.).

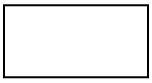
1.



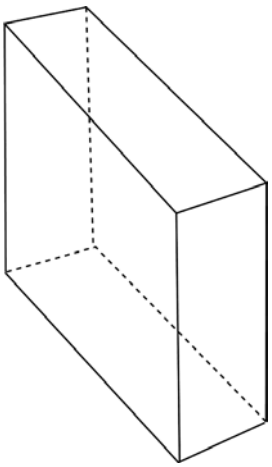
Name of solid: *Hexagonal Prism*	
Cross Sections	Name of Cross Section
Parallel to base 	Regular Hexagon
Perpendicular to base 	Rectangle

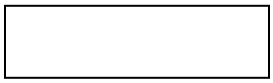
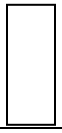
2.



Name of solid: *Rectangular Pyramid*	
Cross Sections	Name of Cross Section
Parallel to base 	Rectangle
Perpendicular to base 	Isosceles triangle

3.

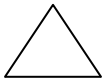


Name of solid: *Rectangular Prism*	
Cross Sections	Name of Cross Section
Parallel to base 	Rectangle
Perpendicular to base 	Rectangle

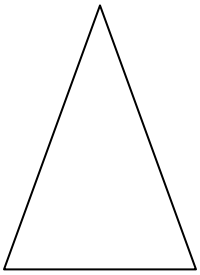
Unit 6, Activity 11, What Slice is It with Answers

For each of the exercises below, sketch a solid which could have the given cross sections and name the solid.

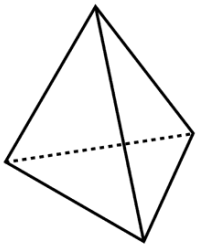
4. Cross section parallel to a base:



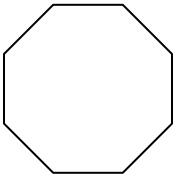
Cross section perpendicular to a base:



Name of Solid: *triangular pyramid*
Sketch:

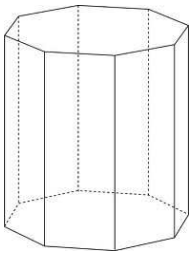


5. Cross section parallel to a base:



Cross section perpendicular to a base:

Name of Solid: *Octagonal prism*
Sketch:



6. DESIGN YOUR OWN!

Cross section parallel to a base:

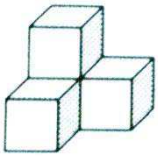
Cross section perpendicular to a base:

Name of Solid:
Sketch:

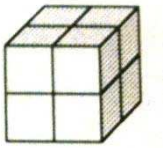
Name_____ Date_____

Build It!

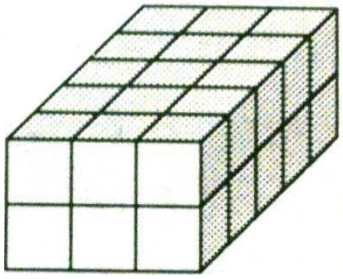
1) Build each of the following figures, and then determine the volume (V) and surface area (SA) of each figure, assuming that 1 unit is a unit of volume.

a) 

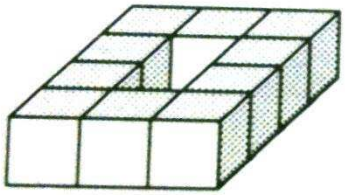
V = _____
SA = _____

b) 

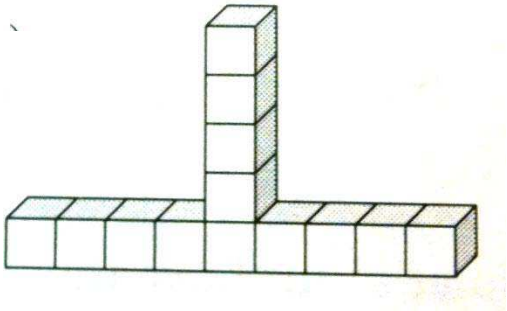
V = _____
SA = _____

c) 

V = _____
SA = _____

d) 

V = _____
SA = _____

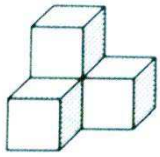
e) 

V = _____
SA = _____

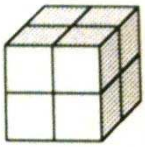
Name_____ Date_____

Build It!

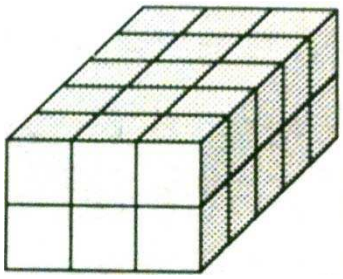
1) Build each of the following figures, and then determine the volume (V) and surface area (SA) of each figure, assuming that 1 unit is a unit of volume.

b) 

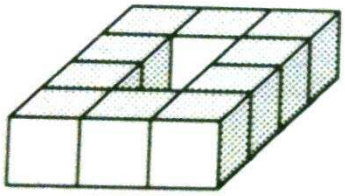
V = 4 cubic units
SA = 18 square units

b) 

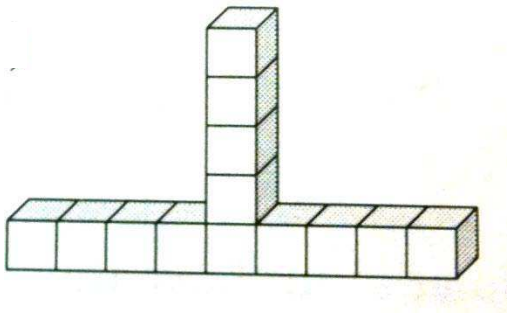
V = 8 cubic units
SA = 24 square units

c) 

V = 30 cubic units
SA = 62 square units

d) 

V = 10 cubic units
SA = 40 square units

e) 

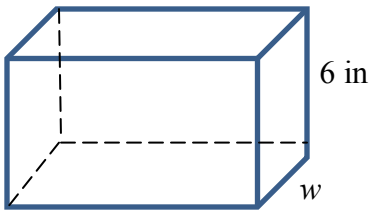
V = 13 cubic units
SA = 54 square units

Name_____ Date_____

Cover It, Fill It

Solve the following problems using the method that makes sense to you. Show all work using sketches and/or mathematics. Don't forget to include correct units with your solution. Be ready to present your solutions to the class!

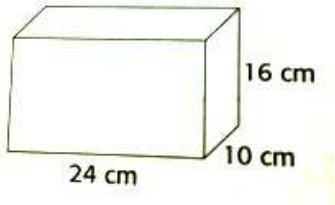
1) The volume of the covered box shown is 630 cubic inches.



a. Find the width *w* of the box. _____
b. Find the total surface area of the box. _____

2) A bedroom is 18 ft long, 15 ft wide, and 10 ft high. If the **walls and ceiling** of the bedroom are given one coat of paint, what is the total area to be painted? _____

3) Kayla has part of a roll of wrapping paper left to wrap her sister's birthday gift. Determine the amount of paper needed to wrap the box below. _____



4) The surface area of a cube is 216 in^2. What is the **length of each side** of the cube?

_____

5) The **inside** of a rectangular swimming pool will be resurfaced. The pool is 40 feet long, 18 feet wide, and 7 feet deep. What is the total area to be resurfaced?

6) The volume of a rectangular prism is 1,001 in^3. The height of the prism is 13 in. and its width is 7 in. What is the length of the prism?

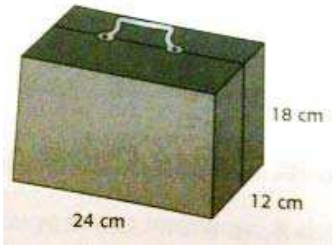
7) A cereal manufacturer needs a box that will have 60 in^3 of space inside.
a. Give the dimensions of two possible boxes the manufacturer can use.
_____ and _____

b. Which of the two boxes you suggested will use less cardboard? _____

c. Based on your findings, what general statement can you make about boxes with the same volume?

8) A straight driveway leading to a hotel is 150 feet long and 12 feet wide. It is paved with concrete 6 inches thick. At a cost of $6.25 per cubic foot, how much did the concrete cost?

9) As a craft project, Rosa is covering the closed wooden box shown with a mosaic made from 1 cm^2 tiles. The tiles come in packages of 100 that cost $2.95 each.



a. How many tiles does Rosa need to completely cover the box?

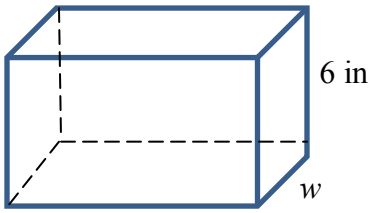
b. How much will Rosa spend for the tiles? Explain how you arrived at your answer.

Name_____ Date_____

Cover It, Fill It

Solve the following problems using the method that makes sense to you. Show all work using sketches and/or mathematics. Don't forget to include correct units with your solution. Be ready to present your solutions to the class!

1) The volume of the covered box shown is 630 cubic inches.



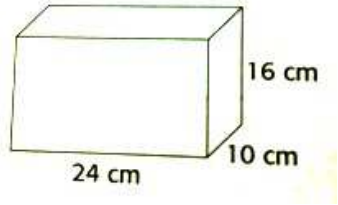
a. Find the width *w* of the box. *7 inches*
b. Find the total surface area of the box.

b) Top and bottom: 2(7 x 15) = 210
Short sides: 2(7 x 6) = 84
Long sides: 2(15 x 6) = 180
Surface area = 210 + 84 + 180 =
474 square inches or 474 in^2

2) A bedroom is 18 ft long, 15 ft wide, and 10 ft high. If the **walls and ceiling** of the bedroom are given one coat of paint, what is the total area to be painted?

Ceiling: 15 x 18 = 270
Short walls 2(15 x 10) = 300
Long walls 2 (18 x 10) = 360
Area to be painted: 270 + 300 + 360 = 930 square feet or 930 ft^2

3) Kayla has part of a roll of wrapping paper left to wrap her sister's birthday gift. Determine the amount of paper needed to wrap the box below. *(24 x 10) x 16 = 3,840 sq cm or 3,840 cm^2*



4) The surface area of a cube is 216 in^2. What is the **length of each side** of the cube?

There are 6 faces on a cube, so $\frac{216}{6}$ *= 36 sq in, which is the area of each face.*

If the area of the face of a square is 36 sq in, then the dimensions of that square must be a 6 x 6, so the length of each side of the cube must be 6 inches.

5) The **inside** of a rectangular swimming pool will be resurfaced. The pool is 40 feet long, 18 feet wide, and 7 feet deep. What is the total area to be resurfaced?
Bottom of pool: 18 x 40 = 720
Short sides: 2(18 x 7) = 252
Long sides: 2(40 x 7) = 560
Total area to be resurfaced: 720 + 252 + 560 = 1,532 sq ft or 1,532 ft^2

6) The volume of a rectangular prism is 1,001 in^3. The height of the prism is 13 in. and its width is 7 in. What is the length of the prism? *11 inches*

7) A cereal manufacturer needs a box that will have 60 in^3 of space inside.
a. Give the dimensions of two possible boxes the manufacturer can use.
2 x 3 x 10 and 5 x 2 x 6 or some other variation using these factors

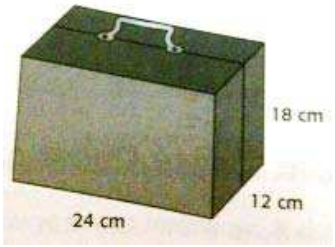
b. Which of the two boxes you suggested will use less cardboard?
The surface area of the 2 x 3 x 10 cereal box is 112 square inches and the surface area of the 5 x 2 x 6 cereal box is 104 square inches. The cereal box using the least amount of cardboard is the 5 x 2 x 6 cereal box.

c. Based on your findings, what general statement can you make about boxes with the same volume? *Answers will vary but students should generalize that a box having dimensions that are closer together will produce a more cube-like box which has a smaller surface area than a box that is long and thin.*

8) A straight driveway leading to a hotel is 150 feet long and 12 feet wide. It is paved with concrete 6 inches thick. At a cost of $6.25 per cubic foot, how much did the concrete cost?

The volume of the driveway is 150 ft x 12 ft by ½ ft = 900 cubic feet
The cost of the concrete is 900 x $6.25 = $5,625.

9) As a craft project, Rosa is covering the closed wooden box shown with a mosaic made from 1 cm^2 tiles. The tiles come in packages of 100 that cost $2.95 each.



a. How many tiles does Rosa need to completely cover the box?
Top and bottom: 2(24 x 12) = 576
Front and back: 2(24 x 18) = 864
Both sides: 2(12 x 18) = 432
Surface area of the box: 576 + 864 + 432 = 1,872 sq cm or 1,872 cm^2

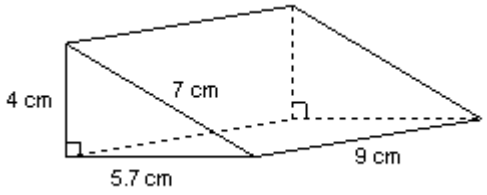
b. How much will Rosa spend for the tiles? Explain how you arrived at your answer.
Rosa will spend $56.05 for the tiles. If 100 tiles come in one package, to find the number of packages needed to cover the box, divide 1,872 by 100 or $\frac{1872}{100}$ *which is 18.72. Since you can't buy part of a box of tiles, you need to round 18.72 to 19 boxes. To find the total cost for the tiles needed, multiply 19 boxes by $2.95 for each box and the cost is $56.05.*

Name_____ Date_____

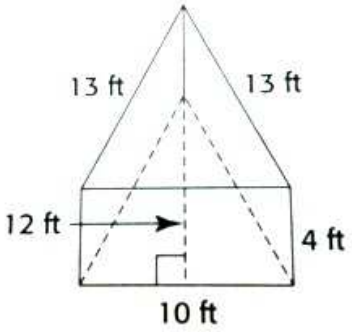
Prism Practice

Use any strategy that is mathematically correct to find the surface area or volume of the figures below. Show all work.

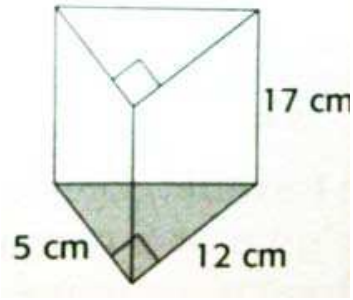
1) Twelve large bookends are needed for the school library. A sketch of one of the bookends is shown below. If 8 ounces of paint covers 350 square centimeters, how much paint is needed for all the bookends? *Write your answer in gallons.*



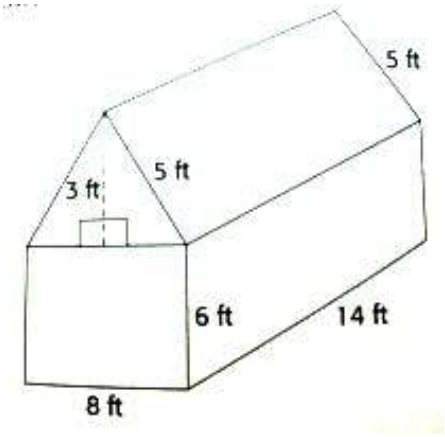
2) A prop in a play is a giant wedge of cheddar cheese. How much yellow cardboard will be needed to make the prop?



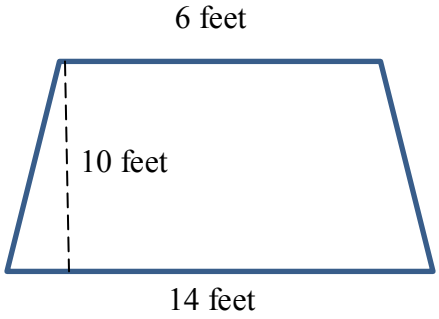
3) Joe's mom is making a flower arrangement using the vase pictured. She will fill the vase with marbles before the flowers are placed inside. How much space is available inside the vase to be filled with marbles?



4) Find the outside surface area of the wooden storage shed shown.



5) The neighbors are putting a pool in their backyard with the trapezoidal base shown below. If the pool has a depth of 6 feet, use the sketch below to determine how much dirt must be dug out before the pool can be put in. *Use ½h(b_1 + b_2) to find the area of a trapezoid.*

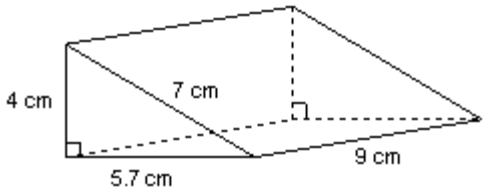


Name_____ Date_____

Prism Practice

Use any strategy that is mathematically correct to find the surface area or volume of the figures below. Show all work.

1) Twelve large bookends are needed for the school library. A sketch of one of the bookends is shown below. If 8 ounces of paint covers 350 square centimeters, how much paint is needed for all the bookends? *Write your answer in gallons.*



Solution:

Surface area of one bookend—173.1 sq cm

2 triangular faces:
2[½(5.7)(4)]
2(½)(22.8)
2(11.4)
22.8 sq cm

Rectangular face 1: 5.7(9) = 51.3 sq cm
Rectangular face 2: 7(9) = 63 sq cm
Rectangular face 3: 4(9)= 36 sq cm

SA = 22.8 + 51.3 + 63 + 36 = 173.1 sq cm for one bookends
SA for twelve bookends: 173.1 x 12 = 2,077.2 sq cm

To calculate amount of paint:

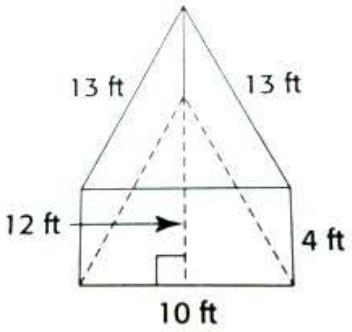
$$\frac{8 \text{ oz.}}{350 \text{ sq cm}} = \frac{x}{2{,}077.2 \text{ sq cm}}$$

$x = 47.48$ *oz*

Solution in gallons:

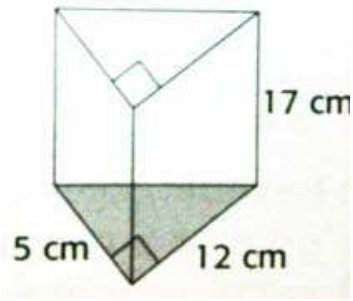
$$\frac{47.48 \text{ oz}}{16 \text{ oz}} = 2.97 \approx 3$$ *gallons of paint needed for 12 bookends*

2) A prop in a play is a giant wedge of cheddar cheese. How much yellow cardboard will be needed to make the prop?



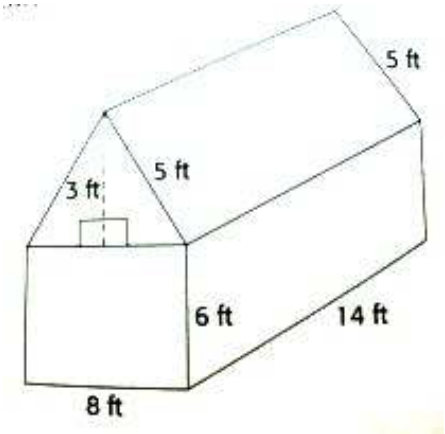
Triangle faces: 2[½(10)(12)] = 120
3 rectangle faces: 2(13 x 4) = 104
1(10 x 4) = 40
Surface Area: 120 + 104 + 40 = 264 sq ft or 264 ft^2

3) Joe's mom is making a flower arrangement using the vase pictured. She will fill the vase with marbles before the flowers are placed inside. How much space is available inside the vase to be filled with marbles?



V = Bh
Area of triangle base: ½ (12)(5) = 30
Volume = 30 x 17 = 510 cubic cm or 510 cm^3

4) Find the outside surface area of the wooden storage shed shown.

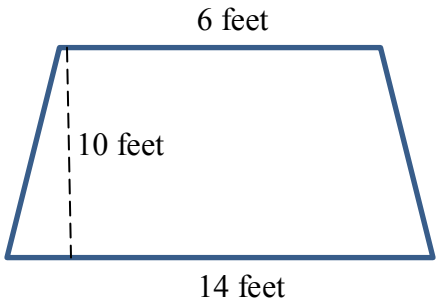


ROOF:
Triangle faces: 2[½(8)(3)] = 24
Rectangle faces: 2(5 x 14) = 140

SHED:
Front and back: 2(8 x 6) = 96
Sides of shed: 2(14 x 6) = 168

Surface Area: 24 + 140 + 96 + 168 = 428 sq ft or 428 ft^2

5) The neighbors are putting a pool in their backyard with the trapezoidal base shown below. If the pool has a depth of 6 feet, use the sketch below to determine how much dirt must be dug out before the pool can be put in. *Use ½h(b_1 + b_2) to find the area of a trapezoid.*



V = Bh
Area of trapezoid base: ½ h (b_1 + b_2) = ½ (10)(14 + 6) = 100
Volume: 100 x 6 = 600 cubic ft or 600 ft^3