Name _____ Date _____ Semester _____

SUMMER PACKET

Accelerated Algebra 2

2023 - 2024

Teacher	Mrs. Miller
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Welcome to Accelerated Algebra 2!

I. The problems in this packet are designed to help review the topics from previous mathematics courses that are important to your success in Accelerated Algebra 2. Please complete each problem, as they are topics you will need to know for this course.

II. Online resources you may use include, but are not limited to:

http://www.purplemath.com
http://www.mathforum.org/dr.math/
http://www.mathisfun.com

Check out http://www.khanacademy.org for videos that help review specific topics. Click on link and "browse the library"

III. You may email questions to your teacher. Email will be checked weekly over the summer.

IV. Pacing:

Below is a suggested time frame for completion. Please manage your time wisely.

	Fall Semester	**Spring Semester**
Pages #3-6	End of June	End of November
Pages #7-10	End of July	End of December
Pages #11-14	Before 1st day of school	Before 1st day of 2nd semester

V. Bring the COMPLETED summer packet with you on the first day of class. The packet will be given credit on that day. Anyone without the completed packet will get a zero. Within the first week of the semester a test will be given on the material from the packet. Be prepared!

All math courses at the high school require the use of a graphing calculator. The teacher will model the use of the TI-83, TI-83+, TI-84, or TI-84+ model. You are free to purchase from a different company or a different model; however, you will need to know how to use the calculator you choose.

Accelerated Algebra 2 Name _____
Summer Assignment Date _____ Teacher _____

For each question, show work below the problem and write your answer in the blank provided. ***ANSWERS WITHOUT WORK WILL NOT BE GRADED.***

Expressions and Formulas: Find the value of each expression.

1. $(-2)^3-(3)(8)+(5)(10)$ 2. $\left[4(5-3)-2(4-8)\right]\div 16$

1. _____

2. _____

3. $\frac{1}{4}\left[-5+5(-3)\right]$ 4. $\frac{(-8)^2}{5-9}-(-1)^2+4(-9)$

3. _____

4. _____

Evaluate each expression if $a=\frac{3}{4}$, $b=-8$, $c=-2$, $d=3$, and $e=\frac{1}{3}$.

5. $-b\left[a+(c-d)^2\right]$ 6. $\frac{ac^4}{d}-\frac{c}{e^2}$

5. _____

6. _____

7. $9bc-\frac{1}{e}$ 8. $2ab^2-(d^3-c)$

7. _____

8. _____

Simplify each expression.

9. $3(m-z)+5(2m-z)$

10. $2x-3y-(5x-3y-2z)$

9. _____

10. _____

11. $6(2+v)-4(2v+1)$

12. $\frac{1}{3}(15d+3)-\frac{1}{2}(8-10d)$

11. _____

12. _____

Solve each equation. Check your solution.

13. $120-\frac{3}{4}y=60$

14. $\frac{5}{2}n=98-n$

15. $4.5+2p=8.7$

13. _____

14. _____

15. _____

16. $4n+20=53-2n$

17. $100=20-5r$

18. $2x+75=102-x$

16. _____

17. _____

18. _____

Solve each formula for the specified variable.

19. $2xy=x+7$, for x

20. $\frac{d}{2}+\frac{f}{4}=6$, for f

19. _____

20. _____

21. $3(2j-k)=108$, for j

22. $3.5s-42=4t$, for s

21. _____

22. _____

Solve each absolute value equation. Check your solutions.

23. $5f - |3f + 4| = 20$

24. $|4b + 3| = 15 - 2b$

23. _____

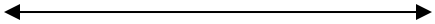
24. _____

Solve each inequality. Then, graph the solution set on a number line.

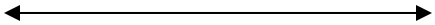
25. $2z < -9 + 5z$

26. $4(5x + 7) \leq 13$

25. _____



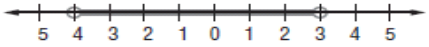
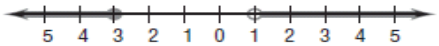
26. _____



Solving Compound and Absolute Value Inequalities

Lesson 1-6

Compound Inequalities A compound inequality consists of two inequalities joined by the word *and* or the word *or*. To solve a compound inequality, you must solve each part separately.

And **Compound Inequalities**	Example: $x > -4$ and $x < 3$ 	The graph is the intersection of solution sets of two inequalities.
Or **Compound Inequalities**	Example: $x \leq -3$ or $x > 1$ 	The graph is the union of solution sets of two inequalities.

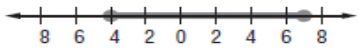
Example 1 **Solve $-3 \leq 2x + 5 \leq 19$. Graph the solution set on a number line.**

$-3 \leq 2x + 5$ and $2x + 5 \leq 19$

$-8 \leq 2x$ $\quad 2x \leq 14$

$-4 \leq x$ $\quad x \leq 7$

$-4 \leq x \leq 7$

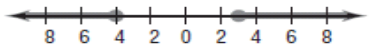


Example 2 **Solve $3y - 2 \geq 7$ or $2y - 1 \leq -9$. Graph the solution set on a number line.**

$3y - 2 \geq 7$ or $2y - 1 \leq -9$

$3y \geq 9$ or $2y \leq -8$

$y \geq 3$ or $y \leq -4$

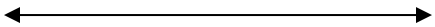


Solve each inequality. Then, graph the solution set on a number line.

27. $-10 < 3x + 2 \leq 14$

28. $3a + 8 < 23$ or $\frac{1}{4}a - 6 > 7$

27. _____



28. _____

29. $18 < 4x - 10 < 50$

30. $5k + 2 < -13$ or $8k - 1 > 19$

29. _____

30. _____

Absolute Value Inequalities

Use the definition of absolute value to rewrite an absolute value inequality as a compound inequality.

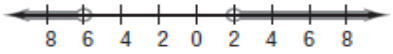
For all real numbers a and b, $b > 0$, the following statements are true.

1. If $|a| < b$, then $-b < a < b$.
2. If $|a| > b$, then $a > b$ or $a < -b$.

These statements are also true for $\leq$ and $\geq$.

Example 1 **Solve $|x + 2| > 4$. Graph the solution set on a number line.**

By statement 2 above, if $|x + 2| > 4$, then $x + 2 > 4$ or $x + 2 < -4$. Subtracting 2 from both sides of each inequality gives $x > 2$ or $x < -6$.



Example 2 **Solve $|2x - 1| < 5$. Graph the solution set on a number line.**

By statement 1 above, if $|2x - 1| < 5$, then $-5 < 2x - 1 < 5$. Adding 1 to all three parts of the inequality gives $-4 < 2x < 6$. Dividing by 2 gives $-2 < x < 3$.

Solve each inequality. Then, graph the solution set on a number line.

31. $|3x + 4| < 8$

32. $|4s| + 1 \geq 27$

31. _____

32. _____

Find each value if $f(x) = -2x + 4$ and $g(x) = x^3 - x$

33. $f(12)$

34. $f(2b)$

35. $g(-2)$

36. $g(7c)$

33. _____

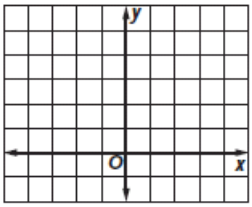
34. _____

35. _____

36. _____

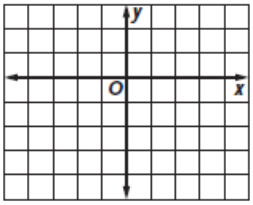
Graph each relation or equation and find the domain and range. Then determine whether the relation or equation is a function.

37. $\{(1,3),(-3,5),(-2,5),(2,3)\}$



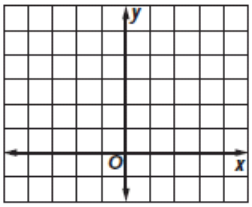
Domain: _____
Range: _____
Function? Yes or No

38. $\{(3,-4),(1,0),(2,-2),(3,2)\}$



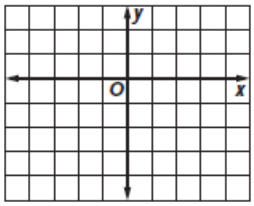
Domain: _____
Range: _____
Function? Yes or No

39. $y = x^2 - 1$



Domain: _____
Range: _____
Function? Yes or No

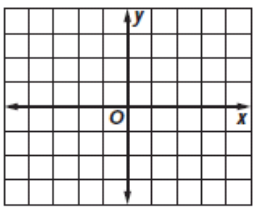
40. $y = x - 4$



Domain: _____
Range: _____
Function? Yes or No

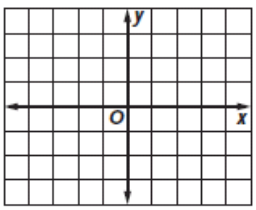
Determine the x-intercept and y-intercept of each equation. Then graph the line.

41. $x + 3y = 6$



y-intercept: _____
x-intercept: _____

42. $5y - x = 10$



y-intercept: _____
x-intercept: _____

Example 1 **Determine the slope of the line that passes through (2, −1) and (−4, 5).**

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope formula

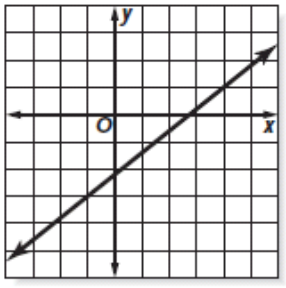
$= \frac{5 - (-1)}{-4 - 2}$ $(x_1, y_1) = (2, -1), (x_2, y_2) = (-4, 5)$

$= \frac{6}{-6} = -1$ Simplify.

The slope of the line is -1.

Example 2 **Graph the line passing through (−1, −3) with a slope of $\frac{4}{5}$.**

Graph the ordered pair (−1, −3). Then, according to the slope, go up 4 units and right 5 units. Plot the new point (4,1). Connect the points and draw the line.



Find the slope of the line that passes through each pair of points.

43. (**4**, **7**) and (**6**, **13**) 44. (**6**, **4**) and (**3**, **4**) 43. _____

44. _____

45. (**5**, **1**) and (**7**, –**3**) 46. (–**1**, –**4**) and (–**1**, **5**) 45. _____

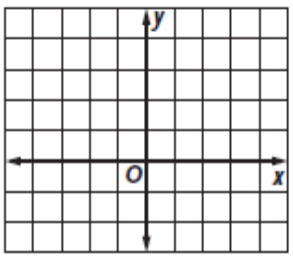
46. _____

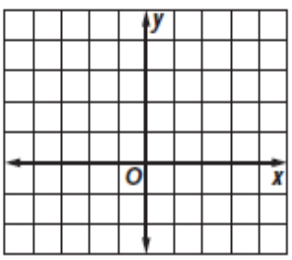
47. (**7**, –**2**) and (**3**, **3**) 48. (–**5**, **9**) and (**5**, **5**) 47. _____

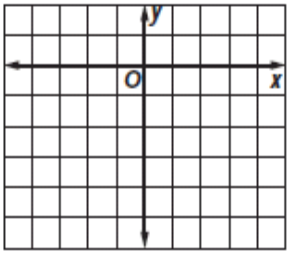
48. _____

Graph the line passing through the given point with the given slope.

49. slope = $\frac{\mathbf{1}}{\mathbf{3}}$ and (**0**, **2**) 50. slope = **2** and (**1**, **4**) 51. slope = **0** and (–**2**, –**5**)







Example 1 **Write an equation in slope-intercept form for the line that has slope -2 and passes through the point $(3, 7)$.**

Substitute for m, x, and y in the slope-intercept form.

$y = mx + b$	Slope-intercept form
$7 = (-2)(3) + b$	$(x, y) = (3, 7)$, $m = -2$
$7 = -6 + b$	Simplify.
$13 = b$	Add 6 to both sides.

The y-intercept is 13. The equation in slope-intercept form is $y = -2x + 13$.

Example 2 **Write an equation in slope-intercept form for the line that has slope $\frac{1}{3}$ and x-intercept 5.**

$y = mx + b$	Slope-intercept form
$0 = \left(\frac{1}{3}\right)(5) + b$	$(x, y) = (5, 0)$, $m = \frac{1}{3}$
$0 = \frac{5}{3} + b$	Simplify.
$-\frac{5}{3} = b$	Subtract $\frac{5}{3}$ from both sides.

The y-intercept is $-\frac{5}{3}$. The slope-intercept form is $y = \frac{1}{3}x - \frac{5}{3}$.

Write an equation in slope-intercept form for the line that satisfies each set of conditions.

52. slope = $-\mathbf{2}$ and $(\mathbf{-4}, \mathbf{6})$

53. slope = $\frac{\mathbf{3}}{\mathbf{2}}$, y-intercept **4**

54. slope = $\frac{\mathbf{-13}}{\mathbf{5}}$ and $(\mathbf{5}, \mathbf{-7})$

52. _____

53. _____

54. _____

Example 1 **Write an equation of the line that passes through (8, 2) and is perpendicular to the line whose equation is $y = -\frac{1}{2}x + 3$.**

The slope of the given line is $-\frac{1}{2}$. Since the slopes of perpendicular lines are negative reciprocals, the slope of the perpendicular line is 2.

Use the slope and the given point to write the equation.

$y - y_1 = m(x - x_1)$	Point-slope form
$y - 2 = 2(x - 8)$	$(x_1, y_1) = (8, 2)$, $m = 2$
$y - 2 = 2x - 16$	Distributive Prop.
$y = 2x - 14$	Add 2 to each side.

An equation of the line is $y = 2x - 14$.

Example 2 **Write an equation of the line that passes through $(-1, 5)$ and is parallel to the graph of $y = 3x + 1$.**

The slope of the given line is 3. Since the slopes of parallel lines are equal, the slope of the parallel line is also 3.

Use the slope and the given point to write the equation.

$y - y_1 = m(x - x_1)$	Point-slope form
$y - 5 = 3(x - (-1))$	$(x_1, y_1) = (-1, 5)$, $m = 3$
$y - 5 = 3x + 3$	Distributive Prop.
$y = 3x + 8$	Add 5 to each side.

An equation of the line is $y = 3x + 8$.

Write an equation in slope-intercept form for the line that satisfies each set of conditions.

55. passes through $(-4, 2)$, parallel to the line whose equation is $y = \frac{1}{2}x + 5$ 55. _____

56. passes through $(3, 1)$, perpendicular to the graph of $y = -3x + 2$ 56. _____

57. passes through $(1, -1)$, parallel to the line that passes through $(4, 1)$ and $(2, -3)$

57. _____

58. passes through $(4, 7)$, perpendicular to the line that passes through $(3, 6)$ and $(3, 15)$

58. _____

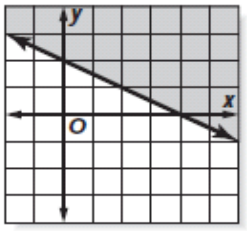
Graphing Inequalities

Graph Linear Inequalities. A **linear inequality**, like $y \geq 2x - 1$, resembles a linear equation, but with an inequality sign instead of an equals sign. The graph of the related linear equation separates the coordinate plane into two half-planes. The line is the boundary of each half-plane.

To graph a linear inequality, follow these steps.

1. Graph the boundary, that is, the related linear equation. If the inequality symbol is $\leq$ or $\geq$, the boundary is solid. If the inequality symbol is $<$ or $>$, the boundary is dashed.
2. Choose a point not on the boundary and test it in the inequality. (0, 0) is a good point to choose if the boundary does not pass through the origin.
3. If a true inequality results, shade the half-plane containing your test point. If a false inequality results, shade the other half-plane.

Example **Graph $x + 2y \geq 4$.**



The boundary is the graph of $x + 2y = 4$.

Use the slope-intercept form, $y = -\frac{1}{2}x + 2$, to graph the boundary line.

The boundary line should be solid.

Now test the point (0, 0).

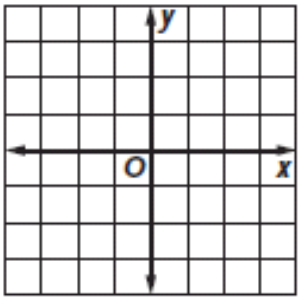
$0 + 2(0) \stackrel{?}{\geq} 4$ $(x, y) = (0, 0)$

$0 \geq 4$ false

Shade the region that does *not* contain (0, 0).

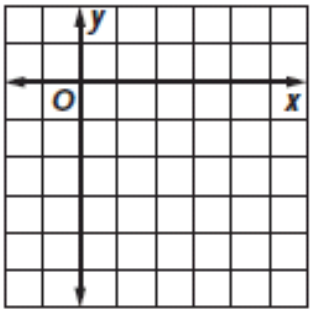
Graph each inequality.

59. $y < 3x + 1$



Is (0,0) a solution?

60. $y \geq x - 5$



Is (0,0) a solution?

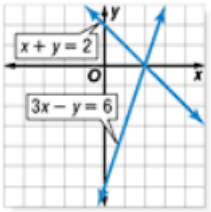
Lesson 3–1

Example 1 Solve by Graphing

Solve the system of equations by graphing.

$x + y = 2$

$3x - y = 6$



Write each equation in slope–intercept form.

$x + y = 2 \quad \rightarrow \quad y = -x + 2$

$3x - y = 6 \quad \rightarrow \quad y = 3x - 6$

The graphs appear to intersect at (2, 0).

Check Substitute the coordinates into each equation.

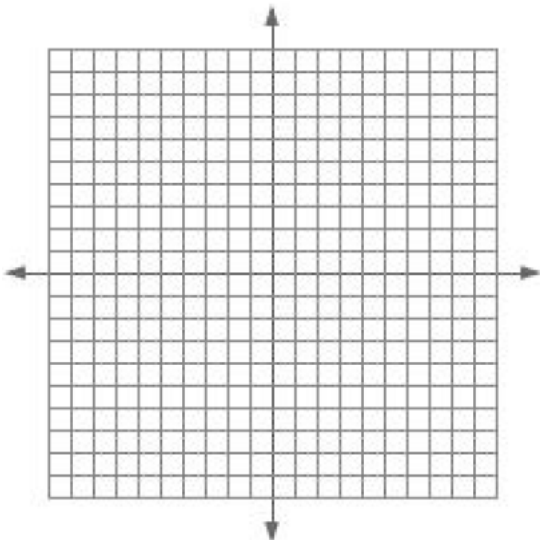
$x + y = 2$	$3x - y = 6$	Original equations
$2 + 0 \stackrel{?}{=} 2$	$3(2) - 0 \stackrel{?}{=} 6$	Replace x with 2 and y with 0.
$2 = 2$ ✓	$6 - 0 \stackrel{?}{=} 6$	Simplify.
	$6 = 6$ ✓	

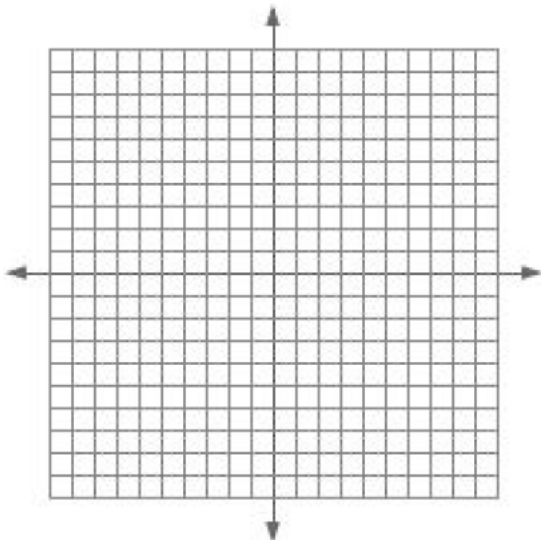
The solution of the system is (2, 0).

Solve the following system of equations graphically.

61. $2x - y = 7$
$3x + y = 8$

62. $4x - y = 6$
$2x - \frac{y}{2} = 4$





Solution:

Solution:

Example 1 **Solve by Using Substitution**

Use substitution to solve the system of equations.

$2x - y = -5$
$3y - 5x = 14$

Solve the first equation for y in terms of x.

$2x - y = -5$	First equation
$-y = -5 - 2x$	Subtract $2x$ from each side.
$y = 5 + 2x$	Multiply each side by -1.

Substitute $5 + 2x$ for y in the second equation and solve for x.

$3y - 5x = 14$	Second equation
$3(5 + 2x) - 5x = 14$	Substitute $5 + 2x$ for y.
$15 + 6x - 5x = 14$	Distributive Property
$15 + x = 14$	Simplify.
$x = -1$	Subtract 15 from each side.

Now, substitute the value for x in either original equation and solve for y.

$2x - y = -5$	First equation
$2(-1) - y = -5$	Replace x with -1.
$-2 - y = -5$	Simplify.
$-y = -3$	Add 2 to each side.
$y = 3$	Multiply each side by -1.

The solution of the system is $(-1, 3)$.

Example 4 **Multiply, Then Use Elimination**

Use the elimination method to solve the system of equations.

$2x + 3y = 6$
$5x - 5y = 65$

Multiply the first equation by 5 and the second equation by 2. Then subtract the equations to eliminate the x variable.

$2x + 3y = 6$	Multiply by 5.	$10x + 15y = 30$	
$5x - 5y = 65$	Multiply by 2.	$(-)\ 10x - 10y = 130$	
		$25y = -100$	Subtract the equations.
		$y = -4$	Divide each side by 25.

Replace y with -4 and solve for x.

$2x + 3y = 6$	First equation
$2x + 3(-4) = 6$	Replace y with -4.
$2x - 12 = 6$	Multiply.
$2x = 18$	Add 12 to each side.
$x = 9$	Divide each side by 2.

The solution is $(9, -4)$.

Solve the following system of equations using substitution.

63. $2x + 2y = 4$
$x - 2y = 0$

63. _____

Solve the following system of equations using elimination.

64. $x - 4y = 4$
$2x + 12y = 13$

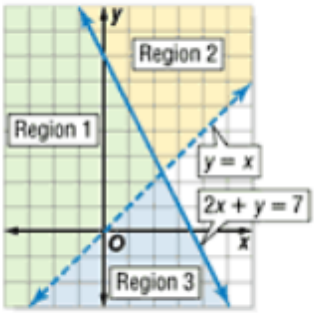
64. _____

Lesson 3–3

Example 1 Intersecting Regions

Solve each system of inequalities by graphing.

a. $y > x$
$2x + y \leq 7$



solution of $y > x$ → Regions 1 and 2
solution of $2x + y \leq 7$ → Regions 1 and 3

The intersection of these regions is Region 1, which is the solution of the system of inequalities. Notice that the solution is a region containing an infinite number of ordered pairs.

Find the coordinates of the vertices of the figure formed by each system of inequalities.

65. $x - y \leq 2$
$x + y \leq 2$
$x \geq -2$

65. _____