Basic Algebra 1.3

Use the commutative and associative properties

+ X commutative property

+ x associative property

simplify

whole number

closure property

counterexample

$3 + 5 = 5 + 3$

$8 \cdot 2 = 2 \cdot 8$

$(2+3)+5 = 2+(3+5)$

$10 \qquad 10$

Commutative Property of Addition		
	Words:	The order in which two numbers are added does not change their sum.
	Symbols:	For any numbers a and b, $a + b = b + a$.
	Numbers:	$5 + 7 = 7 + 5$

Commutative Property of Multiplication		
	Words:	The order in which two numbers are multiplied does not change their product.
	Symbols:	For any numbers a and b, $a \cdot b = b \cdot a$.
	Numbers:	$3 \cdot 10 = 10 \cdot 3$

Associative Property of Addition		
	Words:	The way in which three numbers are grouped when they are added does not change their sum.
	Symbols:	For any numbers a, b, and c, $(a + b) + c = a + (b + c)$.
	Numbers:	$(24 + 8) + 2 = 24 + (8 + 2)$

Associative Property of Multiplication		
	Words:	The way in which three numbers are grouped when they are multiplied does not change their product.
	Symbols:	For any numbers a, b, and c, $(a \cdot b) \cdot c = a \cdot (b \cdot c)$.
	Numbers:	$(9 \cdot 4) \cdot 25 = 9 \cdot (4 \cdot 25)$

$9 \cdot (4 \cdot 25) = 900$

$9 \cdot 4 \cdot 25$

Closure Property of Whole Numbers		
	Words:	Because the sum or product of two whole numbers is also a whole number, the set of whole numbers is closed under addition and multiplication.
	Numbers:	$2 + 5 = 7$, and 7 is a whole number. $2 \cdot 5 = 10$, and 10 is a whole number.

+ ×

$10 - 15 = -5$

$\frac{1}{4} = 0.25$

Name the property shown by each statement. *(Examples 1 & 2)*

4. $27 + 59 = 59 + 27$

5. $(8 + 7) + 3 = 8 + (7 + 3)$

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Whiteboards

Simplify each expression. Identify the properties used in each step.
(Example 3)

6. $(n \cdot 2) \cdot 10$ = $n \cdot 20$

$20 \cdot n$

7. $(3p + 4p + 47)(7 - 6)$

$(p + 50) \cdot (1)$

$p + 50$

8. State whether the statement *Whole numbers are closed under subtraction* is *true* or *false*. If false, provide a counterexample. *(Example 5)*

F 10 - 15

Evaluate each expression if $a = 4$ and $b = 11$. *(Lesson 1–2)*

31. $196 \div [4(b - 4)]$

$196 \div [4 \cdot 7]$

$196 \div 28$

$\frac{196}{28}$

7

32. $\frac{4b11}{(4 - 2)} \div \frac{44}{2} = 22$

GEMA

Reminder: the fraction bar is also a grouping symbol

33. **Multiple Choice** Which of the following is the value of $3t - 5q(r + 1)$, if $q = 2$, $r = 0$, and $t = 11$? *(Lesson 1–2)*

A 23 B 52 C 53 D 33

$3 \cdot 11 - 5 \cdot 2 \cdot 1$

$33 - 10$

$33 + -10$

WB 1.3

1-17 odd