Student Name: _____

Algebra 1 Summer Packet! School Year 2020-2021

About Algebra 1:

Algebra I requires students to think, reason, and communicate mathematically. The skills learned during the Algebra I curriculum will be used as a foundation in all subsequent math classes, such as geometry and Algebra II.

Keys to success in Algebra 1:

- Persistence, and the desire to understand rather than memorize.
- Ask for help! Do not suffer in silence!
- Resilience, and ability to "bounce back" from times when you solve a problem incorrectly.
- Curiosity and the interest to know the "why" of mathematics.

Packet Expectations:

The summer packet contains material learned during the middle school math and Pre-Algebra curriculum.

- **Students are expected to show their work for each problem of this review packet**. Each problem should be worked through to its entirety, and correctly; not just attempted.
- If you cannot print it out, no problem! Use your own paper and stay organized! Title each page!
- The packet will be counted as part of each student's homework average for the first quarter.
- Each student should be prepared to have the summer packet completed and ready to be checked on the Friday of the first week of school.
- Over the course of the first few weeks of the beginning of the school year, the packet will be reviewed, and an assessment will be given as the first test grade of the new school year.

Supplies needed for Algebra 1:

- 3-ring binder - any size!
- Pencils, pencils, pencils!

Please sign below to show that you understand the required materials and positive attitude to be successful in this course.

Printed Name: _____

Signature: _____ Date: _____

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Order of Operations

To avoid having different results for the same problem, mathematicians have agreed on an order of operations when simplifying expressions that contain multiple operations.

1. Perform any operation(s) inside grouping symbols. (Parentheses, brackets above or below a fraction bar)
2. Simplify any term with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

One easy way to remember the order of operations process is to remember the acronym PEMDAS or the old saying, **"Please Excuse My Dear Aunt Sally."**

P - Perform operations in grouping symbols
E - Simplify exponents
M - Perform multiplication and division in order from left to right
D
A - Perform addition and subtraction in order from left to right
S

Example 1

$2 - 3^2 + (6 + 3 \times 2)$
$2 - 3^2 + (6 + 6)$
$2 - 3^2 + 12$
$2 - 9 + 12$
$-7 + 12$
$= 5$

Example 2

$-7 + 4 + (2^3 - 8 \div -4)$
$-7 + 4 + (8 - 8 \div -4)$
$-7 + 4 + (8 - -2)$
$-7 + 4 + 10$
$-3 + 10$
$= 7$

Order of Operations

Evaluate each expression. Remember your order of operations process (PEMDAS).

1. $6 + 4 - 2 \cdot 3 =$

2. $(-2) \cdot 3 + 5 - 7 =$

3. $15 \div 3 \cdot 5 - 4 =$

4. $29 - 3 \cdot 9 + 4 =$

5. $20 - 7 \cdot 4 =$

6. $4 \cdot 9 - 9 + 7 =$

7. $50 - (17 + 8) =$

8. $(12 - 4) \div 8 =$

9. $12 \cdot 5 + 6 \div 6 =$

10. $18 - 4^2 + 7 =$

11. $3(2 + 7) - 9 \cdot 7 =$

12. $3 + 8 \cdot 2^2 - 4 =$

13. $16 \div 2 \cdot 5 \cdot 3 \div 6 =$

14. $12 \div 3 - 6 \cdot 2 - 8 \div 4 =$

15. $10 \cdot (3 - 6^2) + 8 \div 2 =$

16. $6.9 - 3.2 \cdot (10 \div 5) =$

17. $32 \div [16 \div (8 \div 2)] =$

18. $[10 + (2 \cdot 8)] \div 2 =$

19. $180 \div [2 + (12 \div 3)] =$

20. $\frac{1}{4}(3 \cdot 8) + 2 \cdot (-12) =$

21. $\dfrac{5 + [30 - (8 - 1)^2]}{11 - 2^2} =$

22. $\dfrac{3[10 - (27 \div 9)]}{4 - 7} =$

23. $5(14 - 39 \div 3) + 4 \cdot 1/4 =$

24. $[8 \cdot 2 - (3 + 9)] + [8 - 2 \cdot 3] =$

25. $162 \div [6(7 - 4)^2] \div 3 =$

Operations with Signed Numbers

Adding and Subtracting Signed Numbers

Adding Signed Numbers

Like Signs		Different Signs	
Add the numbers & carry the sign		Subtract the numbers & carry the sign of the larger number	
(+) + (+) = +	(+3) + (+4) = +7	(+) + (–) = ?	(+3) + (–2) = +1
(–) + (–) = –	(– 2) + (– 3) = (– 5)	(–) + (+) = ?	(–5) + (+ 3) = –2

Subtracting Signed Numbers

Don't subtract! Change the problem to **addition** and change the sign of the **second** number. Then use the addition rules.

(+9) – (+12) = (+9) + (– 12)	(+4) – (–3) = (+4) + (+3)
(– 5) – (+3) = (– 5) + (– 3)	(–1) – (– 5) = (–1) + (+5)

Simplify. ***Do not use a calculator for this section.***

1. 9 + -4 =
2. -8 + 7 =
3. -14 – 6 =
4. -30 + -9 =
5. 14 – 20 =
6. -2 + 11 =
7. 20 – - 6 =
8. 7 – 10 =
9. -6 – -7 =
10. 5 – 9 =
11. -8 – 7 =
12. 1 – -12 =

Multiplying and Dividing Signed Numbers

If the signs are the same, the answer is *positive*

If the signs are different, the answer is *negative*

Like Signs		Different Signs	
(+)(+) = +	(+3)(+4) = +12	(+)(–) = –	(+2)(–3) = –6
(–)(–) = +	(–5)(–3) = + 15	(–)(+) = –	(–7)(+1) = –7
(+)/(+) = +	(+3)/(+4) = +12	(+)/(–) = –	(+2)/(–3) = –6
(+)/(+) = +	(+3)/(+4) = +12	(–)/(+) = –	(–7)/(+1) = –7

Simplify. ***Do not use a calculator for this section.***

1. (-5)(-3) =

2. $\frac{-6}{2}$ =

3. (2)(4) =

4. $\frac{-12}{-4}$ =

5. (-1)(-5) =

6. $\frac{-16}{8}$ =

7. $\frac{-7}{-1}$ =

8. (3)(-4) =

9. $\frac{8}{-4}$ =

10. (-2)(7) =

11. $\frac{-20}{-1}$ =

12. (2)(-5) =

Rounding Numbers

Step 1: Underline the place value in which you want to round.

Step 2: Look at the number to the right of that place value you want to round.

Step 3: If the number to the right of the place value you want to round is less than 5, keep the number the same and drop all other numbers.

If the number to the right of the place value you want to round is 5 or more, round up and drop the rest of the numbers.

Example: Round the following numbers to the tenths place.

Tenths

1. 23.1246 — 2 is less than 5 so keep the 1 the same — 23.1

2. 64.2685 — 6 is greater than 5 so add one to the 2 — 64.3

3. 83.9721 — 7 is greater than 5 so add one to the 9

$$\begin{array}{r} {\scriptstyle 1} \\ 83.9721 \\ +\ \ 1 \\ \hline 84.0 \end{array}$$

84

Round the following numbers to the **tenths** place.

1. 18.6231 _____
2. 25.0543 _____
3. 3.9215 _____
4. 36.9913 _____
5. 15.9199 _____
6. 0.2658 _____
7. 100.9158 _____
8. 19.9816 _____
9. 17.1083 _____
10. 0. 6701 _____

Evaluating Expressions

Example

Evaluate the following expression when x = 5

Rewrite the expression substituting 5 for the x and simplify.

a. $5x =$ $5(5)= 25$
b. $-2x =$ $-2(5) = -10$
c. $x + 25 =$ $5 + 25 = 30$
d. $5x - 15 =$ $5(5) – 15 = 25 – 15 = 10$
e. $3x + 4 =$ $3(5) + 4 = 19$

Evaluate each expression given that: $x = 5$ $y = -4$ $z = 6$

1. $3x$

2. $2x^2$

3. $3x^2 + y$

4. $2 (x + z) – y$

5. $y + 4$

6. $5z – 6$

7. $xy + z$

8. $2x + 3y – z$

Evaluate each expression given that: $x = 5$ $y = -4$ $z = 6$

9. $5x - (y + 2z)$

10. $\frac{xy}{2}$

11. $x^2 + y^2 + z^2$

12. $2x(y + z)$

13. $5z + (y - x)$

14. $2x^2 + 3$

15. $4x + 2y - z$

16. $\frac{yz}{2}$

Combining Like Terms

What is a ***term***? The parts of an algebraic expression that are separated by an addition or subtraction sign are called ***terms***.
The expression $4x + 2y - 3$ has 3 terms.

What are ***like terms***? Terms with the same variable factors are called ***like terms***.
$2n$ and $3n$ are **like terms**, but $4x$ and $3y$ are not like terms because their variable factors x and y are different.

To simplify an expression, you must combine the like terms.

Examples: Simplify

1. $5x + 8x$
   $5x + 8x = (5 + 8)x = 13x$

2. $3y - 6y$
   $3y - 6y = (3 - 6)y = -3y$

3. $3x + 4 - 2x + 3$
   $3x - 2x + 4 + 3 = (3 - 2)x + 4 + 3 = x + 7$

4. $2b + 5c + 3b - 6c$
   $2b + 3b + 5c - 6c = (2+3)b + (5 - 6)c = 5b - c$

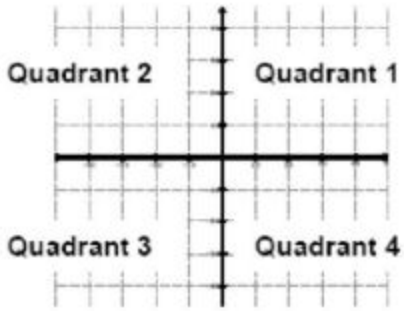
Practice: Simplify each expression

1. $6n + 5n$
2. $25b + 15b$
3. $37z + 4z$
4. $x - 5x$
6. $3n + 1 - 2n + 8$
6. $4f + 5f - 6 + 8$
7. $7t + 9 - 4t + 3$
8. $2k + 4 - 8k - 1$
9. $4r + 3r + 6y - 2y$
10. $8g + 9h - 4g - 5h$
11. $2m + 3n - 4m + 5n$
12. $a + 5b - 2a + 9b$

Graphing

Points in a plane are named using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into 4 quadrants (4 sections) as described below.

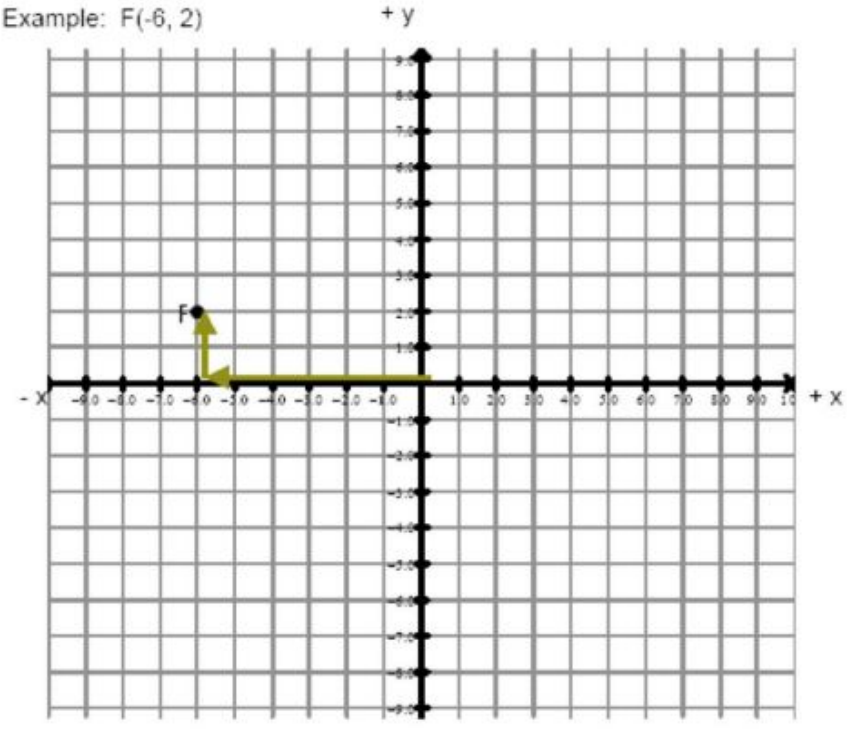


All points in Quadrant 1 has a **positive** x-coordinate and a **positive** y-coordinate (+ x, + y).
All points in Quadrant 2 has a **negative** x-coordinate and a **positive** y-coordinate (- x, + y).
All points in Quadrant 3 has a **negative** x-coordinate and a **negative** y-coordinate (- x, - y).
All points in Quadrant 4 has a **positive** x-coordinate and a **negative** y-coordinate (+ x, - y).

Plot each point on the graph below. Remember, coordinate pairs are labeled (x, y). Label each point on the graph with the letter given.

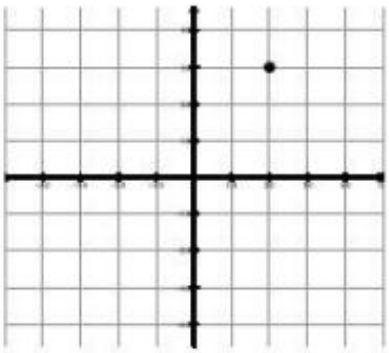
1. A(3, 4) 2. B(4, 0) 3. C(-4, 2) 4. D(-3, -1) 5. E(0, 7)

Example: F(-6, 2)

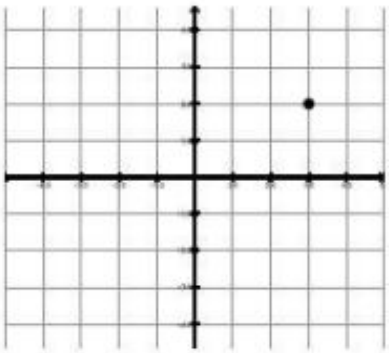


Determine the coordinates for each point below:

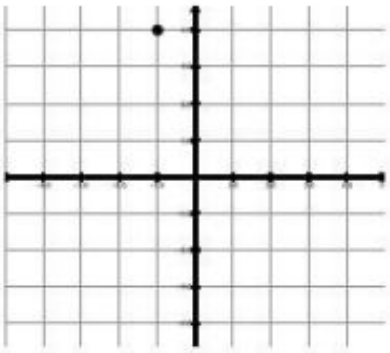
Example. (2 , 3)



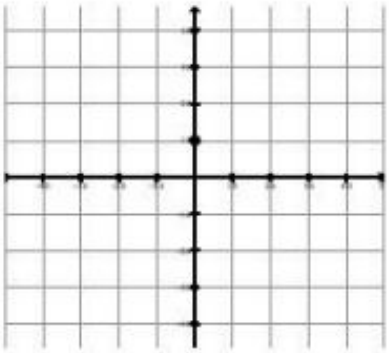
6. (____, ____)



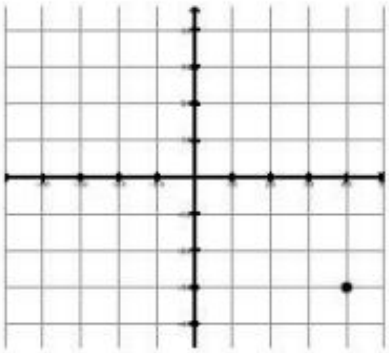
7. (____, ____)



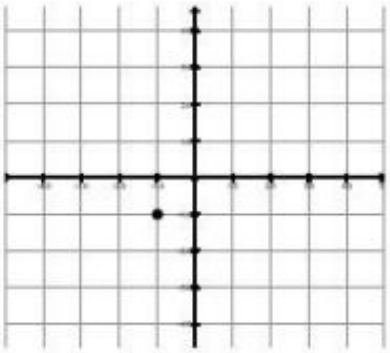
8. (____, ____)



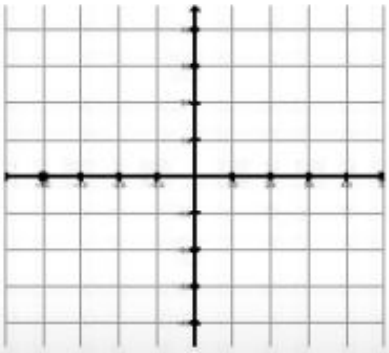
9. (____, ____)



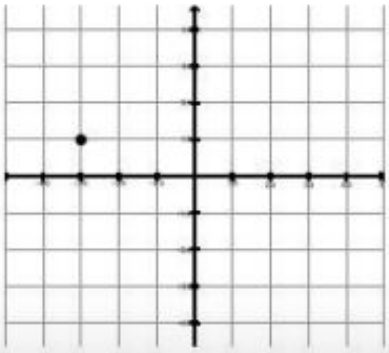
10. (____, ____)



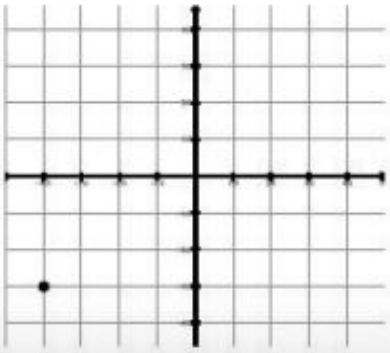
11. (____, ____)



12. (____, ____)



13. (____, ____)



Solving Equations

To solve an equation means to ***find the value*** of the variable. We solve equations by isolating the variable using opposite operations.

Opposite Operations:
Addition (+) & Subtraction (–)
Multiplication (x) & Division (÷)

Example:

Solve.

$3x - 2 = 10$
$+2 \quad +2$ — Isolate 3x by adding 2 to each side.

$\frac{3x}{3} = \frac{12}{3}$ — Simplify / Isolate x by dividing each side by 3.

$x = 4$ — Simplify

Please remember...
to do the same step on each side of the equation.

Always check your work by substitution!

Check your answer.

$3(4) - 2 = 10$ — Substitute the value in for the variable.
$12 - 2 = 10$ — Simplify
$10 = 10$ — Is the equation true? If yes, you solved it correctly!

Try These:

Solve each equation below.

1. $x + 3 = 5$

2. $w - 4 = 10$

3. $c - 5 = -8$

4. $3p = 9$

5. $-7k = 14$

6. $-x = -17$

7. $\frac{h}{3} = 5$

8. $\frac{m}{8} = 7$

9. $\frac{4}{5} d = 12$

10. $\frac{3}{8} j = 6$

11. $2x - 5 = 11$

12. $4n + 1 = 9$

13. $5j - 3 = 12$

14 $2x + 11 = 9$

15. $-3x + 4 = -8$

16. $-6x + 3 = -9$

17. $\frac{f}{3} + 10 = 15$

18. $\frac{a}{7} - 4 = 2$

Use SUBSTITUTION and ORDER OF OPERATIONS to determine if the given value is the solution.

EXAMPLE: Given the equation $4x - 5 = 7$ is $x = 3$ the solution?

$$4x - 5 = 7$$
$$4(3) - 5 = 7$$
$$12 - 5 = 7$$
$$7 = 7$$ Yes! $x = 3$ is the solution!

19. Given the equation $-2x + 5 = 13$, is $x = 4$ the solution?

20. Given the equation $6 - x = 8$, is $x = 2$ the solution?