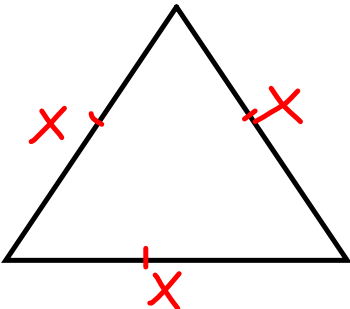


1.7 The Distributive Property

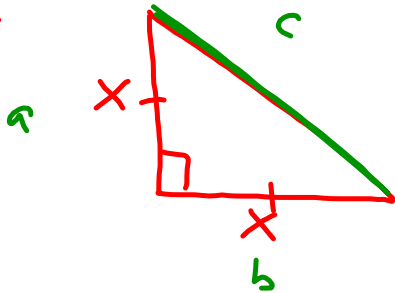
(chapter 3.7 in text)

Learning Goal: you will be able to use the "distributive property" when expanding polynomial expressions.



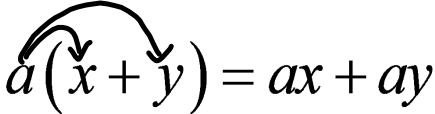
$P = x \cdot x \cdot x$
 $P = 3x$

$a^2 + b^2 = c^2$



The Distributive Property

The distributive property allows you to expand algebraic expressions:

$$a(x + y) = ax + ay$$
A diagram illustrating the distributive property. The equation is $a(x + y) = ax + ay$. A curved arrow starts from the letter 'a' and points to the 'x' in the parentheses. Another curved arrow starts from the same 'a' and points to the 'y' in the parentheses. This visualizes the process of multiplying 'a' by each term inside the parentheses.

Ex. Expand

$$\begin{aligned} \text{a) } & 3(x+2) \\ & = 3x+6 \end{aligned}$$

$$\begin{aligned} \text{b) } & -5(4m-3) \\ & = -20m+15 \end{aligned}$$

$$\begin{aligned} \text{c) } & (2y+5)(-4) \\ & = -8y-20 \end{aligned}$$

$$\begin{aligned} \text{d) } & 2(5a^2-7a+2) \\ & = 10a^2-14a+4 \end{aligned}$$

$$\begin{aligned} \text{e) } & x(x-3) \\ & = x^2-3x \end{aligned}$$

$$\begin{aligned} \text{f) } & p^2(p^2-2p+1) \\ & = p^4-2p^3+p^2 \end{aligned}$$

Ex. Expand and Simplify

$$\begin{aligned}
 \text{a) } & -4(x+3) + 2(2x-1) \\
 & = -4x - 12 + 4x - 2 \\
 & = -4x + 4x - 12 - 2 \\
 & = -14
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } & 3m(m-5) - (2m^2 - m) \\
 & = 3m^2 - 15m - 2m^2 + m \\
 & = 3m^2 - 2m^2 - 15m + 1m \\
 & = m^2 - 14m
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } & \frac{1}{2}(2w-6) - \frac{2}{3}(9w-6) \\
 & = w - 3 - 6w + 4 \\
 & = w - 6w - 3 + 4 \\
 & = -5w + 1
 \end{aligned}$$

$$\text{d) } 2x(4x+1) - 3x(x+2)$$

$$\frac{1}{2} \times \frac{2}{1} = \frac{2}{2} = 1$$

$$\frac{1}{2} \left(\frac{-6}{1} \right) = \frac{-6}{2}$$

$$\begin{aligned}
 \frac{-2}{3} \left(\frac{9}{1} \right) &= \frac{-18}{3} \\
 &= -6
 \end{aligned}$$

$$\begin{aligned}
 \frac{-2}{3} \left(\frac{-6}{1} \right) &= \frac{12}{3} \\
 &= 4
 \end{aligned}$$

$$\text{e) } 3[2+5(2k-1)]$$

Which of the following is a simplified form of the expression $4(5x - 8) - 3(2x - 7)$?

- a $14x - 11$
- b $14x - 53$
- c $26x - 11$
- d $26x - 53$

Which of the expressions below is equivalent to $3(4x - 5) - 7(9x - 2)$?

- a $-51x - 1$
- b $-51x - 3$
- c $-51x - 7$
- d $-51x - 29$

Consider the expression below.

$$3x^2(5x^2 - 2x + 1)$$

Which of the following is equivalent to this expression?

- a $8x^2 - 2x + 1$
- b $8x^2 + x + 4$
- c $15x^4 - 2x + 1$
- d $15x^4 - 6x^3 + 3x^2$