Distributive Property

Part 2: Fractions and Decimals

Recap

Simplify \(-6x^3(2x - 5x^4)\).

Watch the sign changes when multiplying by a negative.

\[-6x^3(2x - 5x^4) = -6x^3(2x) - 6x^3(-5x^4)\]

\[= -12x^5 + 30x^7\]

Example

Expand \(\frac{1}{2}(8x^2 - 12x + 20)\) using the distributive property.

Distribute the \(\frac{1}{2}\) across all three terms of the trinomial.

\[\frac{1}{2}(8x^2 - 12x + 20) = \frac{1}{2}(8x^2) - \frac{1}{2}(12x) + \frac{1}{2}(20)\]

\[= 4x^2 - 6x + 10\]

Example

Expand \(0.4x(5x + 15x^2)\) using the distributive property.

Treat the decimal value the same as any other.

\[0.4x(5x + 15x^2) = 0.4x(5x) + 0.4x(15x^2)\]

\[= 2x^2 + 6x^3\]

Example

Expand \(-\frac{3}{2}(14x^3 - 8x)\).

When multiplying a value by a fraction, remember that the numerator represents a multiplication, while the denominator represents a division.

While these can be done in any order, dividing first has the benefit of making a value smaller and (potentially) easier to work with.

\[\frac{-3}{2}(14x^3 - 8x) = \frac{-3}{2}(14x^3) + \frac{3}{2}(8x)\]

\[= -3(7x^3) + 3(4x)\]

\[= -21x^3 + 12x\]
Distributive Property

Example
Expand \( \frac{3}{4} (9x^2 + 6x - 10) \).

Sometimes terms remain as fractions. If so, be sure to reduce them to lowest terms.

\[
\frac{3}{4} (9x^2 + 6x - 10) = \frac{3}{4} (9x^2) + \frac{3}{4} (6x) - \frac{3}{4} (10)
\]

\[
= \frac{27}{4} x^2 + \frac{9}{2} x - \frac{15}{2}
\]

Distributive Property

Example
Expand and simplify \( \frac{2}{5} (\frac{1}{2} x^2 - 3\frac{1}{4} x) \).

When multiplying two fractions, remember to multiply the numerators and the denominators. Simplify if possible.

\[
\frac{2}{5} \left( \frac{1}{2} x^2 - \frac{3}{4} x \right) = \frac{2}{5} \left( \frac{1}{2} x^2 \right) - \frac{2}{5} \left( \frac{3}{4} x \right)
\]

\[
= \frac{1}{5} x^2 - \frac{3}{10} x
\]

Distributive Property

Example
Expand and simplify \( \frac{1}{2} (3x + 5) - \frac{2}{3} (4x - 9) \).

First, use the distributive property to expand.

\[
\frac{1}{2} (3x + 5) - \frac{2}{3} (4x - 9) = \frac{1}{2} (3x) + \frac{1}{2} (5) - \frac{2}{3} (4x) + \frac{2}{3} (9)
\]

\[
= \frac{3}{2} x + \frac{5}{2} - \frac{8}{3} x + 6
\]

Next, find common denominators for all like terms and simplify.

\[
\frac{3}{2} x + \frac{5}{2} - \frac{8}{3} x + 6 = \frac{9}{6} x + \frac{15}{6} - \frac{16}{6} x + \frac{36}{6}
\]

\[
= \frac{9}{6} x - \frac{16}{6} x + \frac{15}{6} + \frac{36}{6}
\]

\[
= -\frac{7}{6} x + \frac{51}{6}
\]

Questions?