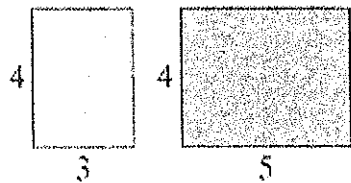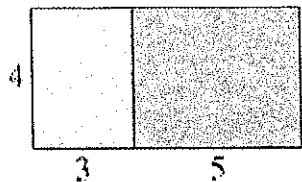# Exploring the Distributive Property

You can find the total area of two rectangles by two methods.
Method 1: Find the area of each rectangle. Then find the sum of the areas.

Method 2: Combine the two rectangles into one large rectangle. Find its length. Find its width. Then find its area.

The total area of two rectangles can be represented by the following two expressions: $3 \cdot 4 + 5 \cdot 4$ and $(3 + 5)4$. Since both expressions have the same value, so they are equivalent. $3 \cdot 4 + 5 \cdot 4 = (3 + 5)4$. This equation is an example of the *Distributive Property*.

Distributive Property

To multiply a sum or difference, multiply each number within the parentheses by the number outside the parentheses.

$a(b + c) = ab + ac$ $2(3 + 5) = 2(3) + 2(5)$

$(b + c)a = ba + ca$ $(5 + 9)2 = 5 \cdot 2 + 9 \cdot 2$

Distributive Property Practice

Simplify by distributing and collecting like terms. Show your work. The 1ˢᵗ one is done for you.

1. $3(4x + 6) + 7x =$
   $12x + 18 + 7x = 19x + 18$

2. $7(2 + 3x) + 8 =$

3. $9 + 5(4x + 4) =$

4. $12 + 3(x + 8) =$

5. $3(7x + 2) + 8x =$

6. $3(4x^2y^3 + 2x^2) + 4(2x^2 + 3x^2y^3) =$

11. $6m + 3(2m + 5) + 7 =$

12. $5(m + 9) - 4 + 8m =$

13. $3m + 2(5 + m) + 5m =$

14. $6m + 14 + 3(3m + 7) =$

15. $4(2m + 6) + 3(3 + 5m) =$

16. $2(1x^3y + 5x^2 + 3xy) + 3(4xy + 2x^2 + 5x^3y) =$

Simplify the expression first. Then evaluate the resulting expression for the given value of the variable.

7. $3x + 5(2x + 6) =$ _____ if $x = 4$
   $3x + 10x + 30 =$
   $13x + 30 =$
   $13(4) + 30 =$ ⟨82⟩

8. $4 + 6(2x + 7) =$ _____ if $x = 3$

9. $8 + 5(9 + 4x) =$ _____ if $x = 2$

17. $9(2m + 1) + 2(5m + 3) =$ _____ if $m = 2$

18. $7(7 + 5m) + 4(m + 6) =$ _____ if $m = 1$

19. $2(4m + 5) + 8(3m + 1) =$ _____ if $m = 3$

3A