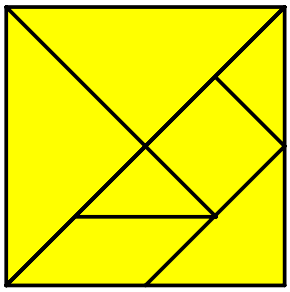
TIPS for Manipulatives
TANGRAMS



What are they?
One tangram set consists of seven shapes that can be arranged to form a square. The square tangram puzzle was invented in China and now, hundreds of years later, it is still being used to challenge individuals to create different shapes using the seven pieces.

How do they help students?
Tangrams are particularly useful in problem solving activities. Frequently, tangrams are used for exploring geometry, proportional reasoning, area and algebra. When students work together using tangrams, they have opportunities to improve communication skills, share ideas, and use mathematical vocabulary.

How many are recommended?
Tangram activities are often done with pairs of students so in most cases one set per pair of students is sufficient. However, individual tangram sets are easy to reproduce so when additional sets are needed students can make their own. With their own sets of tangrams, students can also do home extension activities. When tangrams are first introduced give students time to experiment and explore. Reassemble the tangram square before storing in a small zip-lock bag to prevent losing pieces.

What are some sample activities?
1. Assume that each tangram has a value of 1 whole. Find the value of each piece (based on surface area of one face) stated as a fraction. (Do the same activity but state the value as a decimal or percent).
2. Assume a whole tangram set costs $1.60. Determine a value for each piece of the set.
3. If the largest triangle represents 5/8 then what fraction does the smallest triangle represent? (As an alternative to 5/8 use an integer, decimal or percent.)
4. Use 4 tangram pieces to make a parallelogram.
5. How many ways can right isosceles triangles be formed with the tangram pieces? (As an alternative, form squares, rectangles, or parallelograms.)
6. Find the perimeter/area of each piece. (This is an opportunity to use the Pythagorean theorem).
7. Use the smallest triangle and the largest triangle to explore what happens to the area of a triangle when the lengths of both height and base are doubled.
8. Choose one of the triangles to represent a loading ramp. Calculate the slope of ramp.
9. Stack the right triangles so that the right angles are aligned. Make an observation about the hypotenuses.
10. Let "*a*" represent the area of the smallest triangle. What algebraic expression would represent the area of each other piece?
11. Create a tangram design using two or more pieces. Then create an algebraic expression to represent the area of the design.
12. Create convex polygons using tangram pieces. Investigate the sum of the interior angles.
13. Sort and classify the tangram pieces.
14. Create a shape using tangram pieces. Give instructions to your partner so he/she can build the same shape (sight unseen). Use good communication.
15. Create a "spinner" using tangram pieces that meet at one vertex. Determine the probability that the spinner will land on a piece.

Are there any recommended websites?
http://members.aol.com/sth777/page24.html - exploring the Pythagorean Theorem with tangram pieces
http://mathforum.org/trscavo/tangrams/construct.html - construct a tangram set
http://standards.nctm.org/document/eexamples/chap4/4.4/part2.htm - interactive tangram set
http://members.aol.com/sth777/page3.html - sample puzzles