Study Guide for Unit 4 Lesson 1

Commutative Property

Changing the order of the addends and factors does not change the answer (sum or product).

$6 + 8 = 8 + 6$

$14 = 14$

$7 \times 3 = 3 \times 7$

$21 = 21$

Associative Property

Changing the grouping of the addends and factors does not change the answer (sum or product).

$(3 + 4) + 6 = 3 + (4 + 6)$

$7 + 6 = 3 + 10$

$13 = 13$

$(4 \times 2) \times 5 = 4 \times (2 \times 5)$

$8 \times 5 = 4 \times 10$

$40 = 40$

Identity Property of Addition

Any number plus zero is equal to that number.

$$9 + 0 = 9$$

Identity Property of Multiplication

Any number multiplied by one is equal to that number.

$$8 \times 1 = 8$$

Zero Property of Multiplication

Any number multiplied by zero is zero.

$$6 \times 0 = 0$$

Inverse Operations

Some operations "undo" each other. They are operations that have opposite effects. Addition and subtraction are inverse operations.

$9 + 6 = 15$ $15 - 9 = 6$

Inverse Operations

Multiplication and division are inverse operations.

$8 \times 2 = 16$ $16 \div 8 = 2$

The Distributive Property of Multiplication states:

Multiplying the sum of the addends is the same as multiplying by each addend and then adding the products.

$$6 \times (13 + 5) = (6 \times 13) + (6 \times 5)$$

$$6 \times 18 = 78 + 30$$

$$108 = 108$$

Properties are statements that are true for all values of the variables.

Distributive Property	To multiply a sum by a number, multiply each addend of the sum by the number outside the parentheses.	$3(5 + 2) = 3 \times 5 + 3 \times 2$ $a(b + c) = ab + ac$
Commutative Property	The order in which numbers are added or multiplied does not change the sum or product.	$6 + 8 = 8 + 6$ $7 \times 4 = 4 \times 7$
Associative Property	The way in which numbers are grouped when added or multiplied does not change the sum or product.	$(2 + 5) + 3 = 2 + (5 + 3)$ $(6 \times 9) \times 4 = 6 \times (9 \times 4)$
Additive Identity	The sum of any number and 0 is the number.	$4 + 0 = 4 \quad a + 0 = a$
Multiplicative Identity	The product of any number and 1 is the number.	$5 \times 1 = 5 \quad 1 \times n = n$

EXAMPLES

A Find 5×12 mentally using the Distributive Property.

$5 \times 12 = 5(10 + 2)$ *Use 10 + 2 for 12.*
$= 5(10) + 5(2)$
$= 50 + 10 = 60$

B Find $8 + 11 + 2 + 9$ mentally.

$8 + 11 + 2 + 9$
$= 8 + 2 + 11 + 9$ *Commutative Property*
$= (8 + 2) + (11 + 9)$ *Associative Property*
$= 10 + 20 = 30$ *Add mentally.*

PRACTICE

Rewrite each expression using the Distributive Property. Then evaluate.

3. $7(60 + 8)$ **4.** $8(50 + 1)$ **5.** $52 \times 50 + 52 \times 6$

Identify the property shown by each equation.

6. $9 + 0 = 9$ **7.** $65 \times 1 = 65$ **8.** $4 + (7 + 5) = (4 + 7) + 5$

Find each sum or product mentally.

9. $5 \times 4 \times 8$ **10.** $15 + 14 + 16$ **11.** $2 \times 9 \times 50$

12. **Standardized Test Practice** Find 1.8×5 mentally.

A 0.9 **B** 5.4 **C** 9 **D** 54

Answers: **1.** 153 **2.** 64 **3.** $7 \times 60 + 7 \times 8$; 476 **4.** $8 \times 50 + 8 \times 1$; 408 **5.** $52(50 + 6)$; 2,912 **6.** Identity(+) **7.** Identity(×) **8.** Assoc.(+) **9.** 160 **10.** 45 **11.** 900 **12.** C

Additional Resources:

http://coolmath.com/prealgebra/06-properties/02-properties-commutative-multiplication-01.htm

http://coolmath.com/prealgebra/06-properties/index.html

http://www.basic-mathematics.com/basic-number-properties.html

https://www.khanacademy.org/math/pre-algebra/order-of-operations/arithmetic_properties/v/associative-law-of-addition

http://www.mathsisfun.com/associative-commutative-distributive.html

http://www.gradeamathhelp.com/math-properties.html

http://www.math.com/school/subject2/lessons/S2U2L1GL.html