

Puzzle Parts

Teacher Information

Lesson Objective: Use part-to-part relationships to figure out the whole

Objective (written on board for students): Use tangram pieces to construct a square and name each as a fractional part of the whole.

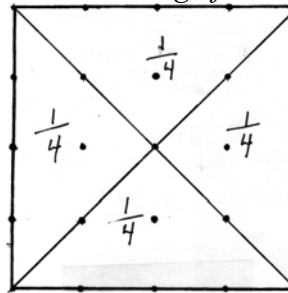
<i>Student Handout</i>	<i>Teacher Information</i>
<p><u>All work should be:</u></p> <ul style="list-style-type: none">• Neat• Trace each part• No overlapping of parts• Use ruler for straight lines• Stay in your group and ask the others in your group for help <p><u>For each task:</u></p> <ul style="list-style-type: none">• Make a prediction about how many Triangles fit into the square.• Label each part.• Design an equation• Discuss different solutions among your group. <p><u>Directions:</u></p> <ol style="list-style-type: none">1. Building the square (5 minutes)<ul style="list-style-type: none">▪ Students use the seven tangram pieces to build a square.▪ Place all tangram pieces in the tub.2. Large triangle (15 minutes)<ul style="list-style-type: none">▪ Take out the large triangles▪ Each student in the group gets one handout with 4 x 4 squares▪ Predict how many times the large triangle will fit into the square.▪ How many times can you draw the large triangle in the square without overlapping or gaps?	<p><i>These are a list of norms for all work. (individual and group)</i></p> <p><i>Be sure that tangram pieces are put away or students continue to work on puzzle instead of the assignment.</i></p> <p><i>We found that student had a much more difficult time with this are than we anticipated.</i></p> <p><i>While students begin to work on the large triangle:</i></p> <ul style="list-style-type: none">➤ <i>Handout a transparency to each group so that when they agree on one example they copy it to the transparency. (Stress that everyone in the group should</i>

- Make sure you fill in the entire square.
- How many pieces does it take to fill the entire square?
- Label each piece as its fractional part of the whole.
- Write an equation.
- Complete the table.
- Discuss your findings with everyone in your group.
- Prepare a group summary for the class.
- Be ready to discuss your findings with the class. (5 – 8 minutes for sharing)
- Place all tangram pieces into the tub.

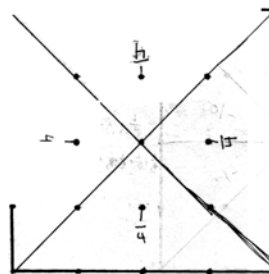
understand and be able to explain.)

- *When everyone is finished students demonstrate their examples.*
- *Students should name each fractional part on the diagram.*

Both of the following are examples of student work that demonstrate understanding of the concepts



tangram (shape)	prediction (for fraction)	actual fraction	equations
1 Large Triangle	3	4	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$ $\frac{4}{4} = 1 \text{ whole}$



$A = \frac{1}{4}$
 $\frac{1}{4} \times 4 = \frac{4}{4} = 1$
 $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$
 $25\% + 25\% + 25\% + 25\% = 100\% = 1$
 $25 + 25 + 25 + 25 = 100 = 1$

3. Medium Triangle (10 minutes)
- Take out the medium triangles
 - Each student in the group gets one handout with 4 x 4 squares
 - Predict how many times the medium triangle will fit into the square.
 - How many times can you draw the medium triangle in the square without overlapping or gaps?
 - Make sure you fill in the entire

While students begin to work on the medium triangle:

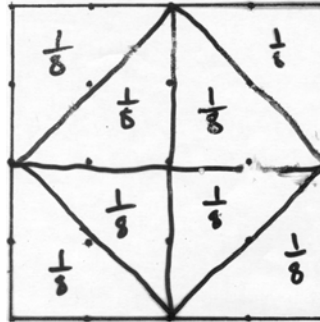
- *Handout a transparency to each group so that when they agree on one example they copy it to the transparency. (Stress that everyone in the group should understand and be able to explain.)*
- *When everyone is finished students demonstrate their examples.*

square.

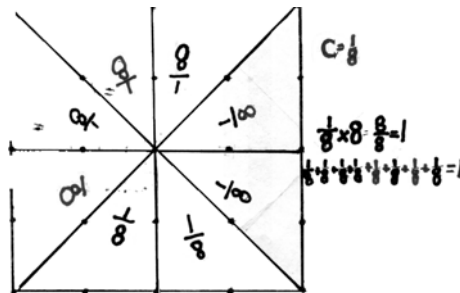
- How many pieces does it take to fit the entire square?
- Label each piece as its fractional part of the whole.
- Write an equation.
- Complete the table.
- Discuss your findings with everyone in your group.
- Prepare a group summary for the class.
- Be ready to discuss your findings with the class. (5 – 8 minutes for sharing)
- Place all tangram pieces into the tub.

➤ *Students should name each fractional part on the diagram.*

Both of the following are examples of student work that demonstrate understanding of the concepts



tangram (shape)	prediction (for fraction)	actual fraction	equations
medium triangle	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 1$ 1 whole



4. Small Triangle (10 minutes)

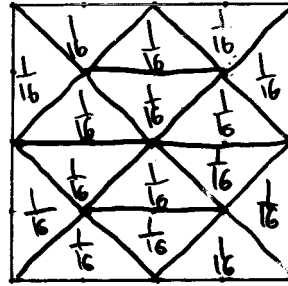
- Take out the small triangles
- Each student in the group gets one handout with 4 x 4 squares
- Predict how many times the small triangle will fit into the square.
- How many times can you draw the small triangle in the square without overlapping or gaps?
- Make sure you fill in the entire square.
- How many pieces does it take to fit the entire square?

While students begin to work on the medium triangle:

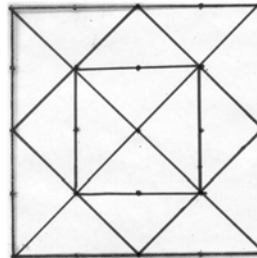
- *Handout a transparency to each group so that when they agree on one example they copy it to the transparency. (Stress that everyone in the group should understand and be able to explain.)*
- *When everyone is finished students demonstrate their examples.*
- *Students should name each fractional part on the diagram.*

- Label each piece as its fractional part of the whole.
- Write an equation.
- Complete the table.
- Discuss your findings with everyone in your group.
- Prepare a group summary for the class.
- Be ready to discuss your findings with the class. (5 – 8 minutes for sharing)
- Place all tangram pieces into the tub.

Both of the following are examples of student work that demonstrate understanding of the concepts. (the second example is not complete for the sections on the diagram are not labeled and 1/6 was written instead of 1/16 as the fractional part.



tangram (shape)	prediction (for fraction)	actual fraction	equations
Small Triangle	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{9}{16} + \frac{9}{16} = 1 \text{ whole}$



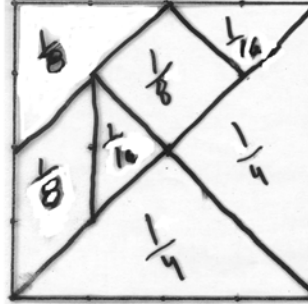
tangram (shape)	prediction (for fraction)	actual fraction	equations
Small Triangle		$\frac{1}{16}$	$\frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} = \frac{16}{16} = 1 \text{ whole}$

5. Constructing the square (10 minutes)

- Get from teacher, handout with placement of small triangles.
- Use this handout to lay the seven tangram pieces on the 4 x 4 square.
- Draw the placement of your seven pieces on the handout labeled “Tangram Fraction”

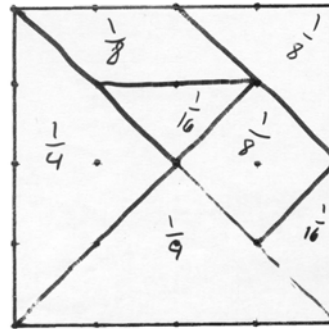
Hint: Student can be lead to completing the square if they begin by laying their pieces on the first example for the small triangle.

- Label each piece as a fractional part of the whole.
- Discuss your finding with the rest of the class. (5 – 8 minutes for sharing)



tangram (shape)	prediction (for fraction)	actual fraction	equations
all of the shapes			

$$\frac{3}{8} + \frac{2}{16} + \frac{2}{4} = 1$$



tangram (shape)	prediction (for fraction)	actual fraction	equations
			$2 \times 4 = 8$ $4 \times 4 = 16$ $\frac{2}{16} = \frac{2}{16}$ $\frac{3}{8} = \frac{6}{16}$ $2 \times 2 = 4$ $\frac{4}{16} = \frac{4}{16}$ $\frac{8}{16} = 1$