

IMPROVING TEACHER QUALITY PROGRAM  
**Mathematics Within: Algebraic Processes and Its Connections to Geometry**  
**Two-part Lesson**

**Participant Name:** John Weimholt

**Broad Topic:** Division      **Subtopic:** Division by fractions (Part one)

**Grade level:** 4-6      **Time:** 30 minutes

**Aim:** To help students understand that division problems are typically seen as either involving sharing or grouping. Note: Sharing is partitioning; the divisor represents how many ways something needs to be distributed; e.g., 6 cookies divided among 3 children. In grouping, the divisor stands for how much of the dividend goes into each group (packet, container, etc.), e.g., 18 tennis balls in 3-ball containers.

**Specific Objective(s):**

- Use array models to illustrate division as sharing and as grouping.
- Use array models to compare division as sharing with division as grouping.

**Materials/Supplies:**

- Index cards
- Array model charts (see p. 3)

**References: (text/handouts, etc)**

- Sample array model charts (teacher reference, see p. 3-4)
- Manipulatives

**Lesson One:**

• **Introduction**

- On the blackboard write and draw the following:

- $6 \div 2 = 3$



- Pass out note cards and ask the students to copy the figure and draw groupings to illustrate the number sentence. Also, write a real-life example to go with it.
- When the students seem ready, ask a volunteer to write his/her response on the board. Ask if anyone drew a different way of grouping and ask the student to draw his/her response on the board as well. Possible answers might look like:



I divided 6 cookies between my friend and I.



I divided 6 dice into pairs, so now I have 3 pairs of dice.

- **Body**

- Ask the students: Can there be two models for the same number sentence? To take a closer look, pass out the array model charts and project the overhead version on the screen.
- Explain that the chart has a column for division by sharing and one for division by grouping. Ask which model should go to which column.
- Backtrack to the first example on the chart,  $6 \div 6 = 1$ . Walk the students through making the correct models and coming up with accompanying stories.
- Ask students to work in groups to do the third sentence,  $6 \div 2 = 3$ . Ask for responses, check for understanding.
- Have student groups move on to  $6 \div 1 = 6$ .
- Class discussion: What patterns have you noticed? What patterns do you see in the stories that describe sharing? In the stories that describe grouping? How are sharing and grouping the same? How are they different?

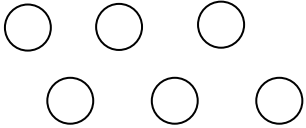

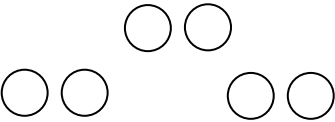
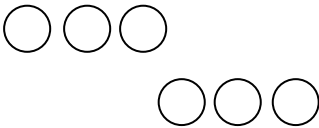
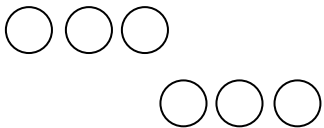
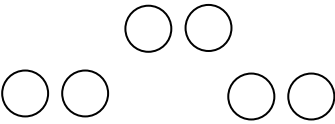

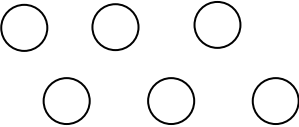
- **Close**

- We've looked at two basic ways that you can approach a division problem. Who can briefly explain them?
- Are they the only ways to envision division problems? What would be some other ways?
- Give an example of division as sharing.
- Give an example of division as grouping.

- **Application/Assessment**

- Have the students fill out the back of their index cards with the following:  
"On the back of your index card, write a new number sentence with a new story and tell whether it is sharing or grouping."

### Page 3—Array Model Chart

Number Sentence	Sharing	Grouping	Notes
$6 \div 6 = 1$	<p>Model:</p>  <p>Example:</p> <p>Six cookies divided by six kids – each kid gets one cookie</p>	<p>Model:</p>  <p>Example:</p> <p>Six cookies in a package of six make one package</p>	
$6 \div 3 = 2$	<p>Model:</p>  <p>Example:</p> <p>Six cookies divided by three kids – each kid gets two cookies</p>	<p>Model:</p>  <p>Example:</p> <p>Six cookies in packages of three make two packages</p>	
$6 \div 2 = 3$	<p>Model:</p>  <p>Example:</p> <p>Six cookies divided by two kids – each kid gets three cookies</p>	<p>Model:</p>  <p>Example:</p> <p>Six cookies in packages of two make three packages</p>	
$6 \div 1 = 6$	<p>Model:</p>  <p>Example:</p> <p>Six cookies divided by 1 kid – one kid gets all six cookies</p>	<p>Model:</p>  <p>Example:</p> <p>Six cookies in packages of one each make six packages</p>	

**Page 4—Array Model chart-overhead**

Number Sentence	Sharing	Grouping	Notes
$6 \div 3 = 2$	Model:  Example:	Model:  Example:	
$6 \div 2 = 3$	Model:  Example:	Model:  Example:	
$6 \div 1 = 6$	Model:  Example:	Model:  Example:	