

# Exploring the Distributive Property

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<b>Reporting Category</b>	Patterns, Functions, and Algebra
<b>Topic</b>	Investigating and recognizing the distributive property
<b>Primary SOL</b>	5.19 The student will investigate and recognize the distributive property of multiplication over addition.
<b>Related SOL</b>	5.7

**Materials**

- Base-10 blocks
- Exploring the Distributive Property Recording Sheet (attached)
- Colored pencils or markers
- Drawing paper

**Vocabulary**

*distributive property*

**Student/Teacher Actions (what students and teachers should be doing to facilitate learning)**

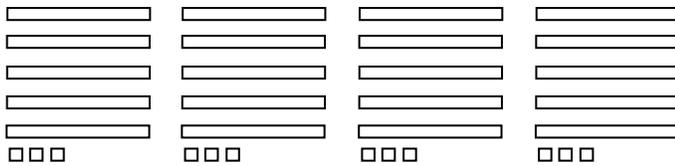
1. Begin the lesson by asking students to compute  $4 \times 53$  mentally. Ask volunteers to share different methods of mental computation for this problem, and write their suggested methods on the board. Spotlight any method that uses the distributive property:

$$4 \times 53 = 4 \times 50 + 4 \times 3 = 200 + 12 = 212$$

Point out how the number 53 was broken into  $50 + 3$ , making it easier to multiply and add mentally. Thus, this problem could be written as follows:

$$4 \times (50 + 3) = (4 \times 50) + (4 \times 3) = 200 + 12 = 212$$

2. Have students use base-10 blocks to model  $4 \times 53$  by showing 4 groups of 53. Guide student to see that if  $\square\square\square\square\square\square\square\square$  = 10 units and  $\square$  = 1 unit, they can make 4 groups of 50 and 4 groups of 3, as shown below:



Using the base-10 blocks, students can see that the 4 groups of  $50 = 200$  (skip count the rods by 10), and the 4 groups of  $3 = 12$ . Therefore,  $200 + 12 = 212$ . Have students record their drawings and solution in symbols on their recording sheets.

3. Present students with another problem,  $6 \times 24$ , and ask them to model this problem with base-10 pieces. Have them draw their diagram on the recording sheet. Have them also show this problem, using numbers and symbols. Have them work in pairs to take turns explaining this method to each other. Once all have explained the problem to their partners, write the steps on the board.

- a) Break 24 into  $20 + 4$ .
  - b) Think of  $6 \times 24$  as  $6 \times (20 + 4)$ .
  - c) Rethink the problem:  
$$6 \times (20 + 4) = (6 \times 20) + (6 \times 4)$$
  - d) Using order of operations, multiply within the parentheses first, then add:  
$$120 + 24 = 144$$
4. Make up a few more problems for students to show in drawings and symbols (e.g.,  $5 \times 35$  and  $3 \times 63$ ).
  5. Share the formal definition of the *distributive property*: multiplying a sum by a number gives the same result as multiplying each addend by the number and then adding the products. Have students discuss what this statement means and show how it works.
  6. Have students create posters of their own equations that show the distributive property. Pass out drawing paper and colored pencils or markers. Have students create an equation that uses both manipulatives and symbols and draw these on the drawing paper. Ask students to share their posters with the class, explaining how the distributive property works.

### Assessment

- **Questions**
  - How does the distributive property work with the problem  $3 \times 43$ ? Use pictures and symbols.
  - How might the expression  $4 \times (7 + 6)$  be rewritten using the distributive property? Use pictures and symbols to show your thinking.
- **Journal/Writing Prompts**
  - Explain how the distributive property works, using examples, drawings, and words.
  - Explain how the distributive property is helpful when you are multiplying large numbers. Create a multiplication problem to help your explanation.
- **Other**
  - Review posters for correctness and to check for understanding of the distributive property.
  - Have students show how the distributive property works with problems with larger numbers, such as  $5 \times 603$ .

### Extensions and Connections (for all students)

- Show how the distributive property works with variable expressions. Ask students how to write “3 times  $n + 1$ .” Lead them to see that this is written  $3 \times (n + 1)$ . Ask students to represent this with their base-10 blocks, using a rod for  $n$  and a unit for one. Have them also represent this with symbols.

# Exploring the Distributive Property Recording Sheet

Name \_\_\_\_\_ Date \_\_\_\_\_

<b>Pictures</b> (Use <input type="text"/> for tens and <input type="checkbox"/> for ones.)	<b>Numbers and Symbols</b>
	$4 \times 53 = (\_ \times \_) + (\_ \times \_)$