

# Simplifying Algebraic Expressions

(using Real Number Properties)

Name \_\_\_\_\_

Directions: Simplify each expression by showing and/or justifying each step.

**EXAMPLE:** Simplify and justify steps:  $20 + 4(x + 3y) - 4x - 8y - 12 + x$

(This is one possible solution.)

$$20 + 4(x + 3y) - 4x - 8y - 12 + x$$

Given

$$20 + 4x + 12y - 4x - 8y - 12 + x$$

Distributive Property

$$20 - 12 + 4x - 4x + x + 12y - 8y$$

Commutative Property of Addition to align terms

$$(20 - 12) + (4x - 4x + x) + (12y - 8y)$$

Associative Property of Addition to group terms

$$(8) + (4x - 4x + x) + (12y - 8y)$$

Addition of Signed Numbers

$$8 + x + y(12 - 8)$$

Distributive Property in reverse

$$8 + x + y(4)$$

Addition of Signed Numbers

$$8 + x + 4y$$

Commutative Property of Multiplication

1.  $3(x + 4) - 5(x - 2)$

Given

$$3x + 12 - 5x + 10$$

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$$3x - 5x + 12 + 10$$

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$$x(3 - 5) + 12 + 10$$

\_\_\_\_\_

$$x(-2) + 12 + 10$$

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$$-2x + 12 + 10$$

\_\_\_\_\_

$$-2x + 22$$

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2.  $4(a + 2b) - 3(2a - b) + 6a - 7b$

Given

$$4a + 8b - 6a + 3b + 6a - 7b$$

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$$4a - 6a + 6a + 8b + 3b - 7b$$

\_\_\_\_\_

$$a(4 - 6 + 6) + b(8 + 3 - 7)$$

\_\_\_\_\_

$$a(4) + b(4)$$

\_\_\_\_\_

$$4a + 4b$$

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3.  $3a^2(2a^2 + 3) - 2(a^4 + 8)$

Given

$$6a^4 + 9a^2 - 2a^4 - 16$$

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$$6a^4 - 2a^4 + 9a^2 - 16$$

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$$a^4(6 - 2) + 9a^2 - 16$$

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$$a^4(4) + 9a^2 - 16$$

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$$4a^4 + 9a^2 - 16$$

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4.  $6(x + 2 + y) - (x + 2 + y)$

Given

5.  $a - b + 4(b - 3a) + 7 - a$

Given

6.  $12x - (4x - 3) + 4(2 + x)$

Given

7.  $a + 3(a - [2a - 6] + 4)$

Given