

Name: _____ Date: _____

ALGEBRA I SUMMER PACKET: Arithmetic and Number Sense Review

Welcome to your Algebra I summer review! This section focuses on the foundational arithmetic skills you will need to be successful this year. Work through the examples carefully before attempting the practice problems.

1. Order of Operations (PEMDAS)

When simplifying expressions, always follow this order:

1. **P**arentheses
2. **E**xponents
3. **M**ultiplication and **D**ivision (from left to right)
4. **A**ddition and **S**ubtraction (from left to right)

Worked Example:

Simplify: $4.5 + 2 \times (6.2 - 1.2)$

5. Parentheses: $6.2 - 1.2 = 5$
6. Multiplication: $2 \times 5 = 10$
7. Addition: $4.5 + 10 = 14.5$ **Final Answer:** 14.5

Practice: Order of Operations

Simplify each expression completely. **Show your steps.** *You will be asked to re-do work that is missing steps.*

1. $12 \div 3 + 5 \times 0.4$	2. $(10 - 2 * 2) \times 4 + 7$
3. $16 - 2^3 \div 4$	4. $10 + (1.5 \times 4) \div 2$

2. Operations with Integers

Addition/Subtraction: Same signs, add and keep. Different signs, subtract and take the sign of the larger absolute value.

Multiplication/Division: Same signs result in a positive. Different signs result in a negative.

Worked Examples:

- $-8 + 5 = -3$ (Different signs, subtract, 8 is larger)
- $-4 - (-9) \rightarrow -4 + 9 = 5$
- $-6 \times 7 = -42$ (Different signs, negative)
- $-20 \div (-5) = 4$ (Same signs, positive)

Practice: Integer Operations

Solve each problem below.

5. $-12 + (-15)$	6. $18 - (-4)$
7. $-9 \times (-3)$	8. $56 \div (-8)$

Reflect: Integer Operations

What methods do you use to remember integer operations? How do you think about these numbers?

3. Number Sense: Comparing Decimals

To compare decimals, align the decimal points and compare digits from left to right. Use the symbols:

- $<$ (Less than)
- $>$ (Greater than)
- $=$ (Equal to)

Worked Example:

Compare 0.45 and 0.405

8. Align: 0.450 vs 0.405
9. Compare: In the hundredths place, 5 is greater than 0. **Final Answer:** $0.45 > 0.405$

Practice: Comparing Decimals

Write the correct inequality symbol ($<$, $>$, or $=$) in the space provided.

9. 0.72 _____ 0.702

10. 1.5 _____ 1.500

11. 0.089 _____ 0.11

12. 12.45 _____ 12.449

Reflection Question:

Explain why -5 is considered smaller than -2 , even though the number 5 is larger than 2. Use a number line description in your explanation.

Expressions and Equations Review

This section focuses on substituting values into algebraic expressions and solving equations for a missing variable. These are fundamental skills for success in Algebra I.

Topic 1: Evaluating Expressions

To evaluate an expression, replace the variables with the given numbers (substitution) and then simplify using the order of operations (PEMDAS).

Worked Example:

Evaluate $3x^2 - 5y$ when $x = -2$ and $y = 4$.

Step 1: Substitute the values.

$$3(-2)^2 - 5(4)$$

Step 2: Simplify exponents.

$$3(4) - 5(4)$$

Step 3: Multiply.

$$12 - 20$$

Step 4: Subtract.

Result: -8

Practice: Evaluating Expressions

Evaluate each expression for the given values. **Show your substitution and simplification steps.**

1. Evaluate $4a + 7b$ when $a = -3$ and $b = 5$.

2. Evaluate $x^2 - 3x + 10$ when $x = -4$.

3. Evaluate $-2(m - n)$ when $m = 8$ and $n = -2$.

4. Evaluate $\frac{y+12}{x}$ when $x = -3$ and $y = 6$.

Topic 2: Solving Equations

To solve an equation, use inverse operations to isolate the variable. Remember: whatever you do to one side of the equation, you must do to the other.

Worked Example (Two-Step):

Solve for x : $-4x + 7 = 23$

Step 1: Subtract 7 from both sides to isolate the term with x .

$$\begin{aligned} -4x + 7 - 7 &= 23 - 7 \\ -4x &= 16 \end{aligned}$$

Step 2: Divide both sides by -4 .

$$\frac{-4x}{-4} = \frac{16}{-4}$$

Result: $x = -4$

Practice: Solving Equations

Solve each equation for the variable. Show all algebraic steps clearly.

5. Solve for x : $x - 15 = -22$

6. Solve for m : $-8m = 72$

7. Solve for y : $3y + 11 = -4$

8. Solve for w : $\frac{w}{5} - 6 = -2$

Reflection: Why is it important to perform the same operation on both sides of an equation? What would happen if you only subtracted 7 from the left side in the example above

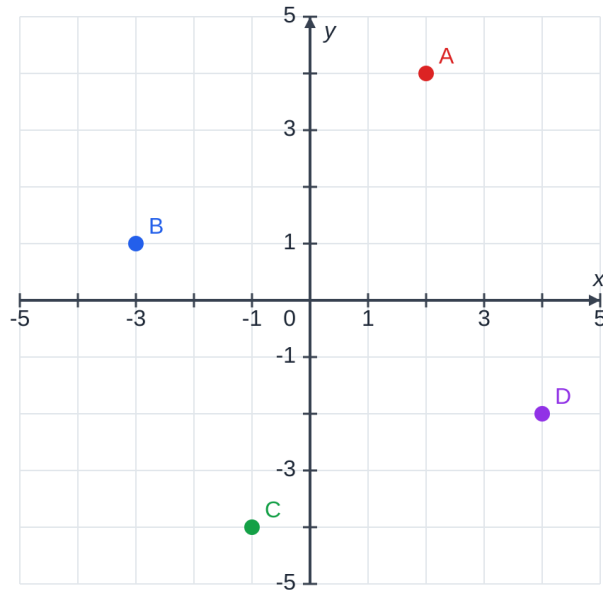
Coordinate Plane and Linear Basics

1. Identifying Points

Points on a coordinate plane are written as an ordered pair (x, y) .

- The **x-coordinate** tells you how far to move left or right from the origin $(0,0)$.
- The **y-coordinate** tells you how far to move up or down.

Example: To find the coordinates of point P , start at $(0,0)$. If you move 3 units right and 2 units down, the coordinates are $(3, -2)$.



Identify the coordinates for points A, B, C, and D.

Point A:	Point C:
Point B:	Point D:

2. Slope and Y-Intercept

Linear equations are often written in **Slope-Intercept Form**:

$$y = mx + b$$

- **m** is the **slope** (the steepness or 'rise over run').
- **b** is the **y-intercept** (where the line crosses the y-axis).

Example: In the equation $y = -3x + 7$:

- The slope (m) is **-3**.
- The y-intercept (b) is **7**.

Directions: Identify the slope (m) and the y-intercept (b) for each equation below.

Equation	Slope (m)	Y-Intercept (b)
$y = 2x + 5$		
$y = -x - 3$		
$y = \frac{2}{3}x + 1$		
$y = 4x$		

3. Graphing Lines

To graph a line using $y = mx + b$:

10. **Plot the y-intercept (b)** on the y-axis.

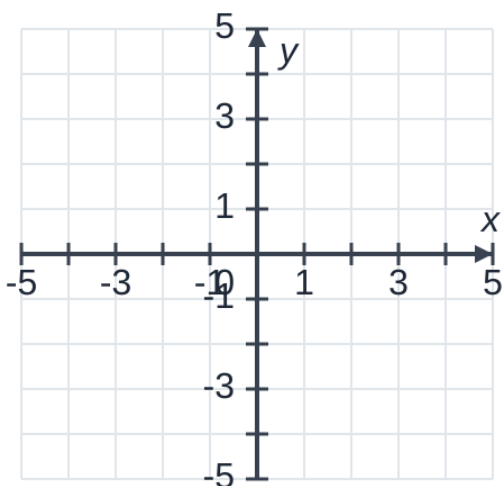
11. **Use the slope (m)** to find the next point. If $m = \frac{2}{3}$, move **up 2** (rise) and **right 3** (run) from your first point.

12. **Draw a line** through the points.

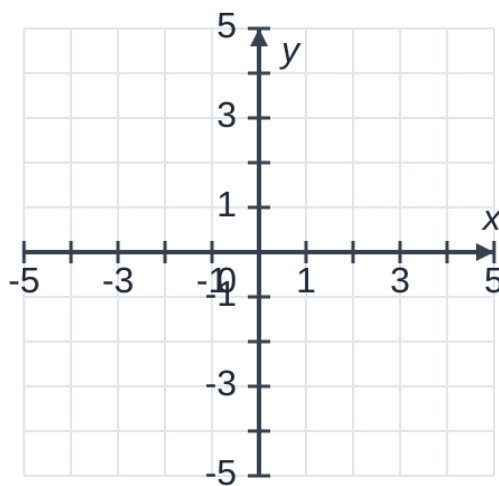
Example: To graph $y = \frac{1}{2}x - 2$, start at -2 on the y-axis. Move up 1 and right 2 to find your next point.

Directions: Graph the following four lines on the coordinate planes provided.

1. $y = x + 2$

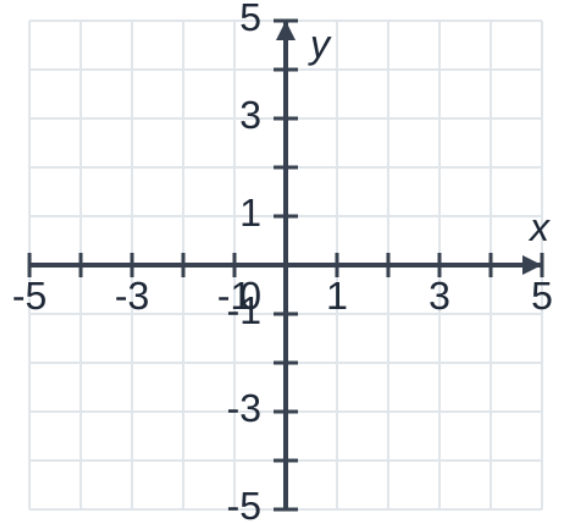
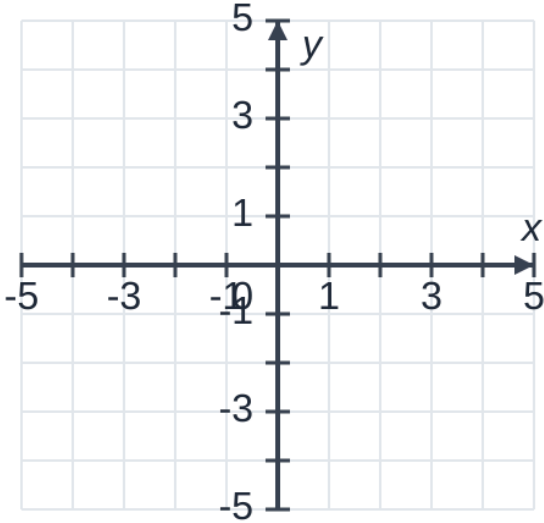


2. $y = -2x + 1$



3. $y = \frac{1}{3}x - 4$

4. $y = -\frac{3}{2}x + 3$



Reflection:

How do you study for math? Be honest. If you don't study, write about that and tell me why you don't study. If you do study, tell me how you study. 3 Sentences Minimum.

What are 2 of your favorite math topics? Why?

You are a freshman! Welcome to high school! Time to start thinking about careers! What are at least 3 careers or areas that you might be interested in working in after you leave BGA?

Answer Key

Arithmetic and Number Sense Review

Order of Operations

13. 6

14. 31

15. 13.2

16. 13

Integer Operations

5. -27

6. 22

7. 27

8. -7

Comparing Decimals

9. >

10. =

11. <

12. >

Reflection Question

13. Answers will vary. Sample: On a number line, -5 is further to the left than -2. Numbers further to the left are always smaller than numbers to the right.

Expressions and Equations Review

Evaluating Expressions

17. $4(-3) + 7(5) = -12 + 35 = 23$

18. $(-4)^2 - 3(-4) + 10 = 16 + 12 + 10 = 38$

19. $-2(8 - (-2)) = -2(10) = -20$

20. $\frac{6+12}{-3} = \frac{18}{-3} = -6$

Solving Equations

5. $x = -7$

6. $m = -9$

7. $y = -5$

8. $w = 20$

Reflection

Answers will vary. Sample: Performing the same operation on both sides maintains the balance of the equation. If you only subtracted 7 from one side, the two sides would no longer be equal.

Coordinate Plane and Linear Basics

Identifying Points

- Point A: (2, 4)
- Point B: (-3, 1)
- Point C: (-1, -4)
- Point D: (4, -2)

Slope and Y-Intercept

- $y = 2x + 5$: $m = 2$, $b = 5$
- $y = -x - 3$: $m = -1$, $b = -3$
- $y = \frac{2}{3}x + 1$: $m = \frac{2}{3}$, $b = 1$
- $y = 4x$: $m = 4$, $b = 0$

Graphing Lines

21. Line passes through (0, 2) with a slope of 1.
22. Line passes through (0, 1) with a slope of -2.
23. Line passes through (0, -4) with a slope of $\frac{1}{3}$.
24. Line passes through (0, 3) with a slope of $-\frac{3}{2}$.