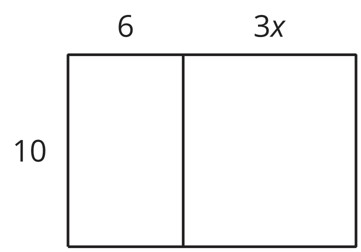
Unit 4, Lesson 2

Expanding and Factoring

Let's use the distributive property to write expressions in different ways.

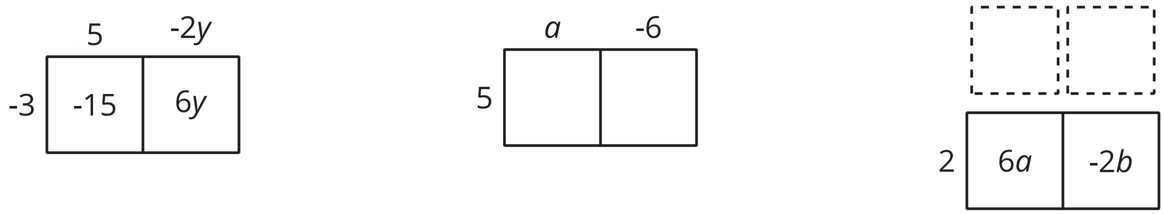
2.1 Expressions for Area

Write as many expressions as you can that represent the area of this rectangle.



2.2 Factoring and Expanding with Negative Numbers

In each row, write the equivalent expression. If you get stuck, use a diagram to organize your work. The first row is provided as an example. Diagrams are provided for the first three rows.



factored	expanded
$-3(5-2y)$	$-15+6y$
$5(a-6)$	
	$6a-2b$
$-4(2w-5z)$	
$-(2x-3y)$	
	$20x-10y+15z$
$k(4-17)$	
	$10a-13a$
$-2x(3y-z)$	
	$ab-bc-3bd$
$-x(3y-z+4w)$	

Are you ready for more?

1. Expand to create an equivalent expression that uses the fewest number of terms: $\left(\left(\left(\left(x+1\right)\frac{1}{2}\right)+1\right)\frac{1}{2}\right)+1$.
2. If we wrote a new expression following the same pattern so that there were 20 sets of parentheses, how could it be expanded into an equivalent expression that uses the fewest number of terms?

2.3 Seeing Structure

Factor each expression. Be prepared to explain your reasoning.

1. $3 \cdot 15 + 4 \cdot 15 - 5 \cdot 15$

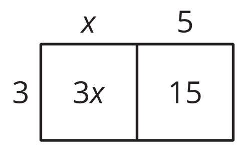
2. $3x + 4x - 5x$

3. $3(x-2) + 4(x-2) - 5(x-2)$

4. $3\left(\frac{5}{2}x + 6\frac{1}{2}\right) + 4\left(\frac{5}{2}x + 6\frac{1}{2}\right) - 5\left(\frac{5}{2}x + 6\frac{1}{2}\right)$

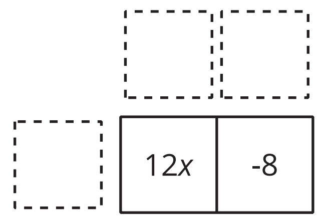
Lesson 2 Summary

Properties of operations can be used in different ways to rewrite expressions and create equivalent expressions. For example, the distributive property can be used to **expand** an expression such as $3(x+5)$ to get $3x+15$.

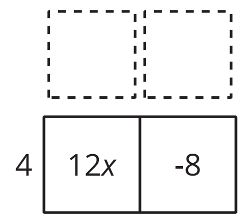


The distributive property can also be used in the other direction to **factor** an expression such as $12x-8$. In this case, we know the product and need to find the factors.

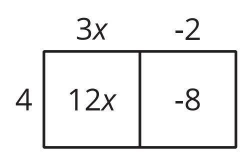
The terms of the product go inside:



Think of a factor each term has in common: $12x$ and -8 each have a factor of 4. The common factor can be placed on one side of the large rectangle:



Now think: "4 times *what* is 12x?" and "4 times *what* is -8?" Write the other factors on the other side of the rectangle:



So, $12x-8$ is equivalent to $4(3x-2)$.