

2-7-2 Distributive Property

To illustrate the distributive property look at the problem $3(2x-7)$.

This problem says 3 times $2x-7$ or 3 of $(2x-7)$. Multiplying by 3 means add $2x-7$ over and over.

$2x-7+2x-7+2x-7$ Simplify this by using the commutative property. $2x+2x+2x-7-7-7=3(2x)+3(-7)$

To use the distributive property, multiply each term inside the parenthesis by the multiplier. Study the following examples. Look where exponent rules are used. Watch the multiplication when negatives are involved. After the distribution, combine any like terms.

Examples:

$$5(3x - 8) = 15x - 40$$

$$3x(7 - 6x) = 21x - 18x^2$$

$$-4z^2(6 - 5z) = -24z^2 + 20z^3$$

$$-(5s - 8) = -5s + 8$$

$$4x - 2(3x - 9) = 4x - 6x + 18 = -2x + 18$$

$$3w^2y^3(7w - 5y^2) = 21w^3y^3 - 15w^2y^5$$

$$5 - (3 - 6x) = 5 - 3 + 6x = 2 + 6x$$

There can be more than two terms inside the parenthesis.

$$-3(4 - 6d - 8d^2) = -12 + 18d + 24d^2$$

$$5(7x^2 - 5x + 9) = 35x^2 - 25x + 45$$

$$6xy^2(5x^2y - 2xy + 3xy^2) = 30x^3y^3 - 12x^2y^3 + 18x^2y^4$$

$$3gh^3 - (7gh - 5gh^3 + 6gh^2) = 3gh^3 - 7gh + 5gh^3 - 6gh^2 = 8gh^3 - 7gh - 6gh^2$$

$$\frac{16x^2 - 12x}{4} = \frac{16x^2}{4} - \frac{12x}{4} = 4x^2 - 3x$$

$$\frac{16x^2 - 12x}{-4} = \frac{16x^2}{-4} - \frac{12x}{-4} = -4x^2 + 3x$$

$$\frac{15w^3 - 25w^5 + 75w^4}{15w^3} = \frac{15w^3}{15w^3} - \frac{25w^5}{15w^3} + \frac{75w^4}{15w^3} = 1 - \frac{5w^2}{3} + 5w$$

Practice:

a) $3(2x - 5) =$

$25(2y - 3) =$

$7(x + 8) =$

b) $5(3 + 8x) =$

$3(3 - 7x) =$

$100(2 + 5x) =$

c) $-(4 - 2x) =$

$-(5x - 8) =$

$-(4 + 2y) =$

d) $4(3x - 8) =$

$-10(5x - 15) =$

$-2(7 - 8y) =$

e) $5y(7 - 6y) =$

$-8h(7h - 6) =$

$\frac{2}{3}k(12 - 5k) =$

f) $-3j^3(6j - 5j^2) =$

$-4m^2(m - 5) =$

$-\frac{1}{2}z^2(6 - 10z) =$

g) $-(9 - 5a + 8a^2) =$

$-(4l - 12) =$

$-(u + 8) =$

$$\text{h) } 3x - (3x - 9) = \quad -9h - 2(5h - 8) = \quad 9x - (7x - 5) =$$

$$\text{i) } 2y^5z^3(7y - 2z^2) = \quad \frac{3}{4}mn^3(8m^5 - 5n^2) = \quad 15v^{12}w^{31}\left(\frac{vw^8}{5} - v^2\right) =$$

$$\text{j) } 8 - (5 - 9x) = \quad 5\frac{2}{3} - (3\frac{7}{8} - 9x) = \quad 10 - (6x - 9) =$$

$$\text{k) } 8 - 5(3x - 9) = \quad -9 + 5(x - 5) = \quad 13 - 7(3x - 9h) =$$

$$\text{l) } -8(2 - 6x + 5x^2) = \quad 9(3w - 6 - 8w^2) = \quad -(q^2 - 6q - 8) =$$

$$\text{m) } 4(10 - 4y + y^2) = \quad \frac{3}{5}(15x^2 - 5x + 9) = \quad -5(-7u^2 - 8u + 1) =$$

$$\text{n) } 2x^2y(x^3y - xy + xy^2) = \quad \frac{25p^3 - 15p}{5} = \quad \frac{x^2 - 12x}{-1} =$$

$$\text{o) } uv^2(u^2v - uv + uv^2) = \quad \frac{16x^2 - 12x}{\frac{1}{2}} = \quad \frac{a^2 - 2a}{-\frac{2}{5}} =$$

$$\text{p) } \frac{4}{3}s^3t^2\left(\frac{2}{3}s^2t^2 - \frac{6}{5}st^2 + 3st^2\right) = \quad \frac{6e^2 - 12e}{\frac{5}{6}} = \quad \frac{10x^2 - 10x}{-100} =$$

$$\text{q) } gh^3 - (gh - gh^3 + gh^2) = \quad \frac{2}{3}xy^3 - (3xy - \frac{3}{4}xy^3 + xy^2) =$$

$$\text{r) } 4a^2b^2 - (10gh + 5g^2h^2 + gh^2) = \quad \frac{7}{12}v^2w^3 - (vw - \frac{3}{8}v^2w^3 + \frac{3}{8}vw^2) =$$

$$\text{s) } \frac{30v^3 - 21v^5 + 18v^8}{3v^5} = \quad \frac{15h^3 - 25h^{51} + 75h^{25}}{-5h^{31}} =$$

$$\text{t) } \frac{35k^5 - 21k^4 + 77k^7}{-7k^3} = \quad \frac{15u^3 - 5u^5 + 75u^4}{3u} =$$

$$\text{u) } \frac{3i^5j^3 - 21i^4j^5 + i^7j^3}{-3i^2j^3} = \quad \frac{3x^5y^3 - 21x^4y^5 + 12x^7y^3}{-9x^5y^2} =$$

$$\text{v) } \frac{5w^3v^3 - w^4v^4 + w^7v^3}{wv^5} = \quad \frac{3e^4f^{13} - 21e^2f^5 + e^5f^5}{-e^2f^5} =$$