Algebra/Geometry Institute Summer 2011

Faculty Name: Sherry L. Young

School: Carver Elementary School

Grade Level: Fourth Grade

Exploring Geometric Shapes of Tangrams

Day 1

1 Teaching objective(s) :

Students will analyze characteristics, properties, and relationships of two-and-three dimensional geometric shapes.

The students will use problem solving to manipulate tangrams and recreate animals from *Grandfather Tang's Story.*

MS 3a. Analyze and describe similarities and differences between and among two-and-three dimensional geometric shapes, figures, and models using mathematical language. (DOK 2).

MS 3c. Identify transformations (rotations {turns}, reflections {flips}, and translations {slides} of two-dimensional figures.

MS 4c. Describe relationships of rectangular area to numerical multiplication.

2 Instructional Activities:

Opening/Introduction:

-TW explain to the students that a tangram is an ancient Chinese puzzle.
-TW explain that **SEVEN** pieces of a tangram puzzle form a square.
-TW tell students that they will be making their own set of tangram pieces using just one piece of construction paper.
-TW pass out a piece of construction paper, scissors and directions on how to make the tangram pieces to each student.
-TW guide students through the process of creating their own tangram pieces.
-TW orally explain and model how to find the Area and Perimeter of rectangles.
-Using the board or overhead, TW write the formula for Area=L×W and Perimeter =Side+Side+Side+Side.

Activity:

-SW follow the instructions as the teacher reads them and create seven tangram pieces.
-After students have created their own tangrams, TW ask students to get in pairs.

-TW pass out a set of plastic tangram pieces to each pair and ask them to compare the pieces they made to the plastic set.
-SW create rectangles using tangram pieces, and find the area and perimeter of each rectangle.

Closing:
After students have completed their assignments,
-Various students will go to the board and work problems on area and perimeter.
-Various students will go to the overhead and model various shapes, using their homemade tangrams.

3. Materials and Resources

-8 ½ × 11 piece of construction paper for each student
-Plastic set of Tangram pieces for each student
-Overhead set of Tangram pieces
-Scissors
http://www.joisetrue.com
www.superteacherworksheets.com

4. Assessment

-TW check to see that students followed directions by observing how their paper pieces compare to the plastic tangram pieces.
-TW monitor students' conversations about their observations of the tangram pieces.

Day 2

1. Instructional Activities:

Opening/Introduction:

-TW review with students about what was previously observed about tangram pieces.
-SW describe the pieces of tangram square.
-TW ask students to get into pairs and pass out a set of tangram pieces to each pair.
-TW guide the students in a sorting activity using the seven shapes.
-TW ask the students to sort the pieces by the number of sides.

Activity:

-SW sort the pieces into two piles-one pile with pieces that have 3 sides, one pile with pieces that have 4 sides.
-SW identify the shapes with three sides as triangles, and the pieces with four sides as a square and a parallelogram.
-TW ask the students to sort their pieces by their shape.
-SW sort the pieces into piles by triangles, square, and parallelogram. If some students put the square and parallelogram together, TW ask the students to explain why (some students may remember that a square is a parallelogram).
-TW guide the students in an activity that will allow the students to create other shapes using their tangram pieces.

-TW ask the students to create a triangle using 2 shapes.
-TW ask the students to create a triangle using 4 shapes.
-TW ask the students to create a square using 2 shapes.
-TW ask the students to create a square using 4 shapes.
-TW ask the students to create a rectangle using 3 shapes.

-TW have the students create the shapes on a piece of paper, outline the shape, label it, and state which tangram pieces were used.

Closing:

-SW restate the lesson concepts and what was learned.
-TW collect their papers when activity is finished.

3 Materials and Resources

-Set of tangrams for each student
-Construction paper
-Pencil
http://www2scholastic.com

4 Assessment

-TW monitor students' conversations about their observations of the tangram pieces.
-TW ask the students to sort their shapes using various attributes and will walk around the room to check for understanding.
-TW collect outlines of the shapes students created.

Day 3

1. Instructional Activities

Opening/Introduction:
-TW review with the students the history of Tangrams.
-TW separate the students into pairs and give each pair two shapes to recreate using their set of tangrams.
Worktime:
-SW try to create various shapes using their homemade tangram set.
-TW monitor progress by walking around the classroom and listening to dialogue between students.
-TW assess the completion of the pictures by asking students to recreate the picture on the overhead in front of the class.
-TW read *Grandfather Tang's Story* to the class.
-TW place the students into pairs and give each pair a picture of an animal from the story.
-SW recreate the animal using their homemade tangrams. After completion of the picture. SW glue the paper pieces on a piece of construction paper.

Closing:
-SW write a summary of Grandfather Tang's Story and share with the class.
-SW orally describe about the tangrams it took to create their picture.

2. Materials and Resources

-*Grandfather Tang's Story* by Ann Tompert
-Student made Tangram pieces
http://math.about.com
www.funorama.com

3. Assessment

-TW monitor progress of the students' ability to manipulate the seven shapes of Tangram Square to create other larger shapes.
-TW check for correct completion of the various shapes from *Grandfather Tang's Story* by evaluating the animal each pair or student recreated using the paper tangrams.

Day 4

1. Instructional Activities

Opening/Introduction:

-TW prompt students to orally explain what tangrams are and ways they can be used.
-TW call various students to the overhead to create shapes and describe the seven tangram pieces.

Worktime:

-SW cut out seven shapes and arrange them (so they don't overlap) to fit in a shaded square.
-SW create their own tangram design using their homemade tangrams.
-SW then trace the outline of their design on paper, and give it a title.

Closing:

-SW state the name and number of pieces a tangram consists of.
-SW stand and share their tangram picture with the class.

2. Materials and Resources

-Paper, pencil
-Scissors
-Tangrams
http://www.josietrue.com

3. Assessment

-TW observe students as they work on the tangrams and ask them to explain what the goal of the puzzle is. (The goal is to correctly fit each piece into the square.)

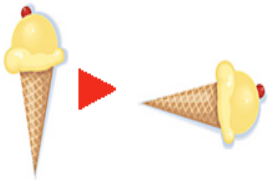
Summative Performance Evaluation

Day 5 **(Attachment)**

Tangram Quiz

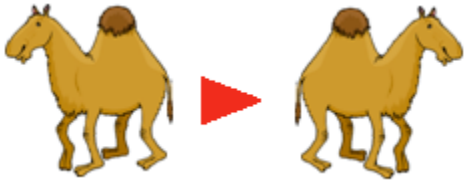
Use separate pieces of paper to trace your solutions on.

1. Name all of the tangram pieces.
2. How many ways can you make a square with the tangram pieces?
3. Where did tangrams originate ?
4. Can you make a square without using any triangles?
5. Make a square using all 7 pieces.
6. Make a trapezoid without using the square piece.
7. Make a rectangle that is not a square and uses all 7 pieces.
8. What type of transformation is shown here?



A. None of these
B. Flipping
C. Turning
D. Sliding

9. What type of transformation is shown here?



A. Sliding
B. Flipping
C. Turning
D. None of these

10. Write a summary of *Grandfather Tang's Story.*

TANGRAMS ACTIVITY

(Attachment)

Name: _____

Date: _____

In the box below, create your own tangram design. Use the tangram pieces that you cut out of your Before Playing worksheet.

Then, trace the outline of your design, give your tangram a title, and trade your worksheet for another student's. Can you complete each other's tangrams?

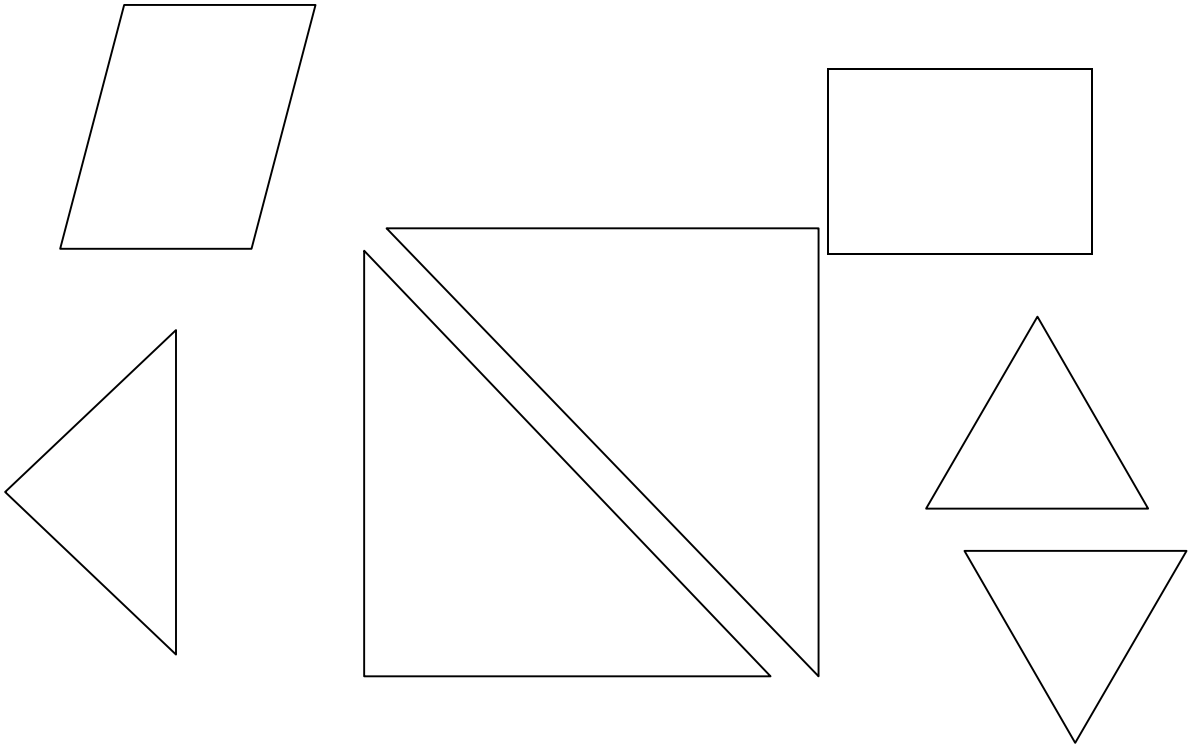
_____

(Title of your tangram)

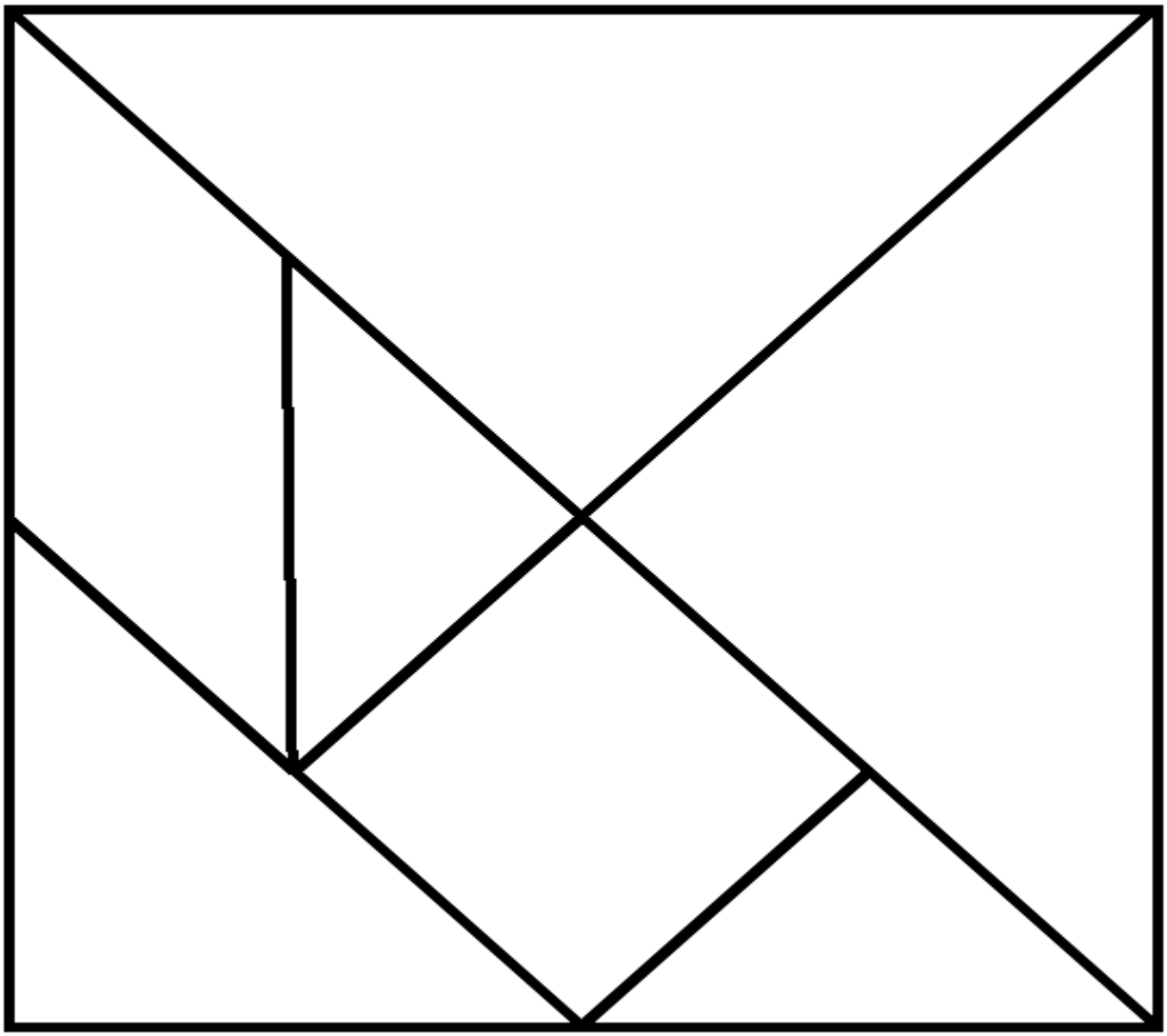
TANGRAMS ACTIVITY (Attachment)
Before Playing Worksheet

Name: _____
Date: _____

Cut out the seven shapes below and arrange them (so they don't overlap) to fit in the shaded square.



Tangram Pattern

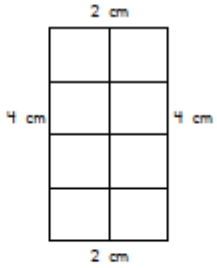


Name: _____

Area & Perimeter

Perimeter is the distance around a shape. To find the perimeter, add the length of each side.

Area is the number of square units that can fit inside of a shape. To find the area, count the square units

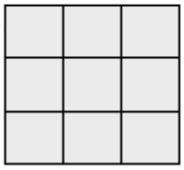


Perimeter = 12 cm

Area = 8 cm^2

Directions: First, label the length of sides of each polygon.
Then, add to find the perimeter.
After that, count the squares to find the area.

Be sure you write ***cm*** next to each answer for perimeter and ***cm^2*** next to each answer for area.

1. 

P = _____

A = _____

2. 

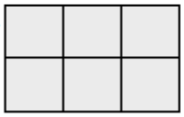
P = _____

A = _____

3. 

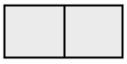
P = _____

A = _____

4. 

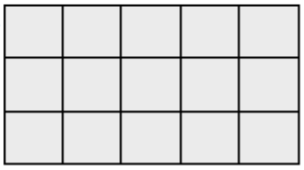
P = _____

A = _____

5. 

P = _____

A = _____

6. 

P = _____

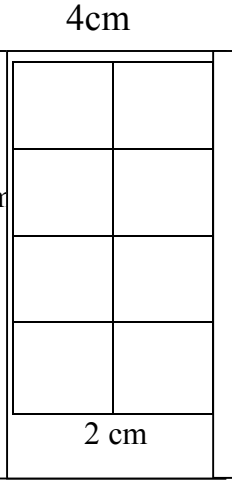
A = _____

Name_____

Area and Perimeter – ANSWER KEY

Perimeter is the distance around a shape. To find the perimeter, add the length of each side.

Area is the number of square units that can fit inside of a shape. To find the area, count the square units



Perimeter = 12 cm

Area = cm^2

Directions: First, label the length of sides of each polygon.
Then, add to find the perimeter.
After that, count the squares to find the area.
Be sure you write <u>cm</u> next to each answer for perimeter and <u>cm^2</u> next to each answer for area.

1.					**2.**					**3.**					**4.**			
					P	**=**	**12**	**cm**		**P**	**=**	**8**	**cm**		**P**	**=**	**10**	**cm**
P	**=**	**12**	**cm**		**A**	**=**	**8**	**cm^2**		**A**	**=**	**4**	**cm^2**		**A**	**=**	**6**	**cm^2**
A	**=**	**9**	**cm^2**															
5.					**6.**													
P	**=**	**6**	**cm**															
A	**=**	**2**	**cm^2**															
					P	**=**	**16**	**cm**										
					A	**=**	**15**	**cm^2**										