# Algebra 1 Workbook

Operations

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## 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?

$y + 3 = 8$

## IDENTIFYING MULTIPLICATION

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?

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

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

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?

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

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?

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

## 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 $2 + 3 = 5$.

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

$y = 2x + 3$

$y = z$

$z = 5x - 9$

6. According to the Transitive Property, what expression would make the most sense in the following statement?

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

## UNDERSTOOD 1

1. What happens when we multiply something by $1$?

2. Simplify the expression.

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

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 $1$s."

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

5. What happens when we divide something by $1$?

6. Simplify the expression by removing any "understood $1$s."

$$\frac{x}{1^1} \cdot \frac{x^2 + 1(1)}{5x^2}$$

## 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?

$2(x + 3) = ?? + 6$

## 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?

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

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.

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

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

6. Use order of operations to simplify the expression.

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


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