Unit 4, Lesson 8

The Distributive Property, Part 1

Let's use the distributive property to describe expressions.

8.1 Math Talk: Ways to Multiply

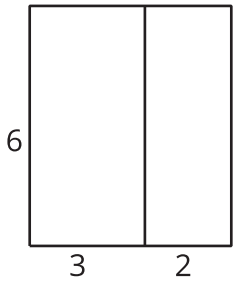
Find the value of each product mentally.

- $5 \cdot 102$
- $5 \cdot 98$
- $5 \cdot 999$
- $5 \cdot (0.999)$

8.2 Ways to Represent Area of a Rectangle

1. Select **all** the expressions that represent the area of the large, outer rectangle in Figure A. Explain your reasoning.

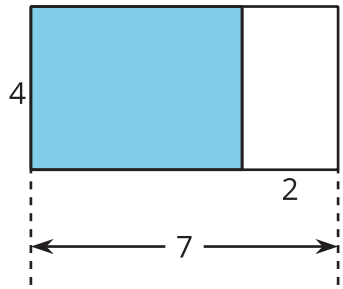
A



- $6 + 3 + 2$
- $6 \cdot 3 + 6 \cdot 2$
- $6 \cdot 3 + 2$
- $6 \cdot 5$
- $6 \cdot (3 + 2)$
- $6 \cdot 3 \cdot 2$

2. Select **all** the expressions that represent the area of the shaded rectangle on the left side of Figure B. Explain your reasoning.

B



- $4 \cdot 7 + 4 \cdot 2$
- $4 \cdot 7 \cdot 2$
- $4 \cdot 5$
- $4 \cdot 7 - 4 \cdot 2$
- $4 \cdot (7 - 2)$
- $4 \cdot (7 + 2)$
- $4 \cdot 2 - 4 \cdot 7$

8.3 Distributive Practice

Complete the table. If you get stuck, consider skipping an entry and coming back to it, or drawing a diagram of two rectangles that share a side.

column 1	column 2	column 3	column 4	value
$5 \cdot 98$	$5\,(100 - 2)$	$5 \cdot 100 - 5 \cdot 2$	$500 - 10$	490
$33 \cdot 12$	$33\,(10 + 2)$			
		$3 \cdot 10 - 3 \cdot 4$	$30 - 12$	
	$100\,(0.4 + 0.06)$			
		$8 \cdot \frac{1}{2} + 8 \cdot \frac{1}{4}$		
			$100 + 70$	
			$40 - 16$	

Are you ready for more?

1. Use the distributive property to write two expressions that equal 360. (There are many correct ways to do this.)

2. Is it possible to write an expression like $a(b + c)$ that equals 360 where a is a fraction? Either write such an expression, or explain why it is impossible.

3. Is it possible to write an expression like $a(b - c)$ that equals 360? Either write such an expression, or explain why it is impossible.

4. How many ways do you think there are to represent 360 using the distributive property?

Lesson 8 Summary

When we need to do mental calculations, we often come up with ways to make the calculation easier to do mentally.

Suppose we are grocery shopping and need to know how much it will cost to buy 5 cans of beans at 79 cents a can. We may calculate mentally in this way:

$$\begin{aligned} &5 \cdot 79 \\ &5 \cdot (70 + 9) \\ &5 \cdot 70 + 5 \cdot 9 \\ &350 + 45 \\ &395 \end{aligned}$$

When we think, "79 is the same as $70 + 9$. I can just multiply $5 \cdot 70$ and $5 \cdot 9$ and add the products together" we are using the distributive property.

In general, when we multiply two factors, we can break up one of the factors into parts, multiply each part by the other factor, and then add the products. The result will be the same as the product of the two original factors. When we break up one of the factors and multiply the parts we are using the distributive property of multiplication.

The distributive property also works with subtraction. Here is another way to find $5 \cdot 79$:

$$\begin{aligned} &5 \cdot 79 \\ &5 \cdot (80 - 1) \\ &5 \cdot 80 - 5 \cdot 1 \\ &400 - 5 \\ &395 \end{aligned}$$