

# 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.  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)  $4b + a$

2)  $3bc$

3)  $3(b + a)$

4)  $\frac{2b}{c}$

Are the following expressions equivalent? WRITE YES OR NO.

If no, show proof with an example!

5)  $n + n + 5 = 2n + 5$

6)  $7(a - b) = 7a - b$

7)  $m - n = n - m$

8)  $3x + 3y = 3xy$

Write each phrase as an algebraic expression.

9) the product of  $e$  and 4, divided by 12

10) 13 multiplied by the amount 60 minus  $w$

11) twice the sum of a number and 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.

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.

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

14)  $15 + 2x - 3y$

15)  $150xy - 8$

# ORDER OF OPERATIONS

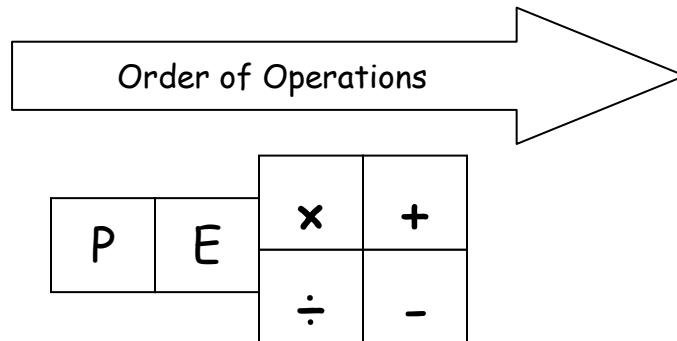
ORDER OF OPERATIONS is the order in which you solve a problem.

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## 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)

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## Practice Problems:

1.)  $3 \cdot 8 + (12 \div 4) - 5^2$

5.)  $7(63 \div 9) + 4^3 - (7 \cdot 8)$

2.)  $5 + 4 \cdot 2 - 3^2 + (8 \cdot 4)$

6.)  $4 - 4(3 \cdot 1) + 16 \div 2$

3.)  $25 - 2 \cdot 9$

7.)  $40 + 2 \cdot 5$

4.)  $6(4) + 7^2$

8.)  $3 \cdot 4 + 8 \div 2$

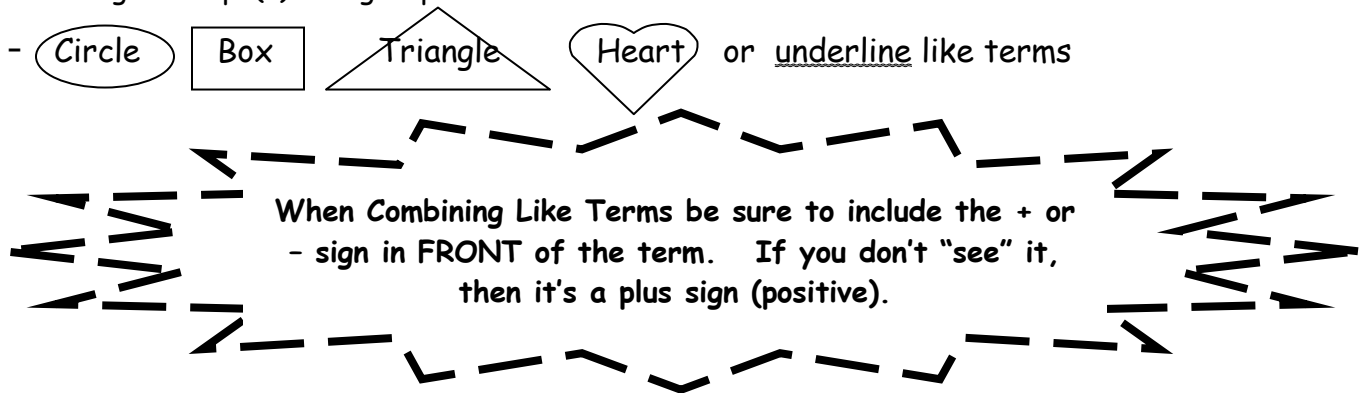
# COMBINE LIKE TERMS

## 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.
-  or underline like terms



## Example:

$$\boxed{3x} + \boxed{9} + \boxed{2x} - \boxed{8} = 5x + 1 \quad \boxed{10} + \boxed{+12y} + \boxed{2} - \boxed{8y} = 4y + 12$$

## Identify the like terms.

1.  $3a$   $b^2$   $b^3$   $4b^2$   $4$   $5a$

2.  $x$   $x^4$   $4x$   $4x^2$   $4x^4$   $3x^2$

## Simplify each expression by combining like terms.

1.  $3x + 3y + x + y + z$

4.  $6r + 11 + 3r - 1 + 37$

2.  $2a + 22b^2 - a$

5.  $2z + 5 + 3z + 7$

3.  $30m^2 + 14n^2 + 8 - 10m^2 + 5n - 3$

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

# 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.  $4(3 + 5x) =$

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

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

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

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

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

4.  $2(x - y + 2x) =$

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

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

9.  $3(2x + 5) + 4(x - 2) =$  \_\_\_\_\_ if  $x = 5$

10.  $(3z - 1)6 + 4 =$  \_\_\_\_\_ if  $z = 3$

# 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!

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*Solve each equation. BOX YOUR ANSWER!!*

1)  $0.4x = 1.6$

2)  $9x = 81$

3)  $\frac{3}{4}x = 48$

4)  $9 + x = 42$

5)  $3.6 + x = 10.8$

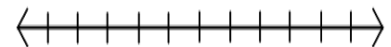
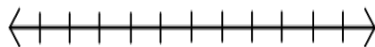
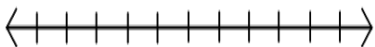
6)  $\frac{1}{2} + x = 3\frac{1}{2}$

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

1)  $x + 10 < 53$

2)  $8x \geq 128$

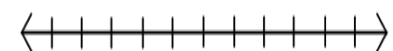
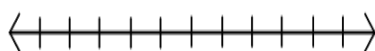
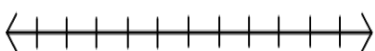
3)  $x - 12 > 27$



4)  $9 + x \leq 21$

5)  $3x > 11.4$

6)  $\frac{1}{2} + y \geq 5$



# 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.  $y = \underline{\hspace{2cm}}$

x	y
2	8
5	11
6	12
10	16

2.  $y = \underline{\hspace{2cm}}$

x	y
3	5
5	7
8	10
10	12

3.  $y = \underline{\hspace{2cm}}$

x	y
1	4
2	8
3	12
4	16

Fill in each table:

4.

$$y = 3x + 2$$

x		y
0		
4		
5		
6		

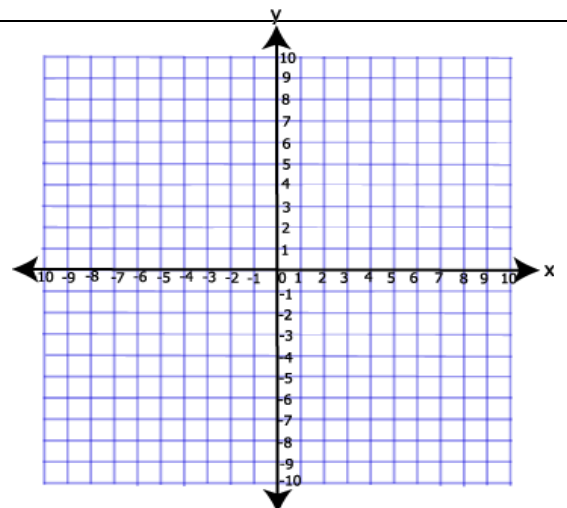
5.

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

x		y
0		
4		
12		
16		

6.  $y = 6x + 1$

x	y =	y	(x,y)
0			
1			
2			
3			





# 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:**

- 1.) The amount of time you study will make a positive difference on your next test score.

**Independent:** time studying

**Dependent:** score on next test

- 2.) 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.**

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

The \_\_\_\_\_ causes the \_\_\_\_\_ to change.

IV: \_\_\_\_\_ DV: \_\_\_\_\_

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

The \_\_\_\_\_ causes the \_\_\_\_\_ to change.

IV: \_\_\_\_\_ DV: \_\_\_\_\_

3.  $y = 4x + 1$

The \_\_\_\_\_ causes the \_\_\_\_\_ to change.

IV: \_\_\_\_\_ DV: \_\_\_\_\_

# 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.

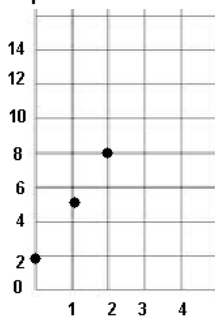
- A) 28                      B) 42  
C) 38                      D) 15

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:  $(67 + n) \div 5 = 15$

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

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

13. What is the solution of the inequality

$$\frac{3}{8}x > 9?$$

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

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.

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)  $c < 96$

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) 23 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 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:  $10 + 2(4 + w)$

- 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)  $72 = 4x$   
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.

$$36 > 9n$$

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.

$$9c \div 3d$$

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.

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

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