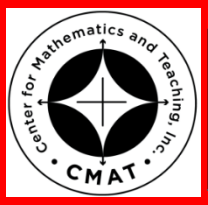
Name _____ Period _____ Date _____



MathLinks

7-15
STUDENT PACKET

MATHLINKS: GRADE 7
STUDENT PACKET 15
SCALE DRAWINGS AND CIRCLE MEASUREMENTS

WORD BANK

Word or Phrase	Definition or Description	Example or Picture
center of a circle		
chord		
circle		
circumference		
diameter		
pi		
radius		
scale		
scale drawing		
scale factor		

SCALE DRAWINGS

Summary

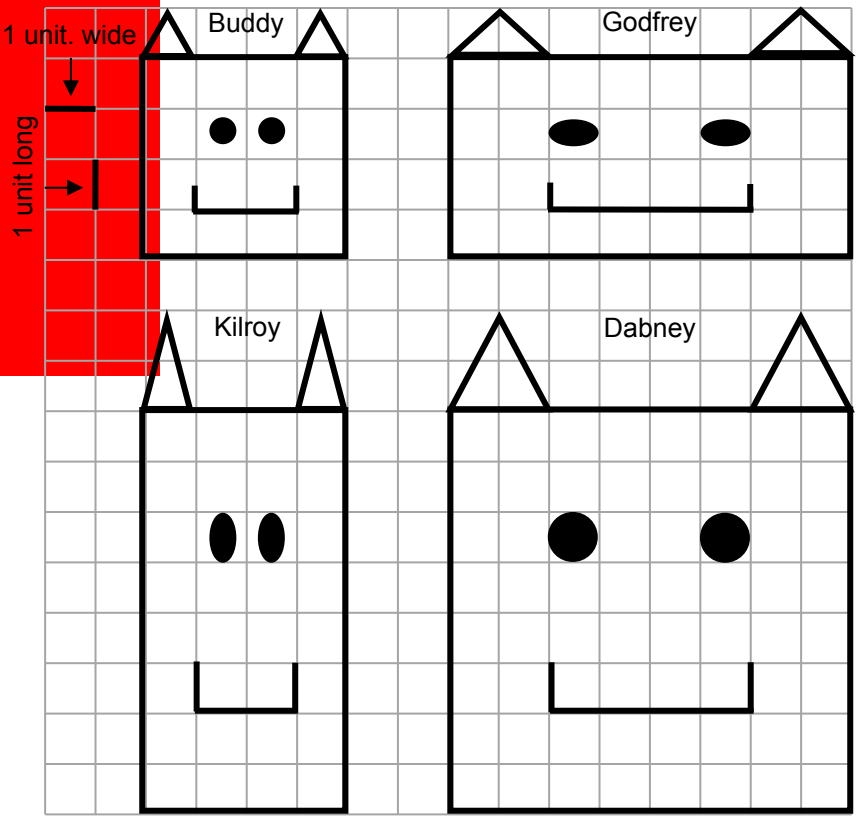
We will make scale drawings with different scale factors. We will use ratio strips and rulers to construct and read drawings made to scale.

Goals

- Explore the effect of different scale factors on scale drawings.
- Read and analyze drawings made to scale.

Warmup

1. Whose face is:
   a. twice as long as Buddy's?
   b. twice as wide as Buddy's?
   c. both twice as long and twice as wide as Buddy's?
2. Whose face is:
   a. half as long as Dabney's?
   b. half as wide as Dabney's?
   c. both half as long and half as wide as Dabney's?
   d. twice as wide as Buddy's.
   e. both twice as long and twice as wide as Buddy's.

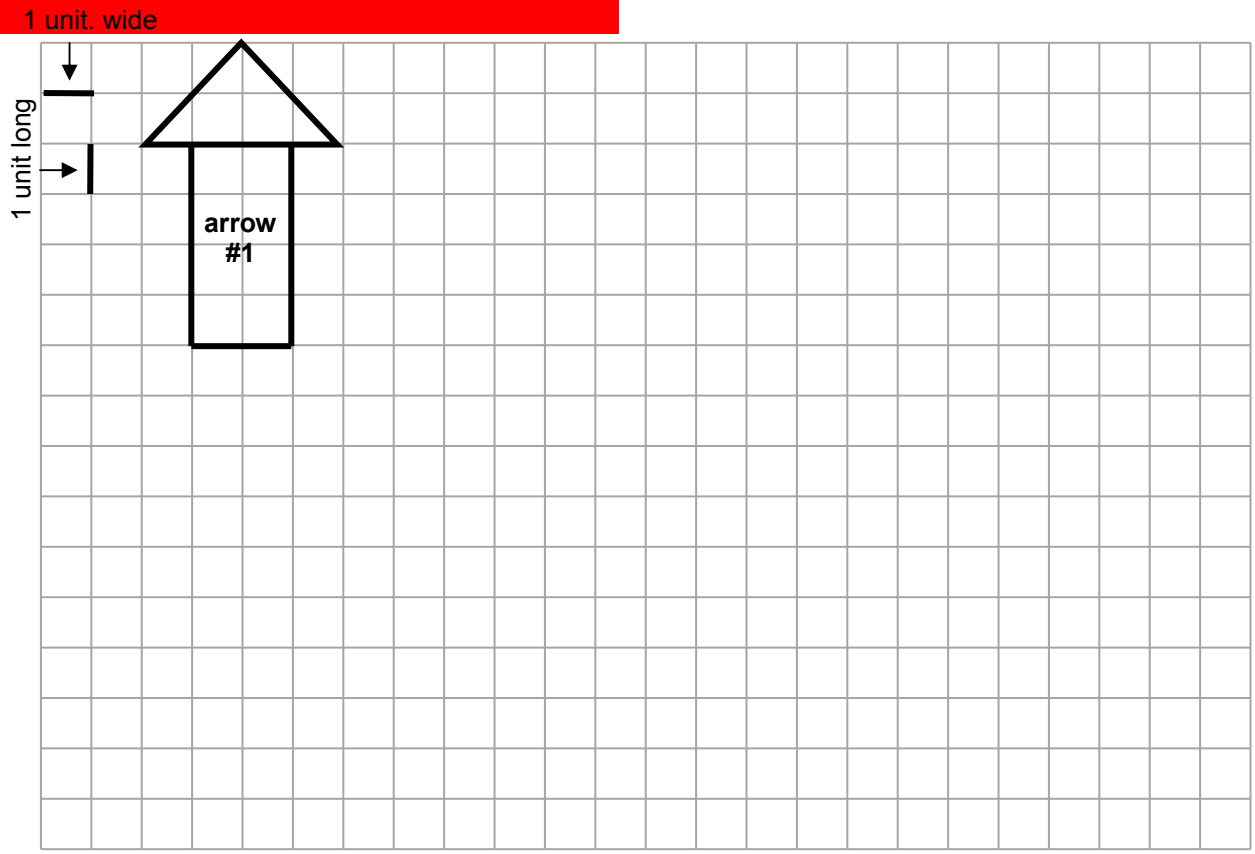


3. A scale factor is a positive number which multiplies some quantity. Whose face:
   a. represents Buddy's face multiplied by a scale factor of 2? _____
   b. represents Dabney's face multiplied by a scale factor of $\frac{1}{2}$? _____
4. Which two faces look the most alike? _____ and _____

SCALE FACTORS: ARROWS

Each arrow is made by combining a rectangle with a triangle as shown below. Draw each arrow on the grid paper based on arrow #1, and complete the table.

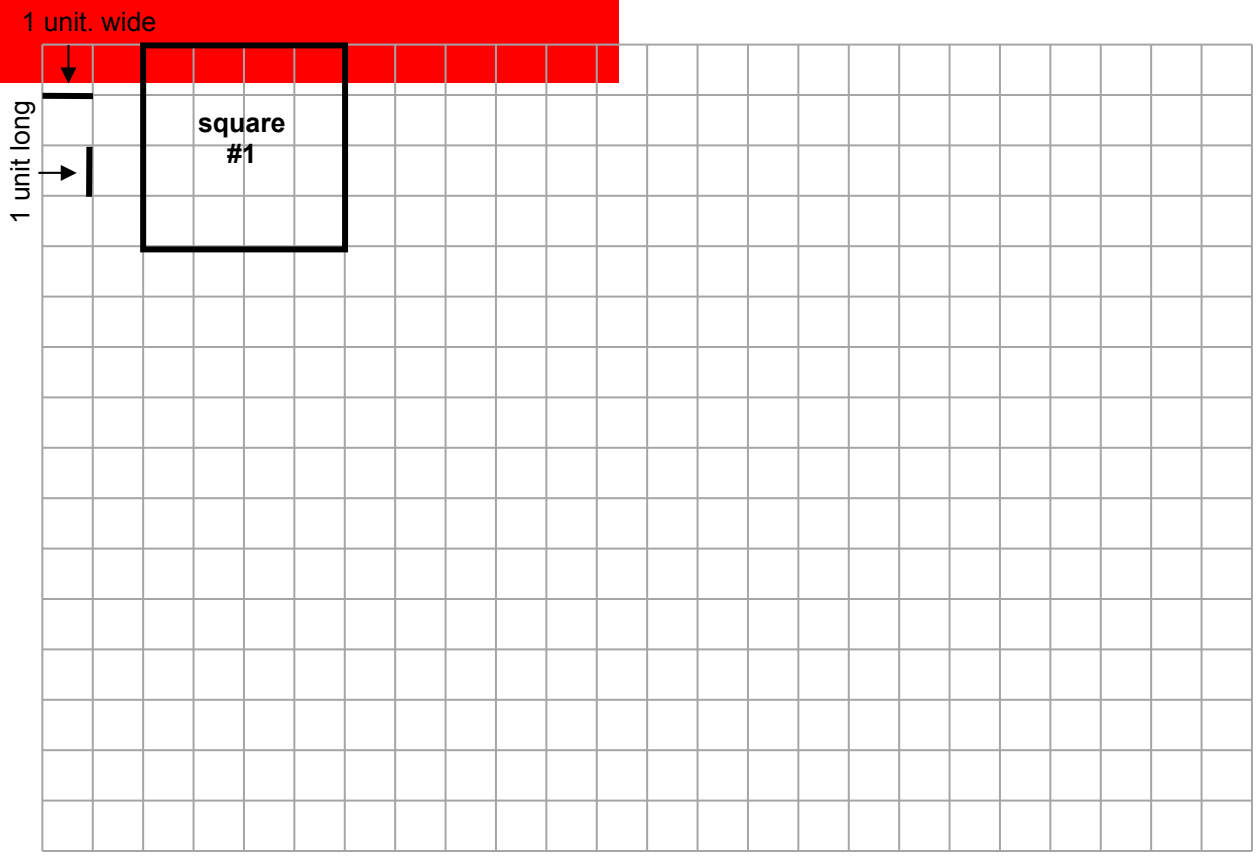
Arrow #	Scale factor	Rewrite the scale factor as a fraction or decimal	Enlargement or Reduction?	Height of the rectangle	Base of the triangle	Area of the arrow
1	100%		neither	4 units	4 units	
2	200%					
3	50%					
4	150%					
5	25%					
6	125%					



SCALE FACTORS: SQUARES

Draw each square on the grid paper based on square #1 below and complete the table.

Square #	Scale factor	Rewrite the scale factor as a percent value	Enlargement or Reduction?	Length of a side	Area of the square
1	1	100%			
2	2				
3	0.5				
4	$1\frac{1}{2}$				
5	$\frac{1}{4}$				
6	1.25				



PATTERNS IN RATIOS

Use the pages 3 and 4 to complete the table. Write each ratio and its value.

		Ratio of scale factors Value of ratio	Ratio of side lengths Value of ratio	Ratio of areas Value of ratio
1.	Square 2: Square 1	2 : 1 2		
2.	Square 3: Square 4			
3.	Square 6: Square 5			
4.	Arrow 1: Arrow 2		4 : 8 $\frac{1}{2}$	
5.	Arrow 4: Arrow 3			
6.	Arrow 6: Arrow 5			

7. What do you notice about values of the ratios of the scale factors and the corresponding values of ratios of the side lengths?

8. What do you notice about the values of the ratios of side lengths and the values of the ratios of areas?

USING A RATIO STRIP

In a scale drawing, all lengths are multiplied by the same scale factor. If the scale factor is greater than 1, the figure is expanded, and if the scale factor is between 0 and 1, the figure is reduced in size.

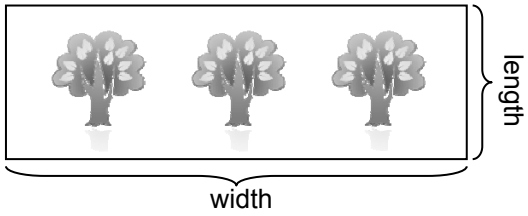
Sometimes the scale in a drawing is described using a ratio. A ratio strip is a double number line where equivalent ratios can be easily identified. You will use Ratio Strip 1 to interpret drawings using a scale of 2 cm : 9 ft.

1. Complete the sequence of numbers on each edge of the strip. Then measure each line segment below with the ratio strip to the nearest whole cm. Finally write how many feet each line segment would represent on a scale drawing.

   a. _____ _____ cm : _____ ft

   b. _____ _____ cm : _____ ft

2. Here is a drawing of a garden that was created using the scale 2 cm : 9 ft. Use Ratio Strip 1 to determine the actual dimensions and area of the garden.



	Drawing dimensions	Drawing area	Garden dimensions	Garden area
Length				
Width				

Use the data from the table above to complete the table below.

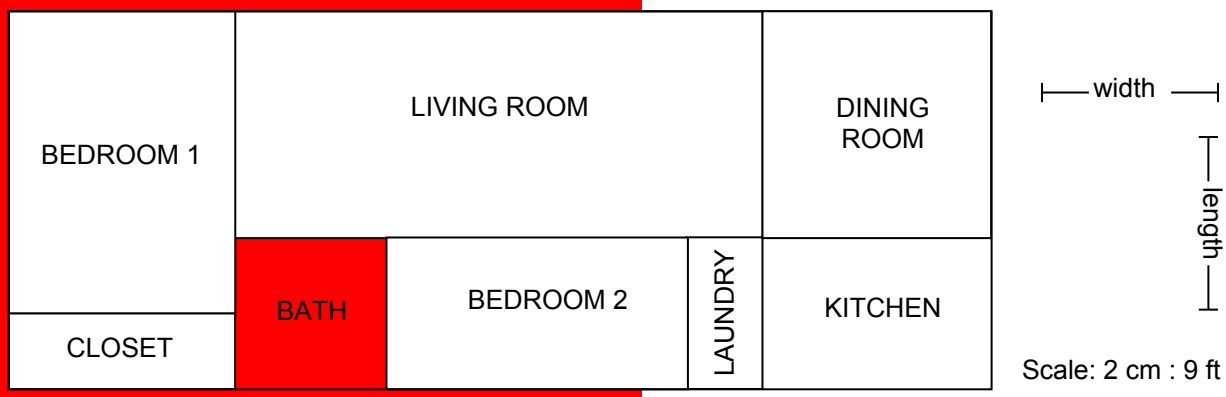
		Ratios of measurements drawing : garden	Value of the ratio
3.	**Length**		
4.	**Width**		
5.	**Area**		

6. Consider the ratio used to create the scale drawing (2 cm : 9 ft), and the ratios found in problems 3 and 4 above. How do the values of these ratios compare?

7. Consider the ratio used to create the scale drawing and the ratio of the areas found in problem 5 above. How do the values of these ratios compare?

A FLOOR PLAN

Architects often use scale drawings to represent actual building floor plans.
Use Ratio Strip 1 to measure some scale drawings of rooms and determine their actual dimensions.



	Room	Drawing length	Drawing width	Actual length	Actual width
1.	Bath	_____ cm	_____ cm	_____ ft	_____ ft
2.	Bedroom 2				
3.	Laundry				
4.	Dining Room	3 cm			
5.	Bedroom 1			18 ft	
6.	Living Room				

7. If length and width of the dining room in the scale drawing were increased by 2 cm each, what would be the new actual dimensions of the dining room?

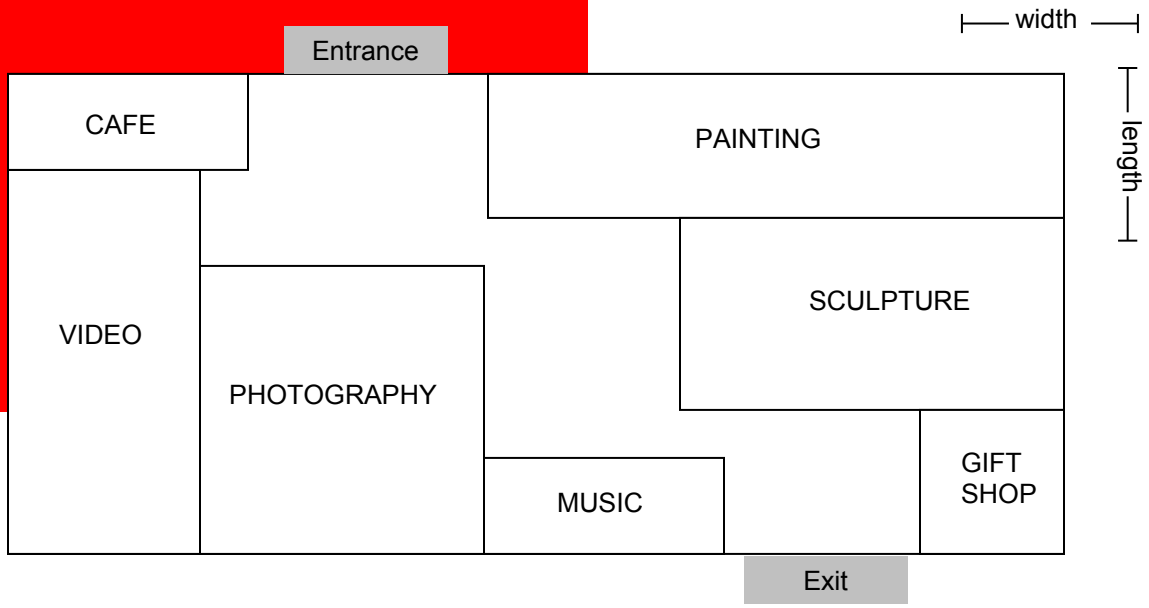
THE MUSEUM

Here is a scale drawing of a museum floor plan. The floor of the photography room is a square with actual side lengths equal to 22.5 feet.

1. Find the scale of this drawing using a customary ruler in inches, rounding all measurements to the nearest $\frac{1}{4}$ inch (0.25"). Then write the scale in these three different equivalent ways.

   _____ in : 22.5 ft 3 in : _____ ft 1 in : _____ ft

2. Create Ratio Strip 2 below based on your scale.



Use your ratio strip as needed and complete the table.

	Room	Drawing length	Drawing width	Drawing area	Actual length	Actual width	Actual area
3.	Cafe						
4.	Video						
5.	Painting						
6.	Sculpture						
7.	Gift shop						

SPORTS PLAYING SURFACES

You will make scale drawings of sports playing surfaces.

1. Draw a ratio strip or double number line that shows a scale of 3 cm : 20 ft.

Determine the dimensions of each sports surface if the scale is 3 cm : 20 ft.

	Sport Surface	Actual Length	Actual Width	Drawing length	Drawing width
2.	Soccer Field	400 ft	300 ft	_____ cm	
3.	Volleyball Court	60 ft	30 ft		
4.	Football Field	360 ft	160 ft		
5.	Roller Rink	70 ft	150 ft		
6.	Bowling Lane	60 ft	3 ft 4 in		

7. Use centimeter graph paper. Choose two of the sports surfaces above and create scale drawings. You may need to tape sheets of graph paper together. You may want to research other features on the internet to include on your scale drawings. Cut them out and label completely.

   I made scale drawings for a _____ and a _____.

8. Use your drawings and explain approximately how many copies of your smaller sports surface will fit inside your larger sports surface.

CIRCUMFERENCE OF CIRCLES

Summary

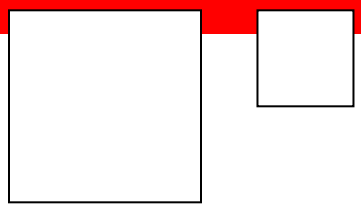
We will explore the relationship between a circle's diameter and its circumference. We will learn about historical approximations to π. We will use the formula for the circumference of a circle to solve problems.

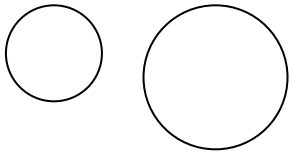
Goals

- Use multiple representations to explore the relationship between the diameter and the circumference of a circle.
- Understand the formula relating circumference and diameter of a circle.
- Understand that π is not a rational number, and explore several approximations to π.
- Solve problems that involve circumferences of circles.

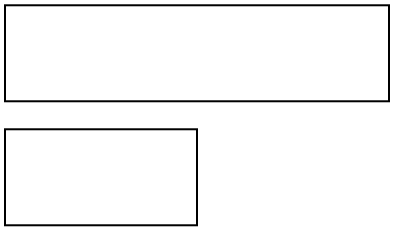
Warmup

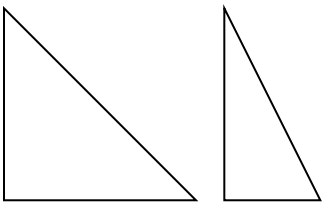
1. Explain why each of the following pairs of figures appear to be scaled copies of one another.





2. Explain why each of the following pairs of figures appear **not** to be scaled copies of one another.





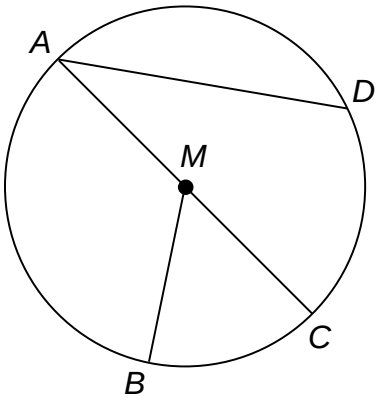
3. Make up a reasonable scale for the pair of squares in problem 1.

4. Make up a reasonable scale for the pair of circles in problem 1.

IMPORTANT VOCABULARY

1. Your teacher will give you directions for drawing several points in relation to the given point. Do not draw line segments.

Use the diagram to the right and the word list below for the following statements.



2. Points on a circle are all equidistant from its _____.

   In the figure, this point is represented by _____.

3. A line segment from the center of a circle to any point on the circle is called a _____.

   In the figure, this segment is represented by _____.

4. A line segment with both endpoints on the circle is called a _____.

   In the figure, this segment is represented by _____.

5. A chord that goes through the center of the circle is called a _____.

   In the figure, this chord is represented by _____.

Word List			
center	chord	diameter	radius

MEASURING CIRCLES

1. Use the table to record the diameter and circumference of objects measured in class.

Object	Diameter (d)	Circumference (C)	$\frac{C}{d}$
A.			
B.			
C.			
D.			
E.			

2. The circumference of a circle is *about* equal to _____ times the length of the diameter.

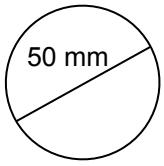
3. Write an equation to describe the relationship between the circumference (C) and the diameter (d). Use the symbol "≈" to represent "is about equal to."

Use the relationship from above to estimate the circumference of the following circles.

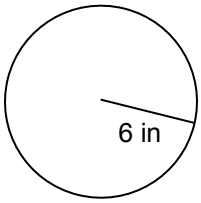
4. $d = 4$ cm

   $C \approx$ _____

5. $C \approx$ _____



6. $C \approx$ _____



Use the relationship from above to estimate the radius and diameter of the following circles.

7. $C = 24$ cm

   $d \approx$_____

   $r \approx$ _____

8. $C = 45$ in

   $d \approx$_____

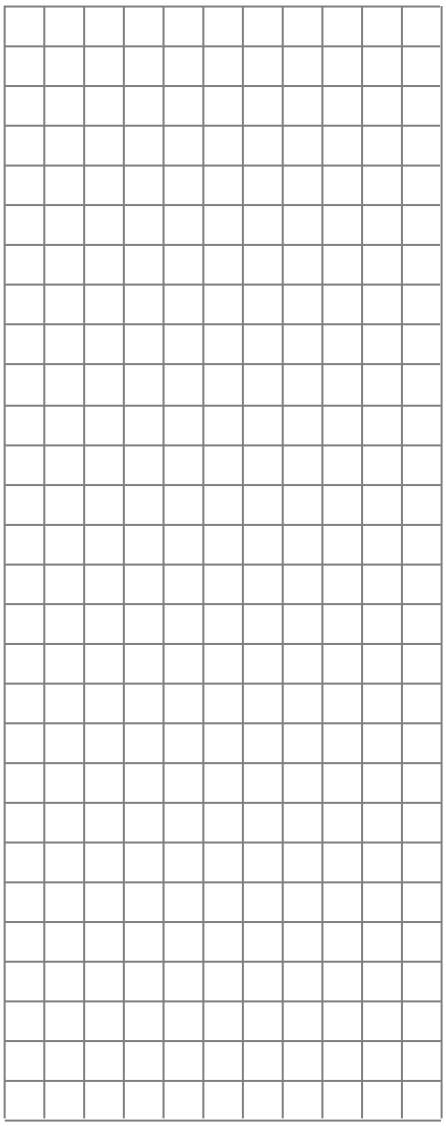
   $r \approx$ _____

CIRCUMFERENCE REPRESENTATIONS

1. Your teacher will help you determine which data to transfer into the table to the right.
2. Draw horizontal and vertical axes on the graph below. Label and scale the axes. Title the graph.
3. Graph the data points and draw a line that best fits the data.
4. What does the point (0, 0) represent on this graph?

Diameter (x)	Circumference (y)

5. Estimate the y-value when $x = 1$ on your graph. In other words, what is $(1, y)$?
6. What does the point $(1, y)$ represent on this graph?
7. Write an equation that best represents this graph.
8. Explain in words what this equation means.
9. Explain why each of the following represents a proportional relationship.
   a. The values in your data table.
   b. The graph.
   c. The equation.



A LITTLE HISTORY

Many civilizations over the centuries have observed that the ratio of the circumference to the diameter of a circle has a constant value. For example, the Romans observed that the number of paces around the outer portion of their circular temples was about three times the number of paces through the center. In mathematics, the Greek letter pi (written π) is used to represent this constant. The number π is not rational, that is, π cannot be expressed as a quotient of integers. Here are some approximations to π used by different civilizations over the ages.

Fraction used as approximation to π	**Decimal approximation for π (to the nearest ten-thousandth)**
1. Egyptian: $\frac{256}{81}$	
2. Greek: between $\frac{22}{7}$ and $\frac{223}{71}$	
3. Hindu: $\frac{3,927}{1,250}$	
4. Roman: $\frac{377}{120}$	
5. Chinese: $\frac{355}{113}$	
6. Babylonian: $\frac{25}{8}$	

7. The decimal approximation to π, correct to five decimal places, is 3.14159.

   a. Which civilization named above had the best decimal approximation to π?

   b. Round this decimal approximation to the nearest hundredth. _____

If you want to write the exact value of pi, you should use the symbol π. Numerical approximations to π, such as 3.14 or $\frac{22}{7}$, are not exact.

8. Starting with your equations from the previous pages, now write exact equations for the **circumference of a circle**:

   a. In terms of d :

   $C =$ _____

   b. In terms of r :

   $C =$ _____

USING APPROXIMATE VALUES FOR π

There is no fraction that represents the exact value of π. If an exact solution to a problem is required, leave the symbol π in the solution. However, if the solution is needed for a task for which an approximation will serve, such as for making a measurement with a ruler, you may approximate π to the accuracy required for the application.

Compute the numerical approximations for each measurement that represents the circumference of a circle

	Exact Circumference of a Circle	**Approximate *C* using 3 for π**	**Approximate *C* using 3.14 for π**	**Approximate *C* using $\frac{22}{7}$ for π**
1.	$C = 7 \bullet \pi$ (d = _____)			
2.	$C = 28\pi$ (d = _____)			
3.	$C = 1.4\pi$ (d = _____)			
4.	$C = 100\pi$ (d = _____)			
5.	$C = 10\pi$ (d = _____)			

6. The value of 3 for π may be the simplest approximation to π. Why may it not be the "best?"

7. Which approximations above were easier to calculate using 3.14 for π? Explain.

8. Which approximations above were easier to calculate using $\frac{22}{7}$ for π? Explain.

CIRCUMFERENCE PROBLEMS

1. The symbol for pi is _____.
2. Common approximations for pi are _____, _____, and _____.
3. Explain what pi means.

4. Formulas for the circumference of a circle are _____ and _____.

Draw a picture, write a formula, and substitute to solve each problem. Use either 3.14 or $\frac{22}{7}$ for π.

5. **The plate problem:** Calculate the circumference of a plate with a radius of 14 cm.

   a. Sketch

   b. Appropriate formula _____

   c. Substitute and solve

   d. Solution

6. **The can problem:** Calculate the diameter of the top of a soup can with a circumference of 32 cm.

   a. Sketch

   b. Appropriate formula _____

   c. Substitute and solve

   d. Solution

7. Explain why neither of the answers you wrote for problems 5 or 6 are exact measurements.

CIRCUMFERENCE PROBLEMS (Continued)

Solve.

8. **The earth's orbit problem:** The earth is about 93,000,000 miles from the sun, and the earth revolves around the sun one time per year. If the earth's orbit is approximately a circle, how far does the earth travel in one year?

   a. Sketch

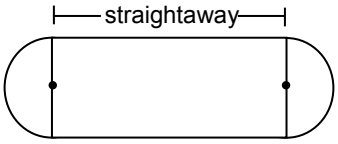
   b. Appropriate formula(s)

   c. Substitute and solve

   d. Solution

9. **The school track problem:** A field at a local school is surrounded by a track. The straightaways are each 425 feet long. The distance across the field (top to bottom in the diagram) is 150 feet. Find the distance around the track.

   a. Label the figure



   Hint: Think of this field as a combination of two familiar shapes.

   b. Appropriate formula(s)

   c. Substitute and solve

   d. Solution

10. Explain why in problems like these it may be preferable to use an approximation to π rather than to leave the answer in terms of π.

AREA OF CIRCLES

Summary

We will use our knowledge of the area of rectangles and circumference of circles to give an informal derivation of the area formula for a circle. We will use the formula to solve problems.

Goals

- Derive the area formula for circles.
- Solve problems that involve areas of circles.

Warmup

Suppose the vertical and horizontal length between adjacent dots represents 4 feet.

1. Find the area of a 16 foot by 20 foot rectangle. Make a scale drawing of the rectangle.

2. Find the circumference of a circle with a radius of 8 feet. (Your answer should be exact, with π in it.) Make a scale drawing of the circle.

DERIVING THE AREA OF A CIRCLE

1. What is the formula for the circumference of a circle in terms of its radius *r*?

2. Your teacher will give you a paper circle and some directions for folding it, cutting it into wedges, and then arranging the wedges into a shape. Space is provided below to tape, glue stick, or sketch the shape.

Use your knowledge of the area of a parallelogram / rectangle, and the circumference of a circle to find the area of this shape.

3. This figure, before folding and cutting, was a _____,

   now looks much like a _____, and the more wedges

   you make, the closer it gets to becoming a _____.

4. The "base" of the figure is approximately _____ of the circle.

5. The height of the figure is approximately _____ of the circle.

6. Write an equation for the approximate area of the figure.

7. Substitute the expression for the circumference of the circle from problem 1 above into your formula and simplify.

8. What is the formula for the area of a circle, in terms of the radius?

Area of a Circle
A = _____

AREA REPRESENTATIONS

1. Use the formula for the area of a circle to complete the table to the right.

Radius (*x*)	**Area (*y*)**
0 units	
1 units	
2 units	
3 units	
4 units	

2. Draw horizontal and vertical axes on the graph below. Label and scale the axes. Title the graph.

3. Graph the data points. How can you tell that a line does not fit the data very well?

4. What does the point (0,0) represent on this graph?

5. What does the point (1, *y*) represent on this graph?

6. Write an equation that best represents this graph.

7. Explain in words what this equation means.

8. Explain why each of the following does NOT represent a proportional relationship.

   a. The values in your data table.

   b. The graph.

   c. The equation.

AREA PROBLEMS

Draw a picture, write an appropriate formula, and substitute to solve each problem.

1. **The dish problem:** Find the area of a plate whose diameter is 12 inches.

   a. Sketch

   b. Appropriate formula

   c. Substitute and solve

   d. Solution

2. **The water sprinkler problem:** A revolving water sprinkler sprays water in a circular fashion to a distance of 20 feet in all directions. What area of grass does it cover?

   a. Sketch

   b. Appropriate formula

   c. Substitute and solve

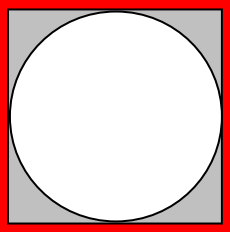
   d. Solution

MORE CIRCLE PROBLEMS

Label the diagrams, write the appropriate formulas, and substitute to solve each problem.

1. **The shaded area problem:** The largest possible circle is to be cut from a square board that is 56 inches on each side. What is the approximate area, in square inches, of the remaining board (shaded area)?

   a. Label the figure.



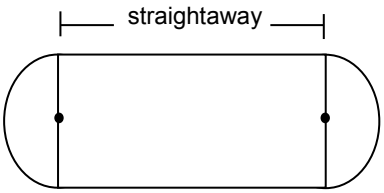
   b. Appropriate formulas

   c. Substitute and solve

   d. Solution

2. **The school track problem (revisited):** A field at a local school is surrounded by a track. Each straightaway is 425 feet. The distance across the field (top to bottom in the diagram) is 150 feet. Find the area of the entire field.

   a. Label the figure.



   b. Appropriate formulas

   c. Substitute and solve

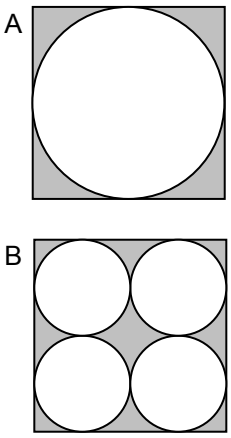
   d. Solution

MORE CIRCLE PROBLEMS (Continued)

3. The exact circumference of a circle is 8π cm. Find the exact area.

4. The exact area of a circle is 25π cm^2. Find the exact circumference.

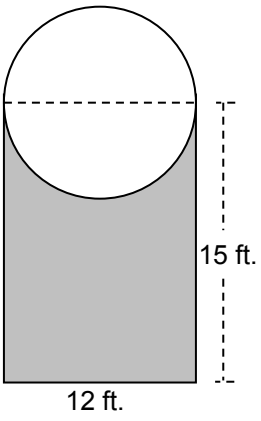
Squares A and B to the right both have side length equal 4 cm. All four circles in square B have the same diameter length.



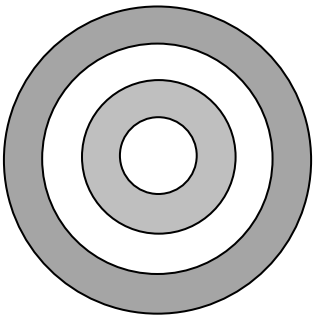
5. Predict which square has the greater amount of white space. _____

6. Test your prediction by calculating the area of the white space in both squares.

7. Find the shaded area of the basketball key to the right.



8. A dartboard is a representation of concentric circles, which are circles that have the same center. The smallest circle (the bullseye) has diameter d = 4 in. Each successive circle has a radius 2 inches greater than the previous one. What fraction of the whole dartboard is the smaller gray ring?



SKILL BUILDERS, VOCABULARY, AND REVIEW

SKILL BUILDER 1

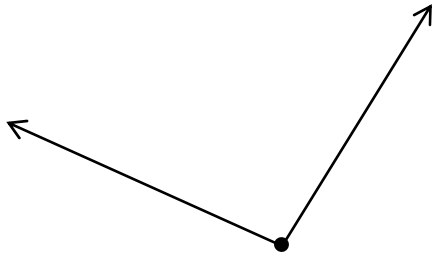
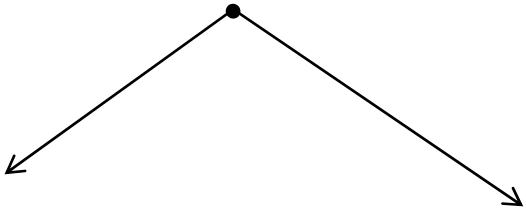
1. A rectangle has an area of 40.5 square units. One side is half the length of the other side. What is the length of each side?

2. The sum of three consecutive even integers is 240. What is each integer?

Compute.

3. $-4(7 - 3) + (-17)$	4. $19 - 9(4 - 8) - 21$	5. $\frac{-8 + 3(-4)}{9 - 11}$

State whether each angle appears to be acute, right, obtuse, or straight. Then use a protractor to find the measure.

6. _____ 	7. _____ 

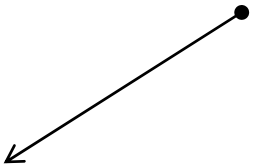
8. Daniel bought a shirt for $10 and sold the shirt for $18. What was his percent markup?

SKILL BUILDER 2

Solve the equations.

1. $3x - 8 = -19$	2. $\frac{x}{12} + 15 = 13$	3. $4(x - 9) = 26$
4. $3.8 - 5y = 12.2$	5. $1\frac{3}{4} + 3\frac{1}{2}x = 4\frac{1}{4}$	6. $5\frac{4}{5} = 3w - 3\frac{1}{10}$

State whether each measure represents an acute, right, straight, or obtuse angle. Then use a protractor to draw the angle. One ray of the angle and the vertex are given.

7. 25° _____ 	8. 130° _____ 

9. Explain the difference between the diameter and the radius of a circle.

Simplify the expressions.

10. $5x - 6(x - y)$	11. $2(w + 6y) - 4 + 12w - y$

SKILL BUILDER 3

1. Make a tree diagram or outcome grid to the right to show all possible outcomes of flipping a penny and a nickel. (Use H for heads and T for tails.)

Use the sample space above to find the following probabilities.

2. *P* (TT)	3. *P* (TH or HT)	4. *P* (getting at least one head)

5. If you flipped a penny and a nickel 20 times, how many times would you expect both to be tails (TT)?

6. Flip a penny and a nickel 20 times and record your results. How many times did get TT? What is your experimental probability for flipping two tails?

   By what percent does your estimate in problem 5 deviate from your theoretical expectation?

7. Sameeha surveyed 20 seventh graders in her math class about their favorite sport, and 13 of them said it was football. She concluded that 65% of the seventh graders at her school like football the best. Is her conclusion valid?

Solve the inequalities.

8. $3x - 9 > 15$	9. $\frac{1}{2} - 2\frac{3}{4}w \leq -5$	10. $5.6 > 2.4y - 7$

SKILL BUILDER 4

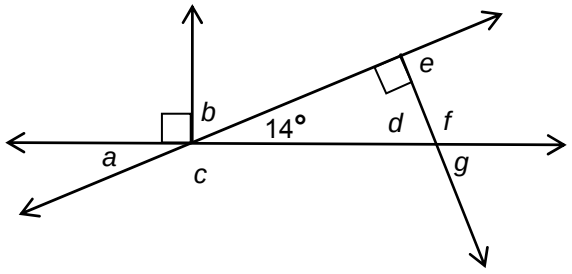
Simplify each complex fraction.

1. $\dfrac{\frac{3}{5}}{\frac{7}{10}}$

2. $\dfrac{\frac{12}{13}}{\frac{3}{26}}$

3. Write in the seven missing angle measures in the diagram to the right.

4. Explain how you figured out these two angle measures.



This diagram is not drawn to scale.

a. $|\angle b|$

b. $|\angle g|$

5. At a seventh grade dance, the ratio of boys to girls is 5 : 4. There are 65 boys at the dance. How many girls are at the dance?

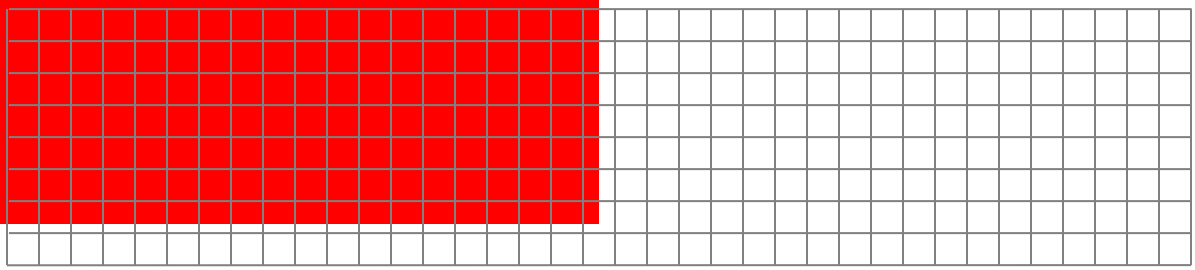
6. Draw an isosceles triangle with two sides of length 2 cm, and a third side that is longer than 3 cm.

7. Draw a triangle for which one side has length 3 cm, another side has length 4 cm, and the included angle is 110°. What is the length of the third side to the nearest mm?

SKILL BUILDER 5

Complete the table. Square A is the original drawing, and Squares B, C, and D are reductions or enlargements of A. Use the grid paper below to draw the squares if needed.

	Square	Scale factor	Rewrite the scale factor as a percent value	Enlargement or Reduction?	Length of a side	Area of the square
1.	A	1				
2.	B	2	200%	Enlargement	8 cm	64 sq. cm
3.	C	0.5				
4.	D	$1\frac{1}{2}$				



On a map, $\frac{1}{4}$ inch represents one mile. Fox, Tiger, and Lion are three cities on the map.

5. If the distance between Fox and Lion is 9 miles, how far apart are Fox and Lion on the map?

6. If Tiger and Lion are $3\frac{1}{2}$ inches apart on the map, what is the actual distance between Tiger and Lion in miles?

7. Harper has an 80 in : 1 in scale drawing of the floor plan of her house. On the floor plan, the dimensions of her rectangular living room are $1\frac{7}{8}$ inches by $2\frac{1}{4}$ inches. What is the area of her real living room in square feet?

SKILL BUILDER 6

Solve. Use either 3.14 or $\frac{22}{7}$ for π below.

1. Approximate the circumference of a plate with a radius of 12 cm. a. Sketch b. Appropriate formula c. Substitute and solve d. Solution	2. Approximate the diameter of a trash can lid with a circumference of 42 in. a. Sketch b. Appropriate formula c. Substitute and solve d. Solution

The city of Atlantic Beach is building a new park. It includes a circular pond that has a circumference of 628 feet.

3. About what is the radius of the pond?	4. The city wants to build a short wall around the pond. The wall must be 1 foot away from the edge of the pond the entire way around. About how long will the wall be? Use 3.14 for π.

SKILL BUILDER 7

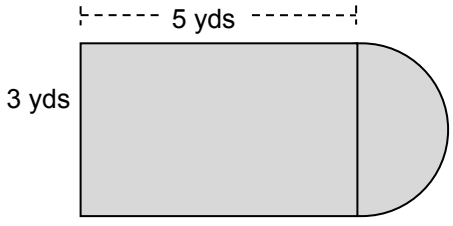
Use either 3.14 or $\frac{22}{7}$ for π.

1. Find the area of a circle with a radius of 5 cm.	2. Find the area of a circle with a diameter of 22 in.
3. Find the radius of a circle with an area of 200.96 square feet.	4. Find the diameter of a circle with an area of 19.625 square cm.

5. Frank's Pizza uses 13 inch by 13 inch pizza boxes for medium pizzas. Their medium pizza has a 12 inch diameter. What percent of the bottom of the box will a medium pizza cover?

6. An apple pie has a diameter of 8 inches, and a cherry pie has a radius of 5 inches. Which pie has a greater area and by how much?

7. Maya is building a pool whose shape combines a rectangle and semicircle (shown to the right). Find the area of the pool.



FOCUS ON VOCABULARY

Select the word from the word list below that best completes the sentence.

1. The _____ of a circle is the distance around it.

2. A line segment with both endpoints on the circle is called a _____.

3. Points on a circle are equidistant from its _____.

4. A _____ drawing is a kind of enlargement or reduction of an actual figure.

5. To enlarge a figure proportionally, multiply its dimensions by the _____.

6. A line segment from the center of a circle to any point on the circle is called a _____.

7. A _____ is the set of all points in a plane that are a given distance (radius) from a given point (center).

8. A chord that goes through the center of a circle is called a _____.

9. $\frac{22}{7}$ and 3.14 are approximations for _____.

Word List		
circle	radius	diameter
chord	circumference	center
scale factor	pi	scale drawing

SELECTED RESPONSE

Show your work on a separate sheet of paper and select the best answer(s).

1. Each floor of an office building measures 50 ft by 120 ft. On a blueprint, the same floor measures 25 in by 60 in. What is the blueprint scale?

   A. 2 in : 10 ft B. 1 in : 2 ft C. 10 in : 2 ft D. 1 ft : 2 in

2. A scale drawing of a school was created using a 1.5 cm : 10 ft scale. What actual length is represented by 6 cm on the drawing?

   A. 0.15 feet B. 15 feet C. 9 feet D. 40 feet

3. Choose all the statements that are true for a circle with a radius of 5 units.

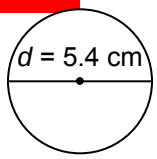
   A. The circumference is 5π units.

   B. The circumference is 10π units.

   C. The area is 10π square units.

   D. The area is 25π square units.

Use the circle below to answer problems 4 and 5.



4. What is the area of the circle to the nearest tenth?

   A. 8.5 cm^2 B. 17 cm^2 C. 22.9 cm^2 D. 91.7 cm^2

5. What is the circumference of the circle to the nearest tenth?

   A. 8.5 cm B. 17 cm C. 22.9 cm D. 91.7 cm

6. Choose all the statements that are true for all circles.

   A. The circumference divided by the diameter equals π.

   B. If the diameter triples, then the circumference triples.

   C. If the diameter is divided by 2, the area is divided by 2.

   D. If the diameter is divided by 2, the area is divided by 4.

KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

15.1 Scale Drawings

1. A blueprint of a room is drawn with a scale of $\frac{1}{2}$ in : 1 ft. The actual length of the room is 16 ft. Find the room's length on the blueprint.

A map is created with a scale of 2 cm : 15 km. Find the actual distance for each map distance.

2. 6 cm

3. 10 mm

15.2 Circumference of Circles

4. Find the circumference of a circle whose radius is 14 meters.

Approximate the measurement using 3 for π	**Approximate the measurement using 3.14 for π**	**Approximate the measurement using $\frac{22}{7}$ for π**

5. What is the circumference of a circle with a radius of 3 meters?

6. The circumference of a DVD is 28.26 centimeters. What is the diameter?

15.3 Area of Circles

7. Find the area of a circle with a radius of 12 km.

8. The area of a circle is 50.24 sq. cm. What is the radius of the circle?

9. Explain which has a greater area, a circle with radius of 3 meters or a square with a side length of 3 meters.

HOME-SCHOOL CONNECTION

Here are some problems to review with your young mathematician.

1. To make a scale drawing of your bedroom on an $8\frac{1}{2}$ in $\times$ 11 in sheet of paper, what might be an appropriate scale? Be sure to include units of measure.

2. Explain what pi means (do not simply write a number for it). Draw a diagram that helps support your explanation.

3. Each of Diana's dinner plates has a diameter of 14 inches.

   a. Find the circumference and the area of her plates.

   b. Diana wants to order salad plates that are half the area of the dinner plate. She orders salad plates that have a diameter of 7 inches. Did she order the right size? Explain.

Parent (or Guardian) Signature_____

COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT	
7.NS.A	**Apply and extend previous understandings of multiply, and divide rational numbers.**
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7.EE.A	**Use properties of operations to generate equivalent expressions.**
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
7.G.A	**Draw, construct and describe geometrical figures and describe the relationships between them.**
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7.G.B	**Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**
7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.G.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

STANDARDS FOR MATHEMATICAL PRACTICE	
MP2	Reason abstractly and quantitatively.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.

9 7 8 1 6 1 4 4 5 0 7 4 0