Lesson ES - 1

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Objective: Applying the Properties of Real Numbers to Expressions

Homework ES-1 – NYA p.82 #15 – 19, 61 – 63, 65, 67
NYA p.88 #26, 29, 32 – 36, 54, 59

Do Now: Identify the properties demonstrated. Do not solve.

1. $2(x + 10) = 2x + 20$ 2. $2y^2 + 4x – 7x = 4x + 2y^2 – 7x$ 3. $6x + 24 = 6(4 + x)$

Exam Prep: Which of the following is not equivalent to the others?

A) $4x(x + 2)$ B) $4(x^2 + 2x)$ C) $4x^2 + 8x$ D) $12x^3$

Important Terminology

Vocabulary	Examples
Constant – an unchanging known value	14, –5, 0.23, ½, π
Variable – an unknown value (usually a letter)	*x, y, t, Θ*
Expression – collection variables, constants, and/or operations	$3x, –5, 8x^2y, \frac{12}{5x}$
Term – In an expression a number, variable, or product of one or more numbers and variables. Multiple terms are separated by "+" or "–" signs.	$2x^2 – 5xy + 21 – \frac{3}{x}$ (4 terms)
Coefficient – numerical factor of a term	3y *means* y + y + y
Like Terms – terms that have exactly the same variable factors	3x and –2x $–7x^2y^3$ and $15x^2y^3$ NOT: 5y and $3y^2$

Commutative Property of Addition/Multiplication

$a + b = b + a$	$a \bullet b = b \bullet a$
$12 + 5 = 5 + 12$ $17 = 17$	$3 \bullet 7 = 7 \bullet 3$ $21 = 21$

Practice: Apply the commutative property (do not solve)

1. $20x + 45 =$	3. $–2x^4 – 100 + 9x =$
2. $6y + 3 \bullet 10x =$	4. $(20x)(–y)(15) =$

Associative Property of Addition/Multiplication

$(a + b) + c = a + (b + c)$	$(a \bullet b) \bullet c = a \bullet (b \bullet c)$
$(3 + 4) + 5 = 3 + (4 + 5)$ $12 = 12$	$(2 \bullet 3) \bullet 5 = 2 \bullet (3 \bullet 5)$ $30 = 30$

Practice: Apply the associative property (do not solve)

1. $31 + (80 + 12) - 1 =$	3. $(7x)(-14y \bullet 10z) =$
2. $(x + 1) + (6y + x) =$	4. $-12(a^8b^{10})cd^2 =$

Distributive Property

$a(b + c) = ab + ac$	$a(b - c) = ab - ac$
Rare Case → $(b + c)a = ba + ca$	$(b - c)a = ba - ca$ ← Rare Case
$5(x + 3) = 5(x) + 5(3)$	$2(x - 3) = 2(x) - 2(3)$
Rare Case → $(x + 3)5 = (x)5 + (3)5$	$(x - 3)2 = (x)2 - (3)2$ ← Rare Case
$5x + 15 = 5x + 15$	$2x - 6 = 2x - 6$

Practice: Apply the distributive property (do not solve)

1. $7(t - 4) =$	3. $5(r + 2) - 4(2r - 1) =$
2. $-(4x - 5) =$	4. $3[2y + 10(x + 4)] =$

Mixed Practice: Name a property and apply it (answers vary)

Expression	Property	Equivalent Exp
1. $10(x^2 - 4x + 6)$		
2. $6a + 13b$		
3. $(x + 9)(y^2 - 2)$		
4. $12a - 2b(c + 10)$		
5. $ct + d0 + 0r$		
6. $10(xy^2 \bullet z^5)$		