

6TH GRADE MATH

Unit 5

Algebraic Expressions

Date:

Extra! Extra! Read all about it!

We are going to start Unit 5 (Algebraic Expressions). Here is a list of IXL topics, for every topic you complete you will earn some extra credit. Here are the possible points you can earn on each topic. The extra credit will be due by _____.

Smart Score on IXL

- 100% - 5 extra points
- 95% - 4 extra points
- 90% - 3 extra points
- 85% - 2 extra points
- 80% - 1 extra point

Unit 5 Topics – You can earn up to 140 extra credit points! You got this 😊

(REVIEW) → 5.OA.A.2 Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.

1. Write numerical expressions: one operation (5-O.3)
2. Write numerical expressions: two operations (5-O.4)

6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents.

3. Write multiplication expressions using exponents (6-D.1)
4. Write powers of ten with exponents (6-D.3)
5. Evaluate exponents (6-D.2)
6. Find the missing exponent or base (6-D.4)
7. Exponents with decimal bases (6-D.5)
8. Exponents with fractional bases (6-D.6)

6.EE.A.2.a Write expressions that record operations with numbers and with variables.

9. Write variable expressions: one operation (6-Y.1)
10. Write variable expressions: two operations (6-Y.2)

6.EE.A.2.b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.

11. Identify terms and coefficients (6-Y.7)
12. Sort factors of variable expressions (6-Y.8)
13. Sort factors of numerical expressions (6-E.12)

6.EE.A.2.c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

14. Evaluate numerical expressions involving whole numbers (6-O.3)
15. Evaluate numerical expressions involving decimals (6-O.6)
16. Evaluate numerical expressions involving fractions (6-O.9)
17. Identify mistakes involving the order of operations (6-O.)
18. Evaluate variable expressions with whole numbers (6-Y.4)
19. Evaluate multi-variable expressions (6-Y.5)
20. Evaluate variable expressions with decimals, fractions, and mixed numbers (6-Y.6)
21. Evaluate variable expressions: word problems (6-Y.)
22. Convert between Celsius and Fahrenheit (6-T.10)

6.EE.A.3 Apply the properties of operations (including, but not limited to, commutative, associative, and distributive properties) to generate equivalent expressions. The distributive property is prominent here.

23. Write equivalent expressions using properties (6-Y.14)
24. ~~Multiply using the distributive property (6-Y.11)~~
25. Factor using the distributive property (6-Y.12)

6.EE.A.4 Identify when expressions are equivalent (i.e., when the expressions name the same number regardless of which value is substituted into them).

26. Identify equivalent expressions I (6-Y.16)
27. Identify equivalent expressions II (6-Y.17)
28. Identify equivalent expressions using strip models (6-Y.)

Exponents

Name: _____

Date: _____

Daily Target: I can write and solve numbers exponential form.

Exponent

The _____ of times a number is _____ by _____.

Example!

$$5^5 = 5 \times 5 \times 5 \times 5 \times 5 =$$

$$3^4 = 3 \times 3 \times 3 \times 3 =$$

$$2^3 = \underline{\quad} \times \underline{\quad} \times \underline{\quad} =$$

$$6^3 =$$

Rewrite the number as a multiplication problem and solve each expression.

1) $10^3 =$

3) $7^2 =$

5) $3^0 =$

2) $2^3 =$

4) $4^4 =$

Rewrite the multiplication problem in exponential notation.

1) $4 \times 4 \times 4 \times 4 \times 4 =$

3) $3 \times 3 \times 3 \times 3 =$

2) $9 \times 9 =$

4) $5 \times 5 \times 5 \times 5 \times 5 =$

Error Analysis:

Mr. Frost said that 7^2 was equal to 49 while Mr. Wainwright said 7^2 was equal to 14. Who is correct and why?

Challenge Problem!

Kyle sends an email to 6 people and each of those people will send the email to 6 more people, and so on. Write an expression shows the number of people that will receive the email after the fourth round. How many people will receive the e-mail after the 4th round?

order of operations

The **order of operations** is a rule that tells you the sequence to follow when you are performing operations in a mathematical expression.

1.

parentheses

P

2.

exponents

E

3.

multiplication

M or **D**

4.

addition
subtraction

A or **S**

()

y^x

\times

\cdot

\div

$+$

$-$

Do **P**, then **E**. Then do **M** or **D**, left to right. Lastly, do **A** or **S**, left to right.

Evaluating Expressions

Name: _____

Date: _____

Daily Target: I can evaluate given expressions.

Evaluating Expressions

An _____ can be _____ by _____
for the _____.

Example:

Steps: P - _____ E - _____ M - _____ D - _____ A - _____ S - _____] L → R] L → R	$4(2 + 3 \cdot 5)$
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Evaluate Each Expression:

1) $2(4) + 3^3$

3) $5 + 2(20 \div 5)$

2) $12 + 2 \cdot 3$

4) $(2 + 4)^2 \div 2$

Word Problem Practice:

A cell phone company charges \$50 per month plus a \$45 activation fee.

- Write an expression for the total cost for m months
- Then evaluate your expression for 10 months of service.

Challenge Problem!

A student have Mr. Mickens the following problem:

$$5(y + 2.4) \div 2$$

How could he re-write this using the distributive property? If $y = 2$, what would the answer be?

Order of Operations Practice

Name: _____

Solve the following using PEMDAS

The order of operations:

1. Parentheses $()$
2. Exponents 5^2
3. Multiplication \times or Division \div
4. Addition $+$ or Subtraction $-$

1) $6 \cdot 5 + 1$

2) $2 + 5 \div 5$

8) $7^2 + 4^2$

3) $7 - 4 \cdot 9$

9) $96 - 3^3$

4) $7(5 + 8)$

10) $19 - 3^2 + 5$

5) $(6 + 3) \times 3$

6) $50 - (2 \times 8)$

7) $4 + 26 - 1^2$

Parts of an Expression

Name: _____

Date: _____

Daily Target: I can identify and define parts of an expression.

term	sum	product	quotient
A single number or variable	_____	_____	_____
	_____	_____	_____

Vocabulary

factor	coefficient	constant	variable
The numbers you _____ to get the product	to multiply a _____	A number or letter on its _____	A letter that _____ a number.

$$(x + 3) \times 5 = 25$$

Diagram illustrating the parts of the expression $(x + 3) \times 5 = 25$. Arrows point from the terms to blank lines below:

- x points to _____
- $+$ points to _____
- 3 points to _____
- \times points to _____
- 5 points to _____
- $=$ points to _____
- 25 points to _____

$$2x \div x + 6 = 8$$

Diagram illustrating the parts of the expression $2x \div x + 6 = 8$. Arrows point from the terms to blank lines below:

- $2x$ points to _____
- \div points to _____
- x points to _____
- $+$ points to _____
- 6 points to _____
- $=$ points to _____
- 8 points to _____

Practice! (Label the expression with the correct terms from above)

$$5m + (6p + 4) = 27$$

Diagram illustrating the parts of the expression $5m + (6p + 4) = 27$. Arrows point from the terms to blank lines below:

- $5m$ points to _____
- $+$ points to _____
- $6p$ points to _____
- $+$ points to _____
- 4 points to _____
- $=$ points to _____
- 27 points to _____

$$(7 \div b) - 2a = 15$$

Diagram illustrating the parts of the expression $(7 \div b) - 2a = 15$. Arrows point from the terms to blank lines below:

- $(7 \div b)$ points to _____
- \div points to _____
- $-$ points to _____
- $2a$ points to _____
- $=$ points to _____
- 15 points to _____

Evaluating Expressions

Name: _____

Date: _____

Daily Target: I can evaluate given expressions.

Evaluating Expressions

An _____ can be _____ by _____
_____ for the _____.

Example:

Step One:

_____ the expression, leaving
_____ for the variables.

$$4(x + 3y)$$

$$x = 2 ; y = 5$$

Step Two:

_____ the given value
for the variables.

Step Three:

_____ the expression.
(PEMDAS)

Evaluate Each Expression:

1) $2x + y^3$
 $x = 4 ; y = 3$

3) $5 + 2(x \div y)$
 $x = 20 ; y = 5$

2) $x + y \cdot 3$
 $x = 12 ; y = 2$

4) $3[(x + y)^2 \div 2]$
 $x = 2 ; y = 4$

Word Problem Practice:

A cell phone company charges \$50 per month plus a \$45 activation fee.

a. Write an expression for the total cost for m months

b. Then evaluate your expression for 10 months of service.

Writing Expressions

Name: _____

Date: _____

Daily Target: I can write and translate a given expression.

Variable

A _____ that is represented by a _____.

Example: a number plus 3 \rightarrow $b + 3$

Examples:

The difference between 20 and a number	
A number reduced by 7	
4 times the quotient of 3 and a number	
3 less than a number	
3 plus the product of 4 and a number	

Practice!

5 less than 2 times a number	
The difference between 4 squared and 2	
9 increased by the product of 3 and 8	
The product of 2 and 6 decreased by 6	
7 times the difference of g and 9	
The product of h and 4 increased by 2	

Word Problems: Writing Equations

Ms. Juengel says that the expression 6 less than m can be written as $m - 6$. A student challenges her and says the expression is actually written as $6 - m$. Who is correct and why?

Challenge!

Ms. Juengel bought 32 notebooks at the store. The total amount she spent was \$19.20. Write an equation to represent how many notebooks she bought.

Name _____ Period _____ Date _____

Translating Words to Algebraic Expressions #1

Directions: Translate the following phrases into algebraic expressions or equations.

1. Six less than twice a number is 45.

2. A number minus seven yields ten.

3. The total of six and some number.

4. A number divided by 14 equals 16.

5. Six less than three times a number.

6. 6 less than the product of a number and 2

7. The quotient of seven and a number

8. The difference of six and a number divided by nine

9. Four times the sum of twelve and y .



Let's Turn Words Into Math

* If the variable isn't given, you may choose your variable.

	Words	Operation	Expression
1	Five more than a number		
2	The difference of a number and 12 squared		
3	16 divided by a number x		
4	24 minus a number h is 20		
5	The sum of 14 and a number t		
6	The quotient of a number and 21		
7	The product of 9 and a number m		
8	14 less than a twice number n		
9	A number b squared decreased by 11		
10	A number p divided by 20		
11	4 times the sum of y and fifteen		
12	A number multiplied by ten		
13	The total of a number x and 12		
14	The difference of a number n and 7 times 4		
15	The quotient of a number and 9		
16	Three times a number m		
17	18 less than 2 times w		
18	The product of 7 and a number n		
19	15 taken from a number x is 30		
20	Half of a number z		

Combining Like Terms

Name: _____

Date: _____

Daily Target: I can use my knowledge of coefficients and constants to combine like terms.

Key Points/Vocabulary:

- Algebraic expressions can be _____ or written in a more condensed way.
- A _____ is a single number (ex. $4n + 5 \rightarrow 5$ is the constant)
- A _____ is the number being multiplied with the variable (ex. $4n + 5 \rightarrow 4n$ is the coefficient)
- If there is no number next to the variable, the coefficient is 1. (ex. $a = 1a$)
- Like terms are terms that are the _____ (same variable)

Example/Visuals:

Step One: Find your _____ terms (<i>the terms with the _____ after it!</i>)	$12x + 7 + 5x$
Step Two: Using the + or - signs in front of them, _____ whether to add or subtract your _____. (<i>If there is none, it is +</i>)	
Step Three: Add/Subtract the numbers _____ to _____ the expression	
Step Four: _____ with other _____ terms.	

Practice! (Simplify the Expressions!)

1) $10x - 3x + 7$

4) $7t + 2r - 3t + r$

2) $14 + 11p - 12$

5) $2(a + 4) + 5$

3) $x + 4 + 2x + 5$

6) $5x + 6y + 2xy + 4x - 2y$

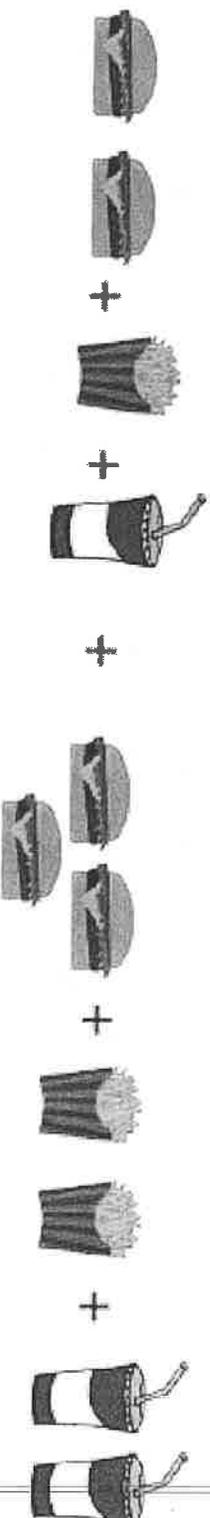
Challenge Problem! (Simplify the Expression)

$$3x + 5y + x^2 + 4 + 3x^2 - 2 + 2y - x$$

How to Combine Like Terms

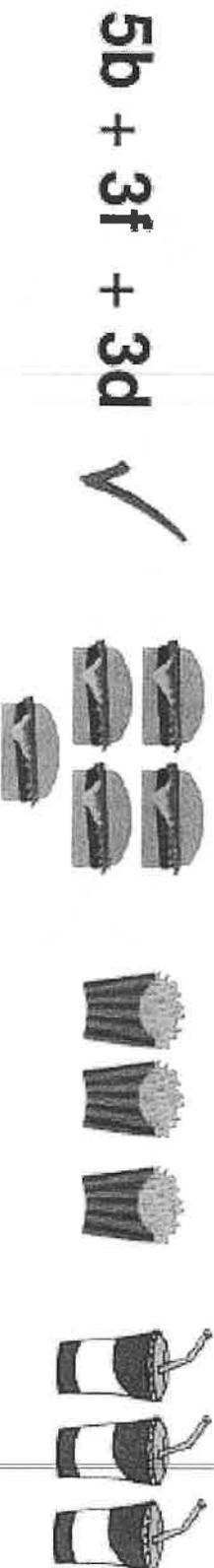
To Combine Like Terms, we add together items that are the same to make a simplified shorter list of items.

Consider the following family take-away order:



We can write this in Algebra as: $2b + f + d + 3b + 2f + 2d$

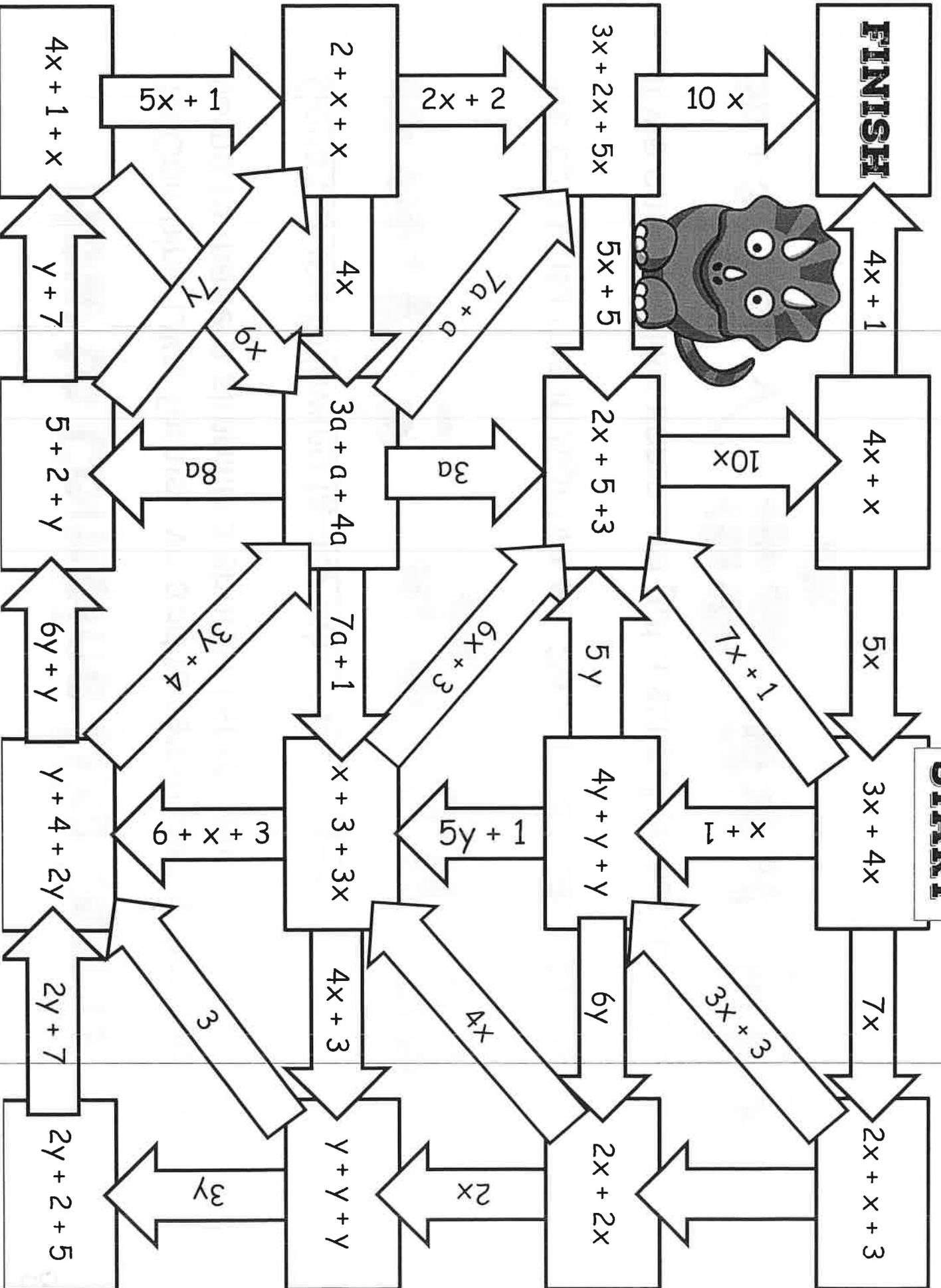
If we combine like items, we get a simplified list as follows:



Images from Ckter.com

Name _____

COMBINE LIKE TERMS 1

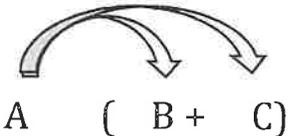


Different Properties

Name: _____

Date: _____

Daily Target: I can identify different properties of a given expression.

Property	Definition	Examples
Identity	<p>“Identity is the <u>same</u>”</p> <p>_____ zero won’t change the sum.</p> <p>_____ by 1 won’t change the product.</p>	$13 + 0 = \underline{\quad}$ $a + 0 = \underline{\quad}$ $7 \times 1 = \underline{\quad}$ $a \times 1 = \underline{\quad}$
Multiplicative property of Zero	<p>“Multiplying by _____”</p> <p>When you multiply by zero, your answer is _____ zero.</p>	$2 \times 0 = \underline{\quad}$ $a \times 0 = \underline{\quad}$ $0 \times b = \underline{\quad}$
Commutative	<p>“<u>C</u>ommutative”</p> <p>= <u>C</u>hange _____</p>	$3 + 2 = \underline{\quad} + \underline{\quad}$ $5 \cdot 7 = \underline{\quad} \cdot \underline{\quad}$ $17 + 8 + 3 = 17 + \underline{\quad} + \underline{\quad}$ $5 \cdot 18 \cdot 2 = 5 \cdot \underline{\quad} \cdot \underline{\quad}$
Associative	<p>Associate with Different _____ = move parentheses</p> <p><i>How #'s are grouped when + or x and does not change their sum product.</i></p>	$6 + (4 + 8) = (\underline{\quad} + \underline{\quad}) + 8$ $4 \cdot (5 \cdot 9) = (\underline{\quad} \cdot 5) \cdot \underline{\quad}$ $(4 + 2) + 2 = 4 + (2 + 2)$
Distributive	<p>Distributive = _____</p> <p>Distribute number to each part</p>  <p style="text-align: center;">A (B + C)</p>	$4 \cdot (20 + 3) = 4 \cdot \underline{\quad} + 4 \cdot \underline{\quad}$ $6 \cdot (30 + 1) = \underline{\quad} \cdot 30 + \underline{\quad} \cdot 1$

NAME _____

Name the property represented by each equation.

D = Distributive; M = Multiplicative of Zero; A = Associative; C = Commutative; I = Identity

_____ 1. $5(6 + 7) = 5 \times 6 + 5 \times 7$

_____ 2. $a \times 0 = 0$

_____ 3. $(4 + 5) + 3 = 4 + (5 + 3)$

_____ 4. $8 \times 9 + 8 \times 14 = 8(9 + 14)$

_____ 5. $22 + 38 = 38 + 22$

_____ 6. $(8 + 9) + (7 + 6) = (7 + 6) + (8 + 9)$

_____ 7. $5 + 0 = 5$

_____ 8. $43 \times (17 \times 65) = (43 \times 17) \times 65$

_____ 9. $109 \times 35 \times 89 = 89 \times 109 \times 35$

_____ 10. $5 \times 10 + 5 \times 7 = 5(10 + 7)$

_____ 11. $a + b = b + a$

_____ 12. $8 \times 1 = 8$

_____ 13. $a(b + c) = ab + ac$

_____ 14. $(a + b) + c = a + (b + c)$

_____ 15. $a + b + c = b + c + a$

