

Name: Key E# \_\_\_\_\_

Review:  
Expressions and Equations

Expressions  
Order of Operations  
Combine Like Terms  
Distributive Property  
Equations & Inequalities  
Graphs and Tables  
Independent/Dependent Variables

# EXPRESSIONS

- ↳ **Constant:** a number that does not change
- ↳ **Variable:** a letter or symbol that stands for a value that may change
- ↳ **Term:** a constant, variable or product of const/variables that are separated by + and - signs.
- ↳ **Coefficient:** the number attached to the variable.

Identify the variables, coefficients, terms, and constants in the following expression:

$$a + 2b + 5c - 6$$

- ↳ **Numerical Expression:** a mathematical phrase that contains only numbers and operation symbols  
Examples:  $10/2$ ,  $4(3)$ ,  $18 - 5$
- ↳ **Algebraic Expression:** a mathematical phrase that contains one or more variables and may contain operation symbols.  $\neq$  sign  
Examples:  $5 + n$ ,  $7a$ ,  $k - 3$

- ↳ **Evaluate:** to simplify an expression given a value for the variable  
Example: Evaluate the expression  $5a - 3y$  when  $a = 6$  and  $y = 4$ .  
Substitute 6 for  $a$  and 4 for  $y$ .  
Now the expression reads:  $5 \cdot 6 - 3 \cdot 4$   
Solve. The expression equals:  $30 - 12 = 18$

- ↳ **Translating between algebraic expressions and words:**  
Examples: eighteen less than  $g \rightarrow g - 18$   
 $105 \div 3 \rightarrow$  the quotient of 105 and 3

+	-	X	÷	=
<ul style="list-style-type: none"> <li>• Sum</li> <li>• Together</li> <li>• Added to</li> <li>• Plus</li> <li>• Increased by</li> <li>• Total</li> <li>• More than</li> <li>• Greater than</li> <li>• Raise(d)</li> <li>• Deposit</li> </ul>	<ul style="list-style-type: none"> <li>• Difference</li> <li>• Minus</li> <li>• Subtract From</li> <li>• Less Than</li> <li>• Decreased by</li> <li>• Fewer Than</li> <li>• Take Away</li> <li>• Loss/fall</li> <li>• Debt</li> <li>• Withdrawal</li> </ul>	<ul style="list-style-type: none"> <li>• Times</li> <li>• Multiply</li> <li>• Product</li> <li>• Double/Triple</li> <li>• Twice</li> <li>• Squared</li> <li>• Cubed</li> <li>• Of</li> </ul>	<ul style="list-style-type: none"> <li>• Quotient</li> <li>• Divided by</li> <li>• Divisor/Dividend</li> <li>• Split</li> <li>• Break Into</li> <li>• Half Of</li> <li>• Per</li> <li>• Out Of</li> </ul>	<ul style="list-style-type: none"> <li>• Is</li> <li>• Equals</li> <li>• Outcome</li> <li>• Total</li> <li>• Is the same as</li> <li>• Equivalent</li> </ul>

# Expressions Practice

Evaluate each expression using  $a = 8$ ,  $b = 4$  and  $c = 2$ . Show your work.

- 1)  $4b + a$   
 $4(4) + 8$   
 $16 + 8$   
 $24$
- 2)  $3bc$   
 $3(4)(2)$   
 $24$
- 3)  $3(b + a)$   
 $3(4 + 8)$   
 $3(12)$   
 $36$
- 4)  $\frac{2b}{c}$   
 $\frac{2(4)}{2} = \frac{8}{2}$   
 $4$

Are the following expressions equivalent? WRITE YES OR NO. If no, show proof with an example

- 5)  $n + n + 5 = 2n + 5$   
 $2n + 5 = 2n + 5$   
YES
- 6)  $7(a - b) = 7a - b$   
 $7a - 7b \neq 7a - b$   
NO
- 7)  $m - n = n - m$   
NO
- 8)  $3x + 3y = 3xy$   
NO

Write each phrase as an algebraic expression.

- 9) the product of  $e$  and 4, divided by 12  
 $\frac{4e}{12}$  or  $4e \div 12$
- 10) 13 multiplied by the amount 60 minus  $w$   
 $13(60 - w)$
- 11) twice the sum of a number and 600  
 $2(n + 600)$
- 12) The Nile River is the longest river in the world at 4,160 miles. A group of explorers traveled along the entire Nile in  $x$  days. They traveled the same distance each day. Write an algebraic expression to find each day's distance.  
 $\frac{4160}{x}$
- 13) At Grant Cinemas, adult tickets cost \$8.50 and children's tickets cost \$5.50. Write an algebraic expression for the cost of  $a$  adult tickets and  $c$  children's tickets.  
 $8.50a + 5.50c$

Identify the term, variable, coefficient, and constant in the following expressions.

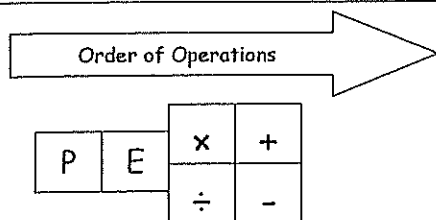
- 14)  $15 + 2x - 3y$   
Terms: 15,  $2x$ ,  $3y$   
Variables:  $x$ ,  $y$   
Coefficients: 2, 3  
Constant: 15
- 15)  $150xy - 8$   
Terms:  $150xy$ , 8  
Variable:  $xy$   
Coefficient: 150  
Constant: 8

# ORDER OF OPERATIONS.

ORDER OF OPERATIONS is the order in which you solve a problem.

## RULES:

Please	parentheses
Excuse	exponents
My	multiplication & ...
Dear	division, whichever comes first from left to right)
Aunt	addition & ...
Sally	subtraction, whichever comes first from left to right)



### Practice Problems:

1.)  $3 \cdot 8 + (12 \div 4) \cdot 5^2$   
 $24 + 3 \cdot 25$   
 $27 - 25 = \boxed{2}$

2.)  $5 + 4 \cdot 2 - 3^2 + (8 \cdot 4)$   
 $5 + 8 - 9 + 32$   
 $13 - 9 + 32$   
 $4 + 32 = \boxed{36}$

3.)  $25 - 2 \cdot 9$   
 $25 - 18 = \boxed{7}$

4.)  $6(4) + 7^2$   
 $24 + 49 = \boxed{73}$

5.)  $7(63 \div 9) + 4^3 - (7 \cdot 8)$   
 $7(7) + 64 - 56$   
 $49 + 64 - 56 = 113 - 56 = \boxed{57}$

6.)  $4 - 4(3 \cdot 1) + 4 \div 2$   
 $4 - 4(3) + 2$   
 $4 - 12 + 2 = -8 + 2 = \boxed{-6}$

7.)  $40 \div 2 \cdot 5$   
 $40 \div 10 = \boxed{50}$

8.)  $3 \cdot 4 + 8 \div 2$   
 $12 + 4 = \boxed{16}$

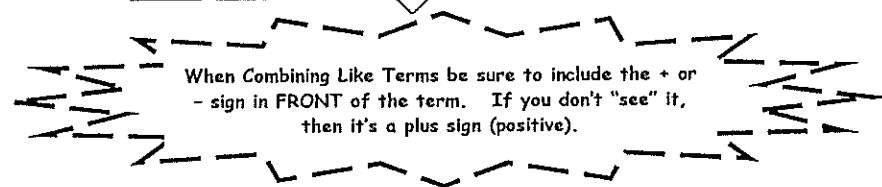
# COMBINE LIKE TERMS

## What are "like terms"

- All **CONSTANTS** (or numbers)
  - 18, 2, 17, 35
- Must have **IDENTICAL VARIABLES** and **EXPONENTS**:
  - $2a, 3a, 9a, a$        $6xy, 5xy, 12xy, xy$        $9x^2, 4x^2, 18x^2$

## How to combine like terms:

- Assign a shape(s) to a group of like terms.
- **Circle** **Box** **Triangle** **Heart** or underline like terms



## Example:

$\text{Hexagon } 3x + \text{Square } 9 + \text{Hexagon } 2x - \text{Square } 8 = 5x + 1$        $\text{Circle } 10 + \text{Hexagon } 12y + \text{Square } 2 - \text{Hexagon } 8y = 4y + 12$

## Identify the like terms.

1.  $\text{Circle } 3a, \text{Square } b^2, b^3, \text{Triangle } 4b^2, 4, \text{Circle } 5a$

2.  $\text{Circle } x, \text{Triangle } x^4, \text{Circle } 4x, \text{Square } 4x^2, \text{Triangle } 4x^4, \text{Square } 3x^2$

## Simplify each expression by combining like terms.

1.  $\text{Circle } 3x + \text{Circle } 3y + \text{Circle } x + y + z$

$4x + 4y + z$

2.  $\text{Circle } 2a + 22b^2 - a$

$a + 22b^2$

3.  $\text{Circle } 30m^2 + 14n^2 + 8 - 10m^2 + 5n - 3$

$20m^2 + 14n^2 + 5n + 5$

4.  $\text{Circle } 6r + 11 + \text{Circle } 3r - 1 + 37$

$9r + 47$

5.  $\text{Circle } 2z + 5 + \text{Circle } 3z + 7$

$5z + 12$

6.  $5b + 5b + 6b^2 - 10 - 3b$

$6b^2 + 7b - 10$

# DISTRIBUTIVE PROPERTY

Distributive Property: Multiply number outside parenthesis to EVERYTHING inside, distributing it.

EXAMPLE: Simplify:  $3(4x + 6) + 7x =$   
 $12x + 18 + 7x =$   
 FINAL ANSWER:  $19x + 18$

Simplify using the distributive property:

1.  $4(3 + 5x) =$   
 $12 + 20x$   
 or  $20x + 12$

2.  $(x - y)6z =$   
 $6xz - 6yz$

3.  $20(f + \frac{1}{2}) =$   
 $20f + 10$

4.  $2(x - y + 2z) =$   
 $2(3x - y)$   
 $6x - 2y$

5.  $3(m^2 + n^2) =$   
 $3m^2 + 3n^2$

6.  $6(3a - 8) =$   
 $18a - 48$

7.  $4(6p + 2q - 2r) =$   
 $4(4p + 2q)$   
 $16p + 8q$

8.  $6(g + 5) - 15 + 3g =$   
 $(6g) + 30 - 15 + 3g$   
 $9g + 15$

Simplify the expression first. Then evaluate the expression for the given value of the variable.

9.  $3(2x + 5) + 4(x - 2) = 10x + 7 = 10(5) + 7$  if  $x = 5$  57  
 $6x + 15 + 4x - 8$

10.  $(3z - 1)6 + 4 = 18z - 2 = 18(3) - 2$  if  $z = 3$  52  
 $18z - 6 + 4$

# ALGEBRAIC EQUATIONS AND INEQUALITIES

- Algebra is a mathematical language that uses letters along with numbers
- There will be one answer when solving an equation
- There will be more than one solution to an inequality
- The letters are UNKNOWN VARIABLES that stand for numbers.
- GOAL: to get the unknown variable by itself.



TRICK: \*BE FAIR! Whatever you do to one side of the equation, you must do to the other!

Solve each equation. BOX YOUR ANSWER!

1)  $0.4x = 1.6$   
 $\frac{0.4}{0.4} x = \frac{1.6}{0.4}$   
 $x = 4$

2)  $\frac{9}{9}x = \frac{81}{9}$   
 $x = 9$

3)  $\frac{1}{3}x = 48 \div \frac{3}{4} = 48 \cdot \frac{4}{3}$   
 $x = 64$

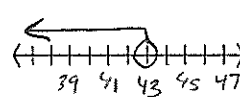
4)  $\frac{9}{-9}x = \frac{42}{-9}$   
 $x = 33$

5)  $3.6 + x = 10.8$   
 $-3.6 -3.6$   
 $x = 7.2$

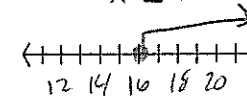
6)  $\frac{1}{2}x = 3 \frac{1}{2} - \frac{1}{2}$   
 $x = 3$

Solve and graph the solution for each of the following inequalities.

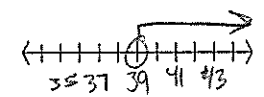
1)  $x + 10 < 53$   
 $-10 -10$   
 $x < 43$



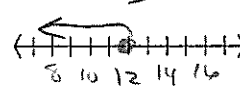
2)  $\frac{8x}{8} \geq \frac{128}{8}$   
 $x \geq 16$



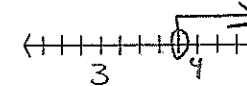
3)  $x - 12 > 27$   
 $+12 +12$   
 $x > 39$



4)  $9 + x \leq 21$   
 $-9 -9$   
 $x \leq 12$



5)  $\frac{3x}{3} > \frac{11.4}{3}$   
 $x > 3.8$



6)  $\frac{1}{2}y \geq 5 - \frac{1}{2}$   
 $-1/2$   
 $y \geq 4 \frac{1}{2}$



# GRAPHS & TABLES

To determine what a function (equation) rule is, ask yourself the key question:

- What am I doing to **X** to get **Y**?
  - are you adding or subtracting the same thing in each row?
  - are you multiplying or dividing by the same thing each time?
  - are you squaring or square rooting each time?
  - are you doing a combination of more than one thing each time?

Remember to work **ACROSS** (from x to y)!!!

1.  $y = X + 6$

x	y
2	8
5	11
6	12
10	16

2.  $y = X + 2$

x	y
3	5
5	7
8	10
10	12

3.  $y = 4x$

x	y
1	4
2	8
3	12
4	16

Fill in each table:

4.  $y = 3x + 2$

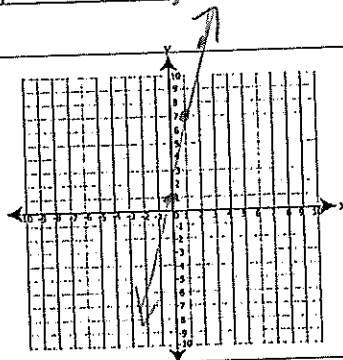
x	$3x + 2$	y
0	$3(0) + 2$	2
4	$3(4) + 2$	14
5	$3(5) + 2$	17
6	$3(6) + 2$	20

5.  $y = \frac{1}{4}x$

x	$\frac{1}{4}x$	y
0	$\frac{1}{4}(0)$	0
4	$\frac{1}{4}(4)$	1
12	$\frac{1}{4}(12)$	3
16	$\frac{1}{4}(16)$	4

6.  $y = 6x + 1$

x	$6x + 1$	y	(x,y)
0	$6(0) + 1$	1	(0,1)
1	$6(1) + 1$	7	(1,7)
2	$6(2) + 1$	13	(2,13)
3	$6(3) + 1$	19	(3,19)



# Independent vs. Dependent Variables

The x-variable is called the independent variable.

- This is because we can choose any number we want for x to put into the equation - its value is not dependent on anything.

The y-variable is called the dependent variable.

- This is because we have to calculate the value for y - its value depends on what we choose for x.

The independent variable causes the dependent variable to change

Examples:

- The amount of time you study will make a positive difference on your next test score.  
Independent: time studying      Dependent: score on next test

- The amount of time you spend in an airplane and the distance between your departure and your destination.  
Independent: Distance      Dependent: Time

Read each statement below. Identify the independent and dependent variables in each sentence.

- The number of cakes sold in a bake sale determines the amount of money made.

The cakes causes the \$ made to change.  
IV: cakes      DV: \$ made

- The winner of the football game depends on which side scored the most points.

The points scored causes the winner to change.  
IV: points scored      DV: winner

- $y = 4x + 1$

The x-value causes the y-value to change.  
IV: x      DV: y

# EOG Style Questions

1. You have read 58 pages of a 96 page book. Solve the equation  $x + 58 = 96$  to find how many more pages you have to read to finish the book.

- A) 28  
 B) 42  
 C) 38  
 D) 15

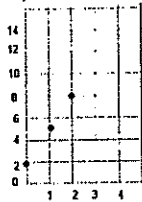
$$6 + 3(5)$$

2. What is the value of  $6 + 3x$  when  $x = 5$ ?

- A) 21  
 B) 45  
 C) 33  
 D) 90

3. Three ordered pairs  $(x, y)$  are plotted on the grid. A pattern on the graph develops.

If the pattern continues, what will the y-coordinate be when the x-coordinate is 3?



- A) 9  
 B) 10  
 C) 11  
 D) 12

4. An inequality is written in the box.

$$3x + 9 > 18$$

Which value is contained in the solution set?

- A) -3  
 B) 0  
 C) 3  
 D) 4

5. Simplify  $4(3c - 2)$

- A)  $12c - 2$   
 B)  $12c - 8$   
 C)  $12c + 6$   
 D)  $12c + 8$

6. Solve for n:  $(67 + n) \div 5 = 15 \div 5$

- A)  $n = 8$   
 B)  $n = 7$   
 C)  $n = -63$   
 D)  $n = -64$

$$\begin{array}{r} 67 + n = 75 \\ -67 \quad -67 \\ \hline n = 8 \end{array}$$

7. A plumber charges \$50 per hour of work in addition to any parts he must order for repairs. If Heather's bathroom requires \$235 worth of parts, which equation will determine the total cost (c) the plumber will charge Heather for h hours of work?

- A)  $c = 50h + 235$   
 B)  $c = 50h + 235h$   
 C)  $c = 285 + h$   
 D)  $c = 50 \times 235 \times h$

8. Which terms can be combined?

- A)  $3x + 3$   
 B)  $3x + x^3$   
 C)  $3x + 2x$   
 D)  $3x + 2$

9. The table shows the function  $y = 3(x - 4)$ .

x	y
5	3
6	6
7	9
?	30

What value of x corresponds to a y-value of 30?

- A) 6  
 B) 8  
 C) 10  
 D) 14

10. It took Raj 12 weeks to save \$132. He saved the same amount each week. Solve the equation  $12m = 132$ . How much money did he save each week?

- A) \$9  
 B) \$16  
 C) \$11  
 D) \$120

11. If  $a = 4$  and  $b = 3$ , what is the value of  $3a - 2b + 1$ ?

- A) 7  
 B) 5  
 C) 3  
 D) 2

12. What is the value of  $72 \div 12 + 6 \times (3 + 1)$ ?

- A) 1  
 B) 16  
 C) 30  
 D) 48

$$\begin{array}{r} 6 + 6 \times 4 \\ \hline 6 + 24 \end{array}$$

13. What is the solution of the inequality  $\frac{3}{8}x > 9$ ?

- A)  $x > 216$   
 B)  $x > 72$   
 C)  $x > 24$   
 D)  $x > 14$

$$x > 24$$

14. Which sentence represents this equation?  $4x - 2 = 12$

- A) Two less than four times a number is 12  
 B) Four times two less than a number is 12.  
 C) Four times a number is two less than 12.  
 D) Four times a number less than two is 12.

$$10 + 10 + 8 - 10 + 7$$

15. Evaluate:  $y + y + c - 10 + x$ , when  $x = 7$ ,  $y = 10$  and  $c = 8$ .

- A) 11  
 B) 25  
 C) 21  
 D) 105

16. In the expression  $8x + 4$ , which best describes the 8?

- A) variable  
 B) equation  
 C) term  
 D) coefficient

17. What is the solution to  $b - 9 = 14$ ?

- A)  $b = 5$   
 B)  $b = 22$   
 C)  $b = 23$   
 D)  $b = 126$

18. Which of the following has a solution of 22?

- A)  $14 + t = 35$   
 B)  $t - 9 = 13$   
 C)  $2t = 54$   
 D)  $t/3 = 11$

19. Solve the inequality:  $c - 4.6 < 5$

- A)  $c > 9.6$   
 B)  $c > 96$   
 C)  $c < 9.6$   
 D)  $c < 96$

$$66 = 2(3 + 2w) + 2w$$

$$l = 3 + 2w \quad w = 10$$

20. A rectangle's length is three more than two times its width. If the perimeter of a rectangle is 66 feet, what is the measurement of the length?

- A) 10 inches  
 B) 21 inches  
 C) 33 inches  
 D) 45 inches

21. Paula is saving for a spring break trip. So far, she has saved \$90. If she plans to save \$15 each week (w) from her part-time job, which expression shows how long must she save for until her savings are quadrupled?

- A)  $15w + 90 = 360$   
 B)  $4(15w + 90) = 360$   
 C)  $15w + 90w = 360$   
 D)  $4(15w) + 90 = 360$

22. Simplify:  $10 + 2(4 + w)$

$$10 + 8 + 2w$$

- A)  $2w + 18$   
 B)  $w + 16$   
 C)  $w + 18$   
 D)  $2w + 14$

23. What situation could  $w > 40$  represent?

- A) Sue has less than \$40 in the bank.  
 B) Sue has at least \$40 in the bank.  
 C) Sue has more than \$40 in the bank.  
 D) Sue has at most \$40 in the bank.

24. In which equation does x have the greatest value?

- A)  $\frac{x}{4} = 4$   
 B)  $2 = 4x$   
 C)  $4x = 52$   
 D)  $4 + x = 19$

25. Which expression is equivalent to  $4(k + 2n)$ ?

- A)  $4k + 2n$   
 B)  $4k + 6n$   
 C)  $4k + 8n$   
 D)  $4k + 16n$

26. Which expression is equivalent to  $5h + 3h$ ?

- A)  $8h^2$   
 B)  $8h$   
 C)  $8 + h$   
 D)  $8 + 2h$

27. An inequality is written in the box.

$$36 > 9n \quad n < 4$$

Which numbers can replace  $n$  to make the inequality true?

- A) 0, 1, 2, 3, 4  
B) any number greater than 4  
C) 0, 1, 2, 3  
D) any number greater than or equal to 4

28. Basketballs cost \$24. A physical education teacher spent \$312 on basketballs for the school. Which equation can be used to determine the number ( $n$ ) of basketballs the physical education teacher purchased?

- A)  $24 + n = 312$       B)  $\frac{24}{n} = 312$   
C)  $24n = 312$       D)  $24 = 312 - n$

29. If each person ( $p$ ) has 2 legs and each dog ( $d$ ) has 4 legs, which expression could represent the total number of legs at a park?

- A)  $6(p + d)$       B)  $2p + 4d$   
C)  $6 + (p \times d)$       D)  $4p + 2d$

30. To rent a kayak at the beach, there is an initial fee of \$45. For each hour the kayak is rented, there is an additional \$5 fee. Which expressions can be used to calculate the cost of renting the kayak for any number ( $n$ ) of hours?

- A)  $50n + 5$       B)  $45n + 5$   
C)  $50 + 5n$       D)  $45 + 5n$

31. Which equation demonstrates the Associative Property of Addition?

- A)  $p(q + r) = (p \times q) + (p \times r)$   
B)  $p + q = q + p$   
C)  $p + (q + r) = (p + q) + r$   
D)  $p + 0 = p$

32. Which expression represents the quotient of the sum of a number plus 8 and 3?

- A)  $n + \frac{8}{3}$       B)  $\frac{n+8}{3}$   
C)  $\frac{n}{8} + 3$       D)  $n \div \frac{8}{3}$

33. Which statement describes how to use an inverse operation to solve the equation  $n \times 4 = 112$ ?

- A) Multiply both sides of the equation by 4.  
B) Divide both sides of the equation by 4.  
C) Subtract 4 from both sides of the equation.  
D) Add 4 to both sides of the equations.

34. An expression is given in the box.

$$9c \div 3d$$

$$9 \cdot 4 = 36$$

What is the value of the expression if  $c = 4$  and  $d = 6$ ?

- A) 2      B) 4  
C) 36      D) 72

35. An inequality is written in the box.

$$72 \quad 4 \cdot 18 > 6 \cdot n$$

What number can replace  $n$  to make a true statement?

- A) 14      B) 13  
C) 12      D) 11

36. Mary had \$18. She bought a movie ticket, a box of popcorn, and a drink. The movie ticket cost \$7, and the drink cost \$4.

If Mary has \$3 left after the movies, how much did the box of popcorn cost?

- A) \$2      B) \$3  
C) \$4      D) \$7

$$7 + 4 + d + 3 = 18$$

$$14 + d = 18$$

$$d = 4$$