

TOPIC: SIMPLIFYING ALGEBRAIC EXPRESSIONS

The Distributive Property

◆ The *distributive property* allows us to *distribute* multiplication into parenthesis.

New

Distributive Property of Multiplication

$$a(b + c) = \underline{\hspace{1cm}}b + \underline{\hspace{1cm}}c$$

Using Order of Operations: $2(4 + 5) = 2(9) =$

Using Distributive Property $2(4 + 5) =$

◆ Since multiplication is commutative, $a(b + c) = (b + c)\underline{\hspace{1cm}}$.

EXAMPLE

Use the distributive property to write each expression without parenthesis.

(A) $4(x - 8)$

(B) $(4x + 2y - 7z)3$

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PRACTICE

Use the distributive property to simplify the expression.

(A) $7(3 - 2)$

(B) $-4(6 - 1)$

EXAMPLE

Use the distributive property to simplify the expression.

$$-(2x - 3y + 4 - z)$$

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PRACTICE

Use the distributive property to simplify the expression.

(A) $\frac{1}{4}(8 - 12)$

(B) $0.6(-8x + 2.5)$

(C) $x(x + 5)$

(D) $x(2x + 7y)$

EXAMPLE

Apply your knowledge of the distributive property to write the following *with* parenthesis.

(A) $91 \cdot m + 91 \cdot n = \underline{\hspace{1cm}}(m + n)$

(B) $4 \cdot x - 4 \cdot y$

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Like Terms

◆ Recall: Algebraic expressions combine numbers and variables using operations. Ex: $2x + 5$

► The **terms** of an expression are the parts of an expression separated by ____ or ____ signs.

Like Terms	Not Like Terms
[SAME DIFFERENT] <i>variables</i> ____ <i>exponents</i> $4x^2$ and $7x^2$ $2ab$ and $8ba$ $5x^2yz$ and $-10x^2yz$	[SAME DIFFERENT] <i>variables</i> ____ <i>exponents</i> $4x^2$ and $7x^3$ $2a$ and $2ba$ $5x^2yz$ and $-10xy^2z$

◆ You can combine **like terms** by adding or subtracting their _____. You **CANNOT** combine **unlike terms**.

EXAMPLE

Combine like terms in the following expressions.

(A) $4x^2 + 7x^2$

(B) $2ab + 8ba$

(C) $5x^2yz$ and $-10xy^2z$

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EXAMPLE

In each expression, combine any like terms.

(A) $6a^2 + 8a^2$

(B) $7x^2 + 8x + 4$

(C) $-y^5 + 3y^5$

EXAMPLE

Combine like terms such that each variable only appears once.

(A) $3p + (-9p) + 4 - 2 + p$

(B) $6z - 4 + 11z + 9$

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PRACTICE

Use the distributive property to simplify the expression.

(A) $\frac{3}{4}x + \frac{1}{2}x$

(B) $0.5z + .25z - 1.35 + 1.55$

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Simplify Expressions

◆ An algebraic expression is *fully simplified* when there are ____ parentheses & all like terms have been _____.

EXAMPLE

Simplify the following expressions.

(A) $-z + 2(3 + 5z)$

(B) $2a^2 - (6a^2 - b^2) + 5b^2$

HOW TO: Simplify Algebraic Expressions

- 1) **Distribute** constants/variables in ()
- 2) **Identify** like terms (*same variable/same exponent*)
- 3) **Group** like terms by writing _____ each other
- 4) **Combine** like terms (+ / - _____)

PRACTICE

Simplify the following by combining like terms.

(A) $\frac{1}{2}x + \frac{3}{4}x - \frac{1}{2}y + \frac{1}{2}y$

(B) $2m + 3n - p + 4m - 2n + 5p$

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PRACTICE

Simplify the expressions.

(A) $7(x - 3) + 10$

(B) $6(2a - b) + 4(3a + 5b)$

(C) $-3[2x - (4 - x)]$

PRACTICE

Simplify the expressions.

(A) $3x^2 + 5x^3 - 2x + 4x^2 - x^3 + 8x + 10$

(B) $\frac{1}{2}x^2 + \frac{3}{4}xy - \frac{1}{3}x^2 + \frac{1}{4}xy$

EXAMPLE

Simplify the expression by first expanding and then combining like terms.

$$3x(2x^2 - 5xy) - 4y(x^2 - 2xy)$$