

# Algebra 1 Workbook

**Operations** 



#### **VARIABLES**

■ 1. Which value can we identify as the variable in the expression?

$$3y^2 + ay - 6 = 1$$

2. Identify any constant(s) in the equation.

$$x^2 - 3x + 2 = 0$$

3. How many terms exist in the equation?

$$x^2 - 3x + 2 = 0$$

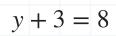
■ 4. Identify any coefficient(s) in the expression.

$$2x^2 + bx - c$$

■ 5. Which value is the variable representing?

$$x - 7 = 2$$

■ 6. Which value is the variable representing?



# **IDENTIFYING MULTIPLICATION**

- $\blacksquare$  1. Give three different examples of how we can write "a times b" mathematically.
- 2. Simplify the expression.

$$5(2 \cdot 3) \times (1)(a)$$

■ 3. Find the value of the expression.

$$4 \times 3(1)(2 \cdot 1)$$

4. Find the value of the expression.

$$2(4)(3 \cdot 4) \times (5)(2)$$

- 5. Why do we have different ways to write multiplication?
- 6. Simplify the expression.

$$(-3)(2) \times 4 \cdot (-2)(2 \cdot 1)$$

#### **ASSOCIATIVE PROPERTY**

- 1. Give an example of an expression that demonstrates the Associative Property of Multiplication.
- **2.** Using the Associative Property, rewrite and simplify  $2 \times (3 \times 4)$ .
- 3. According to the Associative Property, what number would make the most sense in the place of the variable?

$$42 + (31 + 17) = (42 + x) + 17$$

- $\blacksquare$  4. Rearrange (3+6)+2 using the Associative Property, then simplify.
- 5. Give an example of an expression that demonstrates the Associative Property of Addition.
- 6. According to the Associative Property, what number would make the most sense in the place of the variable?

$$(4 \times 2) \times 9 = x \times (2 \times 9)$$

#### **COMMUTATIVE PROPERTY**

- $\blacksquare$  1. Using the Commutative Property, rewrite 6 + 19 and then simplify.
- 2. Give an example of an expression that demonstrates the Commutative Property of Multiplication.
- 3. According to the Commutative Property, what's the value of the variable in the equation?

$$11 + (23 + 6) = 11 + (6 + x)$$

- $\blacksquare$  4. Rearrange (3+6)+2 using the Commutative Property and then the Associative Property.
- 5. Give an example of an expression that demonstrates the Commutative Property of Addition.
- 6. According to the Commutative Property, what's the value of the variable in the equation?

(	$4\times$	2)	Y	Q	_	(r	V	9)	Y	4
- (	$+$ $\wedge$	41	$\boldsymbol{X}$	フ	_	(X	$\boldsymbol{A}$	フリ	$\boldsymbol{\wedge}$	4

#### TRANSITIVE PROPERTY

- 1. If AB = CD and CD = EF, what's another way to express EF?
- 2. According to the Transitive Property, if x = 2y and 2y = 5z, what's the value of x?
- 3. Give an example that demonstrates the Transitive Property.
- 4. By the Transitive Property, what value would make the statement true?

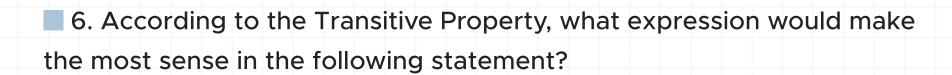
If 
$$2 + 3 = x$$
 and  $4 + 1 = 5$ , then  $2 + 3 = 5$ .

 $\blacksquare$  5. Use the Transitive Property to write an equation that only includes x variables, without any y or z variables.

$$y = 2x + 3$$

$$y = z$$

$$z = 5x - 9$$



If 
$$x = 2y$$
 and  $2y = ??$ , then  $x = 5z$ .



# **UNDERSTOOD 1**

- 1. What happens when we multiply something by 1?
- 2. Simplify the expression.

$$\frac{1x^1}{1(1^1)} + \frac{1}{1(1x)} - 1^1$$

 $\blacksquare$  3. What value of x makes the equation true?

$$1(2^1) - \frac{1}{1(1)^1} + \frac{x^1}{1 \times 1} = 4$$

■ 4. Simplify the expression by removing any "understood 1s."

$$\frac{x^1}{4x^3} + \frac{5x^4}{1x}$$

- 5. What happens when we divide something by 1?
- 6. Simplify the expression by removing any "understood 1s."

x	$x^2 + 1(1)$
11	$5x^2$



# ADDING AND SUBTRACTING LIKE TERMS

- 1. Give an example of like terms that can added.
- 2. Simplify the expression.

$$-x + 6x - 8x + 3x$$

- 3. What stays the same when adding or subtracting like terms?
- 4. Simplify the expression.

$$x + 2x^2 - y - 5x^2 + 7y - 4x$$

■ 5. Simplify the expression.

$$\frac{1}{3}x - 5x^2 + \frac{1}{2}x^2 - x - y$$

■ 6. Simplify the expression.

$$2a^2b - 5ab - 3ab^2 + a^2b + 4ab$$

# MULTIPLYING AND DIVIDING LIKE TERMS

1. Simplify the expression.

$$\frac{3x^2}{x^3}$$

2. Simplify the expression.

$$2a^2 \cdot 6b^3 \cdot ab^2$$

■ 3. Simplify the expression.

$$\frac{6x^a}{3x^b}$$

4. Simplify the expression.

$$3x^a \cdot 5x^b$$

■ 5. Simplify the expression.

$$\frac{5y^2 \cdot 4x^3 \cdot 2xy}{x^2y}$$



# ■ 6. Simplify the expression.

$$\frac{2y^2 \cdot 3x^3y \cdot x^2y^2}{x^4y^2}$$



# **DISTRIBUTIVE PROPERTY**

■ 1. Use the Distributive Property to simplify the expression.

$$5(x-2) + \frac{1}{2}(6-2x)$$

■ 2. Use the Distributive Property to expand the expression.

$$-\frac{2}{5}(10-5x)$$

■ 3. Give an example that demonstrates the Distributive Property with subtraction.

■ 4. Which three main operations are used in the Distributive Property?

■ 5. Use the Distributive Property to simplify the expression.

$$2(5 - 3x) - 2(x - 4)$$

■ 6. What value would make the following equation true?

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2(x +	.31	[ [	+	n

## DISTRIBUTIVE PROPERTY WITH FRACTIONS

■ 1. Use the Distributive Property to expand the expression.

$$-\frac{x^2z}{y^3}\left(\frac{y^2}{2}-\frac{xz^3}{z^2}\right)$$

2. Fill in the blanks.

"When we're distributing fractions, we multiply the numerator of the coefficient by the \_\_\_\_\_ of the terms inside the parentheses, and we multiply the denominator of the coefficient by the \_\_\_\_\_ of the terms inside the parentheses."

■ 3. Use the Distributive Property to expand the expression.

$$\frac{2}{3}\left(\frac{x}{2}-6\right)$$

■ 4. Explain why the two sides of the equation aren't equal to one another.

$$\frac{3}{2}\left(\frac{x}{5} - \frac{y}{2}\right) \neq \frac{3x}{10} - \frac{y}{2}$$

■ 5. What missing value would make the equation true?

$$\frac{2ab}{c^2} \left( \frac{3ac}{b} + a^2 c^2 \right) = \frac{6a^2}{c} + ??$$

■ 6. Use the Distributive Property to show that the equation is true.

$$\frac{x^2}{3z} \left( \frac{2x}{z} + y^2 \right) = \frac{2x^3}{3z^2} + \frac{x^2y^2}{3z}$$



## PEMDAS AND ORDER OF OPERATIONS

1. Simplify the expression.

$$\sqrt{2(5-3)} - |3[6-7]|$$

■ 2. Using PEMDAS, evaluate each expression separately to show that they are not equal.

$$4 \times (3-1) - (4 \div 2 + 2)$$

$$(4 \times 3 - 1) - 4 \div (2 + 2)$$

■ 3. Use order of operations to simplify the expression.

$$(10 - [(-1)^2 + 1 - 6 \div 6])^{1/2} + 4 \div 2$$

■ 4. Use order of operations to simplify the expression.

$$3 - [(-2)^2x + (3-7)]$$

■ 5. Using order of operations, explain why  $9 + 6 \div 3 \neq 5$ .

■ 6. Use order of operations to simplify the expression.

$$\frac{-2+3-10\cdot 2\cdot [(5-4)+2]}{2}$$



