

## Distributive Property

### Student Probe

Erica has to figure out how to solve  $6 \times 9$ . She does not know  $6 \times 9$ , but she knows  $6 \times 5$ . She wrote the number sentence below to help her figure out the answer. What goes in the box to make her number sentence true? Explain how you know.

$$6 \times 9 = (6 \times 5) + (6 \times \square)$$

If the student cannot answer and explain his thinking, he needs this lesson.

### Lesson Description

This lesson is designed to help students understand and apply the distributive property.

### Rationale

The distributive property is very useful in relating one basic fact to another and also in the development of 2-digit computation for multiplication and division. Students who are able to apply the distributive property will have a better understanding of its usefulness when solving problems with a variable such as  $3(2x + 4) = 5$ .

### Preparation

Make 4 array cards with the dimensions  $7 \times 8$ . Make 1 array card with the dimensions  $9 \times 7$ . Make 1 array card with the dimensions  $6 \times 7$  that is divided as shown in Step 10 below. Make additional array cards for extra practice as needed.

### At a Glance

What: Uses the Distributive Property for Multiplication over Addition to multiply and divide

Common Core State Standard: CC.3.OA.5. Apply properties of operations as strategies to multiply and divide.

Mathematical Practices:  
Reason abstractly and quantitatively.  
Model with mathematics.  
Look for and make use of structure.

Who: Students who do not understand or cannot apply the distributive property.

Grade Level: 3

Prerequisite Vocabulary: array, row, column

Prerequisite Skills: use of parentheses, understand having an unknown in a number sentence, and meaning of multiplication and division

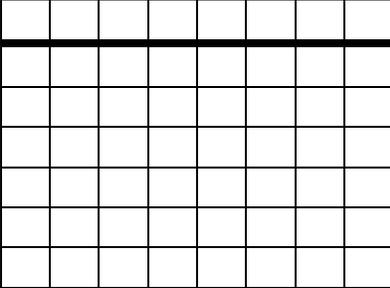
Delivery Format: small group, individual

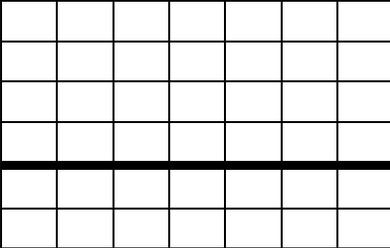
Lesson Length: 15 – 20 minutes

Materials, Resources, Technology: pre-made array cards (see Preparation portion of lesson.)

Student Worksheets: None

## Lesson

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
1. Give the student an array card that has the dimensions $7 \times 8$ . Ask the student to write a multiplication sentence that matches the array.	$7 \times 8 = 56$	Refer to <a href="#">Representing Multiplication</a> .
2. Show the student the next $7 \times 8$ array card but draw a line to represent $1 \times 8$ and $6 \times 8$ .  		
3. Ask the student to give the dimensions of each piece.	$1 \times 8$ and $6 \times 8$	Count the rows and columns for each part with the student.
4. Ask the student how he could figure out how many squares there are using the two expressions and to write a number sentence to show his answer.	$(1 \times 8) + (6 \times 8) = \square$	Model how to write the number sentence describing what each part represents.
5. Ask the student to figure out how many squares there are.	56	Show student that $1 \times 8 = 8$ and $6 \times 8 = 48$ . Then add $8 + 48$ to get 56.
6. Ask the student how $7 \times 8$ compares to $(1 \times 8) + (6 \times 8)$ .	$7 \times 8 = (1 \times 8) + (6 \times 8)$ $56 = 56$	Model how to write the equation.

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>7. Ask the student to tell what each numeral in the number sentence represents in the array.</p>	<p>7 tells how many rows in the whole array.  8 tells how many columns in the whole array.  1 tells how many rows in the first part of the divided array.  8 tells how many columns in the first part of the divided array.  6 tells how many rows in the second part of the divided array.  8 tells how many columns in the second part of the divided array.</p>	<p>Show the student what each number represents.</p>
<p>8. Repeat Steps 2 – 7 with the additional arrays for <math>7 \times 8</math>.  Divide as in Step 2 using <math>(2 \times 8)</math> and <math>(5 \times 8)</math> for one array and using <math>(3 \times 8)</math> and <math>(4 \times 8)</math> for one array.</p>		
<p>9. Make array cards with other dimensions and repeat as needed.</p>		
<p>10. Give student a <math>6 \times 7</math> array card that is divided as shown.</p>  <p>Do not tell the student the dimensions of the array card.</p>		

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
11. Ask the student to give the dimensions for each partial piece of the array.	$4 \times 7$ and $2 \times 7$ .	Show student how to find the dimensions by counting the rows and columns for each piece of the array.
12. Ask the student to give the dimensions of the entire array.	$6 \times 7$	Show student how to find the dimensions by counting the rows and columns of the array.
13. Ask the student to write an equation that shows how the dimensions from Step 11 relate to the dimensions from Step 12.	$(4 \times 7) + (2 \times 7) = 6 \times 7$	Model how to write the equation.
14. Make other array cards and repeat Steps 10 – 13 as needed.		

### Teacher Notes

None

### **Variations**

None

### **Formative Assessment**

Baret has to figure out how to solve  $9 \times 7$ . He does not know  $9 \times 7$ , but he knows  $9 \times 5$ . He wrote the number sentence below to help him figure out the answer. What goes in the box to make his number sentence true?

$$9 \times 7 = (9 \times 5) + (9 \times \square )$$

Allow student to use  $9 \times 7$  array card as needed.

### **References**

Russell Gersten, P. (n.d.). *RTI and Mathematics IES Practice Guide - Response to Intervention in Mathematics*. Retrieved Feb. 25, 2011, from rti4success

Van de Walle, John A., Karp, Karen S., and Bay-Williams, Jennifer M., (2010), *Elementary and Middle School Mathematics: Teaching Developmentally*, Boston, Allyn & Bacon