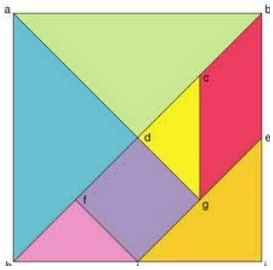


PRACTICE TASK: Tangram Challenge

Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MCC.K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MCC.K.G.6. Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

BACKGROUND KNOWLEDGE

"Children need to freely explore how shapes fit together to form larger shapes and how larger shapes can be made from smaller shapes" (Van de Walle p. 196). Van de Walle, NCTM and numerous other resources provide supplementary material for tangrams that allow students to explore the composition and decomposition of shapes.

ESSENTIAL QUESTIONS

- What makes shapes different from each other?
- How do shapes fit together and come apart?
- How can shapes be sorted?
- How do we use shapes in school?

MATERIALS

- Tangram puzzle set – one for each child
- *Tangram Challenge* Recording Sheet
- Example of completed tangram picture
- *Grandfather Tang's Story* by Ann Tompert and Robert Andrew Parker or similar literature connection

- *Three Pigs, One Wolf and Seven Magic Shapes* by Maccarone and Neuhaus and *The Tangram Magician* by Lisa Campbell Ernst.

GROUPING

Individual, small group or math work station

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
To introduce this task, *Three Pigs, One Wolf and Seven Magic Shapes* by Maccarone and Neuhaus, *The Tangram Magician* by Lisa Campbell Ernst, or a similar book.

Give each student a set of tangram puzzle pieces. Have them name and describe each piece in the set. Have them tell you something about each shape. Allow time for free exploration with the shapes so students can explore how simple shapes can form larger shapes. After time has been allowed for exploration, ask students to create a square using any number of pieces, and then compare the squares with their neighbors. Record the squares by tracing them on a piece of paper, challenging students to make as many different squares as they can. Ask students to define their squares using the attributes of four equal sides.

Display the Tangram Shape Chart and demonstrate to students how to use the chart by placing some of their squares in the appropriate row on the chart. Then have students work in groups to find other shapes that can be made from tangram pieces and sketch those in the appropriate square on the chart. All students are not expected to complete the entire chart (in fact not all shapes are possible). Encourage students to continue to work on this task on their own time and have the students share one of their solutions.

Part II
Next, read *Grandfather Tang's Story*, and point out where/how the tangram shapes are used to build the cat and the man. Distribute the student page with the cat and man designs. Be sure everyone understands the challenges of placing the shapes in the right places to make the correct puzzle. Allow time for students to complete the cat and the man puzzles. Circulate around the room as students complete their tangram puzzles. Ask students to describe their puzzle pieces using the questions below.

- What shapes are your puzzle pieces?
- What do you notice about all of the triangle pieces?
- What else do you notice about the puzzle piece shapes?
- How did you decide which puzzle pieces to use for each puzzle?

FORMATIVE ASSESSMENT QUESTIONS

- Are students able to sort shapes into reasonable groups?
- Are students able to talk about what makes shapes different from each other?
- Are students able use the tangram pieces to create given shapes in more than one way?
- Are students aware of how shapes fit together and come apart?
- Can students create a definition of a given shape by using its attributes?
- Do students recognize how we use shapes in school?
- Have students correctly placed their shapes on the Tangram Shape Chart?
- How did you count the number of sides?
- How do you know this is a square (rectangle, or triangle)?
- How many pieces did you use to create this shape? Where does this shape belong on the chart? How do you know?

DIFFERENTIATION

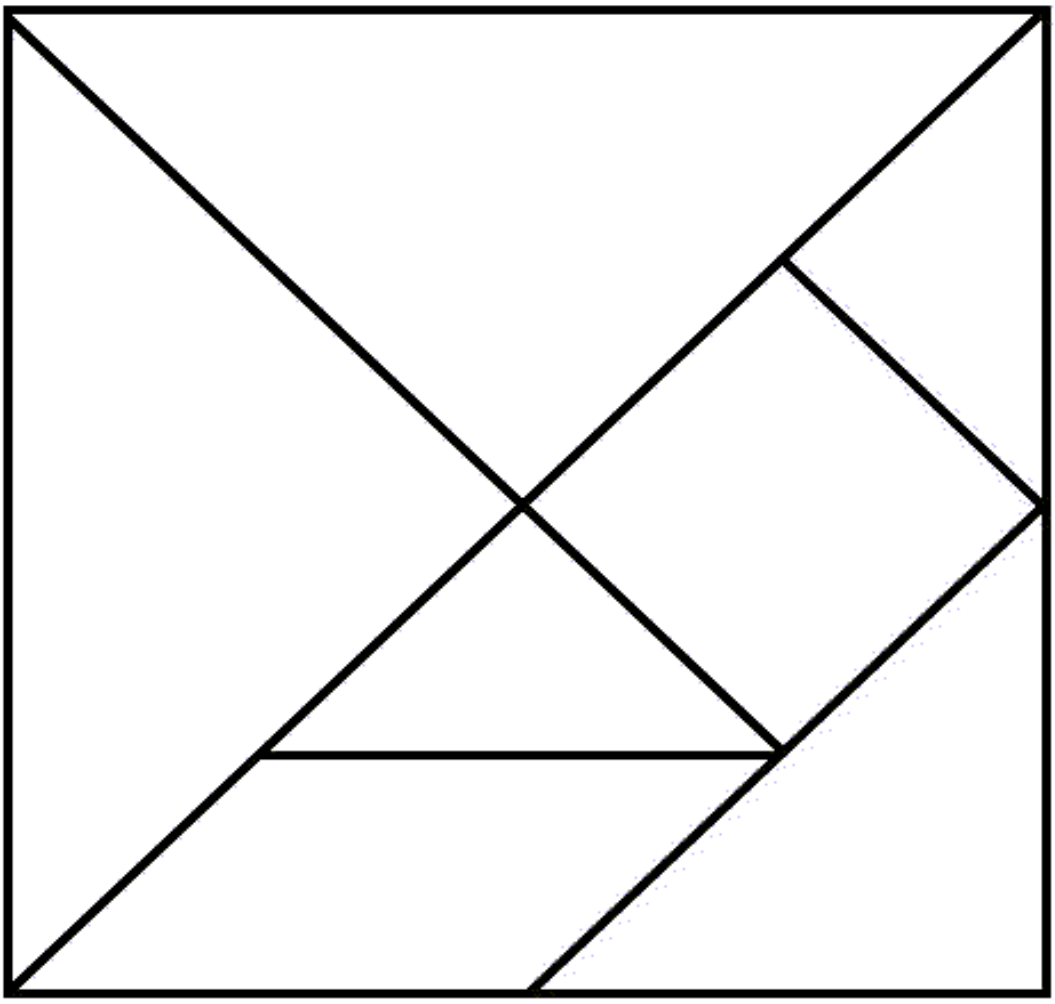
Extension

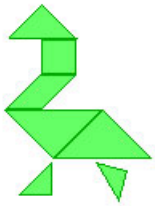
- Have students create their own tangram puzzle picture.
- Ask students to create a new character for the book, Grandfather Tang's Story and make a tangram mat for the character that can be added to the tangram center for classmates to try.
- Have students create the chart as an independent study with sketches of how the figures were created.
- Challenge students to a trapezoid with 1 to 7 pieces.

Intervention

- Have the students work with the tangram pieces to create either more simple pictures or use pictures with details (line segments) filled in.
- For each shape, provide only the pieces that will make that specific shape with the necessary pieces and have the students put them together.
- Allow student to trace the constructed shape on a separate piece of paper.

Student Tangram Puzzle

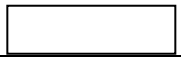
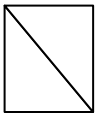




Name _____ Date _____

Tangram Challenge

Find as many ways as possible to create the shapes below using tangram pieces. You may work with a partner or a small group. Sketch how you made the shapes in the appropriate boxes below. See the examples below.

# of pieces	Square 	Rectangle 	Triangle 
1			
2			
3			
4			
5			
6			
7