

## Lesson 3.1 Mathematical Properties & Equivalent Expressions

**Commutative Property:** The order in which numbers are added does not change the sum. The order in which numbers are multiplied does not change the product.

$$a + b = b + a$$

$$a \times b = b \times a$$

**Associative Property:** The grouping of addends does not change the sum. The grouping of factors does not change the product.

$$a + (b + c) = (a + b) + c$$

$$a \times (b \times c) = (a \times b) \times c$$

**Identity Property:** The sum of an addend and 0 is the addend. The product of a factor and 1 is the factor.

$$a + 0 = a$$

$$a \times 1 = a$$

**Properties of Zero:** The product of a factor and 0 is 0. The quotient of the dividend 0 and any divisor is 0.

$$a \times 0 = 0$$

$$0 \div a = 0$$

**Distributive Property:** If two addends or the minuend and subtrahend in an equation are being multiplied by the same factor, the equation can be rewritten by factoring out the common factor.

$$a \times (b + c) = (a \times b) + (a \times c)$$

$$a \times (b - c) = (a \times b) - (a \times c)$$

Rewrite each expression using the property indicated.

**a**

1. associative:  $(7 + 6) + y =$

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2. commutative:  $z \times 8 =$

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3. distributive:  $6 \times (a + b) =$

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4. commutative:  $7 + y =$

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5. identity:  $45 \times 1 =$

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**b**

identity:  $724 + 0 =$

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zero:  $61 \times 0 =$

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zero:  $0 \div 5 =$

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associative:  $5 \times (6 \times 3) =$

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distributive:  $(7 \times 3) + (7 \times 7) =$

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