



Algebra 1 Honors & Dual Enrollment Summer Homework

Name _____

Dear Future Algebra 1 Honors Student,

I hope you are excited for your upcoming year in Algebra 1! Algebra allows us to describe the world around us in a very precise and accurate manner. It allows us to make predictions, and model situations that vary over time. This branch of mathematics is foundational for all other areas of math. Your level of success in Algebra 1 will directly correlate to how successful you will be in your future math experiences.

As you probably know, your high school mathematics classes are cumulative. This means that you will need to utilize concepts previously learned to be successful. The purpose behind this summer homework packet is to acquaint you with the necessary skills to be successful in this year's math course.

At first glance this packet may seem overwhelming. However, there are approximately 9 weeks of summer. Pace yourself. Complete 15 to 20 problems of this packet per week and you will easily be able to complete the assignment before your return to school in the fall. Please be prepared to submit this assignment during your **second Algebra 1 class. It will be graded for accuracy as well as completion.** Work needs to be shown in a neat and organized manner, and it is perfectly acceptable to complete the packet on separate sheets of paper. Just be sure to staple any extra papers to the packet. Also, **do not** rely on a calculator. Please use paper and pencil techniques ONLY.

Show ALL work for each problem and take your time. Remember, this will be your first impression to your new math teacher, and you want to make sure that it is a positive one! See below for directions and helpful websites. We hope you have a wonderful summer!

Best,

Wareham High School Math Department

Need help with your Summer math packet???

Feel free to email Mrs. Medina at mmedina@wareham.k12.ma.us with any questions you might have. To ensure the fastest response, please include your name, summer assignment name, and (if possible) a picture of the problem and your accompanying work.

Directions:

- Before answering any questions, read through the given notes and examples for each topic.
- This packet is to be submitted during your **second** algebra class period.
- All work must be shown in the packet or on a separate sheet of paper stapled to the packet.
- **To avoid a penalty on your grade, final answers MUST BE BOXED or CIRCLED.**

Part 1 - Integers

Example: Adding Integers

$$9 + (-4) = ?$$



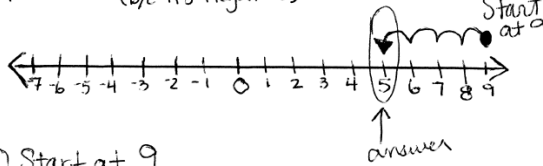
There are 5 unpaired positive numbers, so

$$9 + (-4) = \boxed{5}$$

$$9 + (-4) = ?$$

Start at 9

Move left 4 (b/c it's negative)



- ① Start at 9
- ② Move left (b/c negative) 4
- ③ Since we stop at 5, 5 is the answer.

Use the number line below to help you with the problems that follow for addition and subtraction.

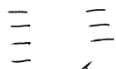


$-3 + -5 = \underline{\quad}$	$8 + -2 = \underline{\quad}$	$7 + -7 = \underline{\quad}$	$-3 + 5 = \underline{\quad}$	$-4 + 9 = \underline{\quad}$
$6 + -13 = \underline{\quad}$	$-5 + 5 = \underline{\quad}$	$-6 + 6 = \underline{\quad}$	$5 + -3 = \underline{\quad}$	$13 + -4 = \underline{\quad}$
$8 + -9 = \underline{\quad}$	$-5 + -6 = \underline{\quad}$	$-14 + 6 = \underline{\quad}$	$-1 + 10 = \underline{\quad}$	$1 + -10 = \underline{\quad}$
$-12 + 0 = \underline{\quad}$	$13 + -13 = \underline{\quad}$	$10 + -20 = \underline{\quad}$	$8 + -16 = \underline{\quad}$	$-12 + 25 = \underline{\quad}$
$-3 + 7 = \underline{\quad}$	$-6 + -2 = \underline{\quad}$	$-47 + 47 = \underline{\quad}$	$100 + -25 = \underline{\quad}$	$-77 + 78 = \underline{\quad}$

Example: Subtracting Integers

$$-5 - 3 = ?$$

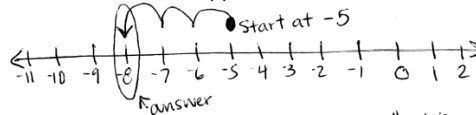
$$-5 + (-3) = -8$$



There are 8 unpaired negative numbers, so $-5 + (-3) = \boxed{-8}$.

$$-5 - 3 = ?$$

Rewrite as an addition problem by adding the opposite $\Rightarrow -5 + (-3)$



- ① Rewrite as an addition problem by "adding the opposite"
- ② Start at -5
- ③ Move left (b/c 3 is negative) 3
- ④ Since we stop at -8, -8 is the answer.

Rewrite each as an addition problem and evaluate. The first two have been done for you.

$6 - 8 =$ $6 + (-8) = \underline{-2}$	$-4 - (-8) =$ $-4 + (+8) = \underline{4}$	$5 - 9 =$	$8 - 5 =$	$-3 - 6 =$
$-8 - 8 =$	$4 - 9 =$	$-5 - 3 =$	$-9 - 4 =$	$4 - 7 =$
$7 - 2 =$	$-1 - 6 =$	$-5 - 4 =$	$6 - (-8) =$	$-6 - (-8) =$
$-3 - (-7) =$	$-1 - (-8) =$	$-14 - (-4) =$	$17 - (-8) =$	$14 - (-5) =$

Part 2 - Order of Operations

<p>P</p> <p>E</p> <p><u>MD</u> →</p> <p><u>AS</u> →</p>	<p>Grouping Symbols</p> <p>Exponents</p> <p>Multiply & Divide (left to right)</p> <p>Add & Subtract (left to right)</p>	<p><i>Example 1:</i></p> $8 - 3 \cdot 2 - 33 \div 11 =$ $8 - 6 - 3 =$ $2 - 3 =$ -1	<p><i>Example 2:</i></p> $5 \cdot 2^2 - 2^3(-6 + 3) =$ $5 \cdot 2^2 - 2^3(-3) =$ $5 \cdot 4 - 8(-3) =$ $20 - (-24) =$ $20 + (+24) =$ $\mathbf{44}$
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Evaluate the problems below. Be sure to use order of operations and circle your final answer

1. $8(-2) - (-4)^2 =$	2. $-4(1 + 5)^2 \div 6 - (42 + 5) =$
3. $-12^2 \div 4 - 3 \cdot 2^4 =$	4. $8 - 4(2 + 5^2) \div 12 =$
5. $(-3)^2 \cdot (5 - 7)^2 - (-9) \div 3 =$	6. $(-1) \cdot (2 - 6)^2 \div 8 + 8 - 3 \cdot 4 =$

Part 3 – Algebraic Expressions

An *algebraic expression* is a mathematical number sentence that contains operations of numbers and variables.

<p><i>Example 1:</i> sum of <u>a number and 14</u> 'a number' = x 'and' = + '14' = 14 Answer: $x + 14$</p>	<p><i>Example 2:</i> <u>6 less than a number t</u> '6' = 6 'less than' = - 'a number t' = t Answer: $t - 6$</p>	<p><i>Example 3:</i> <u>7 more than 11 times a number</u> '7 more than' = $7 +$ '11 times' = $11 \cdot$ 'a number' = x Answer: $7 + 11x$</p>	<p><i>Example 4:</i> Mr. Skelly purchased some groceries that cost d dollars. He paid with a \$50 bill. Write an expression for the amount of change he will receive. $50 - d$</p>
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Write an algebraic expression for each verbal expression written below. Be sure to **underline** your key words.

7. x more than 7	8. a number less 35	9. 5 times a number
10. one third of a number	11. f divided by 10	12. the quotient of 45 and r
13. three times a number plus 16	14. 18 decreased by 3 times d	15. k squared minus 11
16. The volume of a cylinder is π times the radius r squared times the height h . Write an expression for the volume.	17. Jocelyn makes x dollars per hour working at the grocery store and n dollars per hour babysitting. Write an expression that describes her earnings if she babysat for 25 hours and worked at the grocery store for 15 hours.	

Part 4 – Simplifying Expressions

<p><i>Example 1:</i></p> $n - 7n$ $= 1n - 7n$ $= 1n + (-7n)$ $= -6n$ <p style="margin-left: 150px;"><i>fill in a '1' in front of variables with no coefficient</i> <i>rewrite any subtraction by 'adding the opposite'</i> <i>add like you would integers</i></p>		
<p><i>Example 2:</i></p> $x - 10 + 1 + 6x$ $= 1x - 10 + 1 + 6x$ $= 1x + (-10) + 1 + 6x$ $= 1x + 6x + (-10) + 1$ $= 7x + (-9)$ $= 7x - 9$ <p style="margin-left: 150px;"><i>fill in a '1' in front of variables with no coefficient</i> <i>rewrite any subtraction by 'adding the opposite'</i> <i>reorganize by placing variables and constants that are alike together</i> <i>add like you would integers</i> <i>change back to subtraction wherever necessary</i></p>		
18. $10n + 9n =$	19. $13r + 5r =$	20. $v - 1 + 2 =$
21. $8b + b =$	22. $8k - 7k =$	23. $a + 12 + 8a - 9 =$
24. $7r + 3 + 7 + 12r =$	25. $-12m - 7m =$	26. $-x - 8 - 3x =$

Part 5 - Simplifying Expressions with Distributive Property

Example 1:

$$\begin{aligned} & 3x + 2(5x - 7) \\ & = 3x + 2(5x + -7) && \text{rewrite any subtraction by 'adding the opposite'} \\ & = 3x + 10x + -14 && \text{distribute the '2' to each term in the parentheses} \\ & = 13x + -14 && \text{Add like you would integers} \\ & = \mathbf{13x - 14} && \text{change back to subtraction wherever necessary} \end{aligned}$$

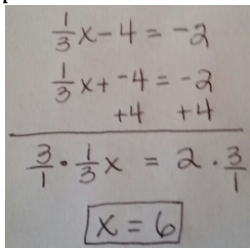
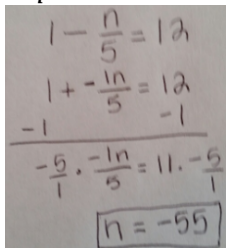
Example 2:

$$\begin{aligned} & 8x - 6(3 - 2x) \\ & = 8x + -6(3 + -2x) && \text{rewrite any subtraction by 'adding the opposite'} \\ & = 8x + -18 + 12x && \text{distribute (multiply) the '-6' to each term in the parentheses} \\ & = 8x + 12x + -18 && \text{reorganize by placing variables and constants that are alike together} \\ & = 20x + -18 && \text{add like you would integers} \\ & = \mathbf{20x - 18} && \text{change back to subtraction wherever necessary} \end{aligned}$$

Simplify the following expressions using the methods shown above.

27. $9 - 3(2x - 4) =$	28. $-5 + 5(x + 4) =$	29. $4(6n + 9) - 10n =$
30. $14 - 3(4n - 1) =$	31. $-8n - 8(-4 - 2n) =$	32. $7k - 2(3k + 1) - 9 =$
33. $-6 + 5(8 - k) - 8k =$	34. $k + 1 - 4(2k - 9) =$	35. $9 - 3(-4 + 3x) + 12x =$

Part 6 - Solving Two Step Equations

<p><i>Example 1:</i></p> $3f + 5 = 20$ $\begin{array}{r} -5 \\ 3f = 15 \\ \hline f = 5 \end{array}$	<p><i>Example 2:</i></p> $2x - 3 = 11$ $\begin{array}{r} +3 \\ 2x = 14 \\ \hline x = 7 \end{array}$	<p><i>Example 3:</i></p> 	<p><i>Example 4:</i></p> 
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Solve the following two-step equations using the methods shown above.

36. $\frac{1}{8}a - 6 = 1$	37. $\frac{x}{4} + 7 = -2$	38. $5y - 4 = 7$
39. $9 - 4m = 19$	40. $\frac{x}{7} - 8 = -10$	41. $6t + 3 = -7$
42. $15 = -15 - 8u$	43. $0 = \frac{1}{6}y + 8$	44. $11 - \frac{1}{10}x = 10$
45. $50 = 8 + \frac{a}{2}$	46. $-10b - 7 = 9$	47. $18 = -\frac{w}{32} + 20$

Part 7 - Solving Equations that Require Distributive Property

Example 1:

$$\begin{aligned}
 2(6k-1) &= -38 \\
 2(6k+1) &= -38 \\
 12k-2 &= -38 \\
 +2 & \quad +2 \\
 \hline
 12k &= -36 \\
 \frac{12k}{12} &= \frac{-36}{12} \\
 \boxed{k} &= \boxed{-3}
 \end{aligned}$$

Example 2:

$$\begin{aligned}
 18x - (8x-7) &= 67 \\
 18x - 1(8x-7) &= 67 \\
 18x - 8x + 7 &= 67 \\
 10x + 7 &= 67 \\
 -7 & \quad -7 \\
 \hline
 10x &= 60 \\
 \frac{10x}{10} &= \frac{60}{10} \\
 \boxed{x} &= \boxed{6}
 \end{aligned}$$

Example 3:

$$\begin{aligned}
 2(9n-1) + 7(n+6) &= -60 \\
 2(9n+1) + 7(n+6) &= -60 \\
 18n-2 + 7n+42 &= -60 \\
 18n+7n-2+42 &= -60 \\
 25n+40 &= -60 \\
 -40 & \quad -40 \\
 \hline
 25n &= -100 \\
 \frac{25n}{25} &= \frac{-100}{25} \\
 \boxed{n} &= \boxed{-4}
 \end{aligned}$$

Solve the following equations using the distributive property.

48. $3(2x + 5) = 39$	49. $8(7 - y) = -24$	50. $-4(8 + 5n) = 8$
51. $6(3x - 5) - 7x = 25$	52. $-2(5 + 6m) + 16 = -90$	53. $15(t + 2) + 9t = 6$
54. $7w - 3(4w + 8) = 11$	55. $-3(3x + 15) - (10 + x) = 35$	56. $11(4 - 6y) + 5(13y + 1) = 9$

Part 8 - Solving Equations with Variables on Both Sides

Example 1:

$$\begin{array}{r} 8u = 3u + 35 \\ -3u \quad -3u \\ \hline 5u = \frac{35}{5} \\ \boxed{u = 7} \end{array}$$

Example 2:

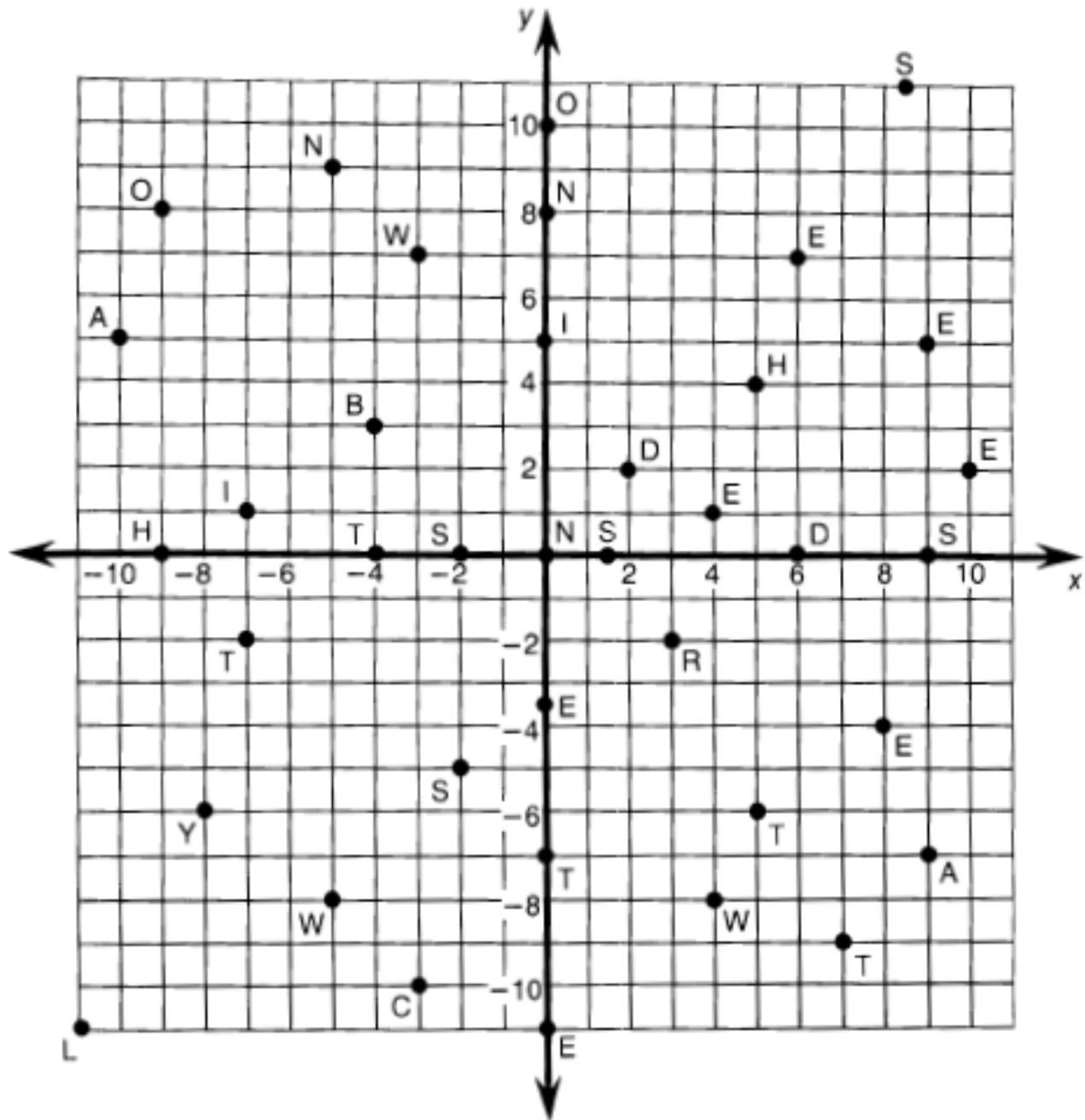
$$\begin{array}{r} -15v - 40 = 23 - 8v \\ -15v + 40 = 23 + 8v \\ +8v \qquad \qquad +8v \\ \hline -7v + 40 = 23 \\ +40 \quad +40 \\ \hline -7v = \frac{63}{-7} \quad -7 \\ \boxed{v = -9} \end{array}$$

Solve the following equations using the examples above as guidance.

57. $7y = 33 - 4y$	58. $2x + 48 = 10x$	59. $5t - 26 = 18t$
60. $-30n = -27n - 63$	61. $\frac{3}{2}(x + 4) - 3 = 10 - 2x$	62. $.1n - 2n = .2(n - 3)$
63. $\frac{1}{3}x - 2 = 6x + \frac{7}{3}$	64. $\frac{4}{5}(x - 2) = \frac{1}{5}x + 2$	65. $\frac{4}{5}(x - 2) = \frac{1}{3}(x + 4)$

What Happened After a Burglar Broke Into a Tuba Factory ?

Each ordered pair at the bottom of the page represents a point on the coordinates below. Above each ordered pair, write the letter that appears at that point.



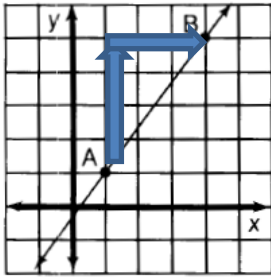
(5, 4)(10, 2)(-3, 7)(-10, 5)(-2, -5)(-3, -10)(3, -2)(8, -4)(6, 0)(0, 5)(-4, 0)(0, -11)(2, 2)

(-5, -8)(-7, 1)(7, -9)(-9, 0)(-7, -2)(4, -8)(6, 7)(-5, 9)(0, -7)(-8, -6)(0, 10)(0, 0)(9, 5)

(9, 0)(5, -6)(-9, 8)(-11, -11)(4, 1)(0, 8)(-4, 3)(9, -7)(-2, 0)(8.5, 11)(0, -3.5)(1.5, 0)

Part 10 - Slope

Example 1 - Find the slope of a graph:



1. Choose 2 points on the line. We'll use A and B.
2. To get from point A to point B we have to rise up 4 and go to the right 3.
3. $Slope = \frac{\Delta y}{\Delta x} = \frac{Rise}{Run} = \frac{4}{3}$

*NOTE: Up and right yield positive values, while down and left yield negative values.

Example 2 - Find slope from 2 points:

$$\begin{array}{c} \Delta y = +2 \\ \text{---} \curvearrowright \text{---} \\ (2, 1) \text{ and } (-1, 3) \\ \text{---} \curvearrowleft \text{---} \\ \Delta x = -3 \end{array}$$

$$Slope = \frac{Rise}{Run} = \frac{\Delta y}{\Delta x} = \frac{2}{-3} = -\frac{2}{3}$$

Example 3 - Find slope from a table:

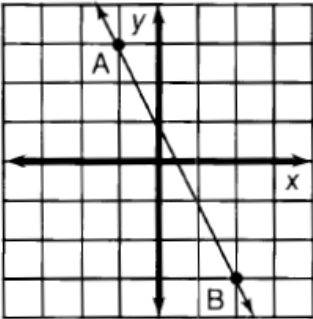
x	y
10	1
-2	-5
4	-2
-8	-8

$$\Delta x = -12 \quad \Delta y = -6$$

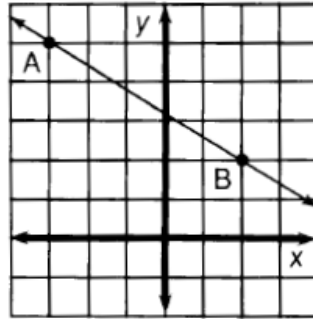
$$Slope = \frac{Rise}{Run} = \frac{\Delta y}{\Delta x} = \frac{-6}{-12} = \frac{1}{2}$$

Find the slope of the following graphs. Use example 1 to help you.

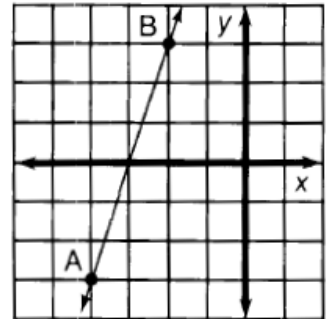
66.



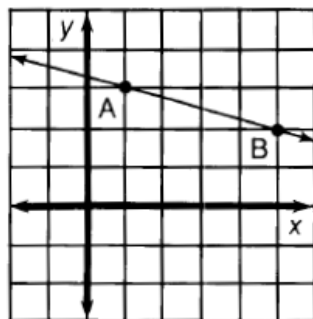
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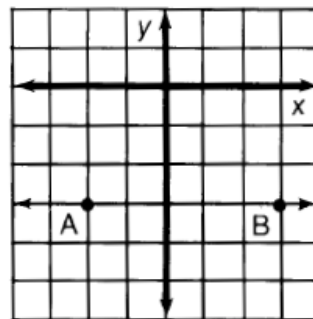
68.



69.



70.



Find the slope of the following points. Use example 2 to help you.

71. (9, 2) and (3, -1)

72. (-4, -8) and (-2, 0)

73. (8, 3) and (2, 5)

74. (-5, 8) and (-4, 2)

75. (-3, -3) and (0, 0)

76. (1, -4) and (6, -2)

77. (0, -1) and (4, -7)

78. (2, 5) and (9, 1)

79. (-3, 1) and (-7, 4)

Find the slope of the following tables. Use example 3 from the previous page to help you.

80. $y = -2x$

x	y
1	-2
4	-8
-5	10
3	-6

81. $y = -x + 6$

x	y
4	2
-1	7
6	0
0	6

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

x	y
4	-8
2	-5
0	-2
-2	1

83. $y = 4 + 2x$

x	y
3	10
-7	-10
1	6
-3	-2

84. $y = 7 - 3x$

x	y
6	-11
1	4
0	7
-2	13

85. $y = -3x + 1$

x	y
3	-8
-3	10
4	-11
-2	7

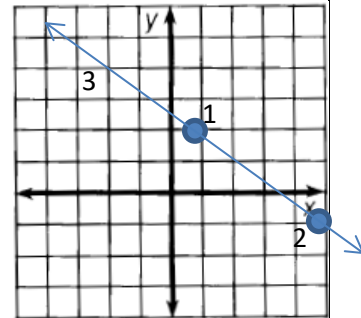
Part 11 - Graphing Linear Equations using Slope and Y-intercept

Example 1:

Graphing equations is easy when the equation is in the form $y = mx + b$ where 'm' is the slope and 'b' is the y-intercept. The slope is a measure of how steep the line is, and the y-intercept is where the line intersects the y-axis. To graph the line $y = -\frac{3}{4}x + 2$, identify the slope and y-intercept. The slope is $-\frac{3}{4}$, and the y-intercept is

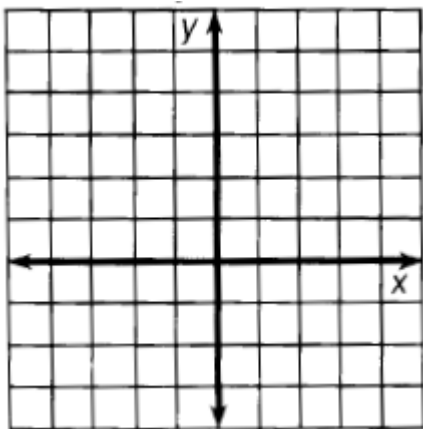
2.

1. Plot a point on the y-axis at 2, since 2 is the y-intercept. (See 1)
2. Place your pencil on that point and count **down 3** and to the **right 4**, since the slope is $-\frac{3}{4}$. (Note: If the slope were $\frac{3}{4}$, you would count **up 3** and to the **right 4**.) (See 2)
3. Use a ruler to draw a line across the whole graph through the two points. (See 3)

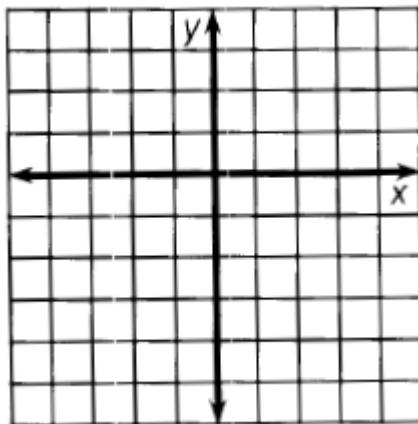


Graph the following linear equations on the coordinate planes provided. Use the example above to guide your work.

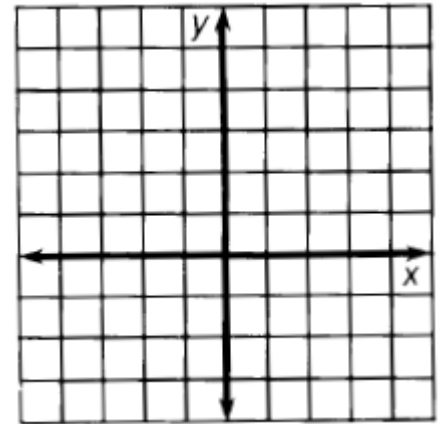
86. $y = \frac{2}{3}x + 1$



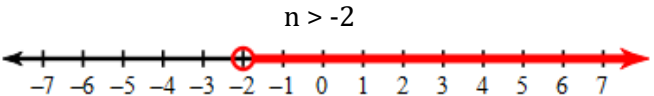
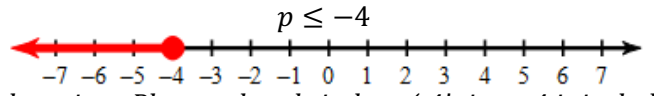
87. $y = \frac{1}{2}x - 3$



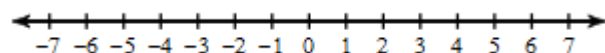
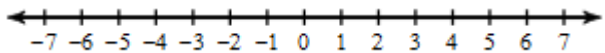
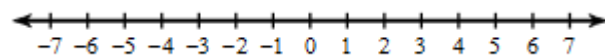
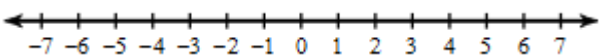
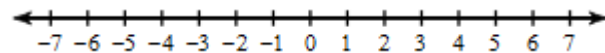
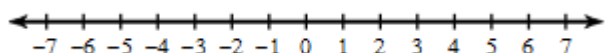
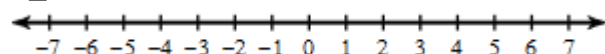
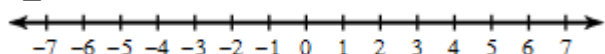
88. $y = -\frac{3}{2}x + 3$

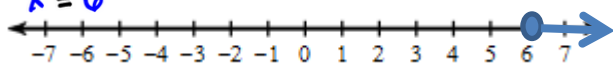
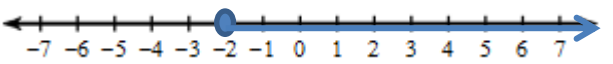


Part 12 - Solving & Graphing Inequalities

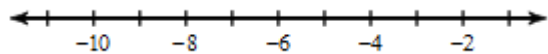
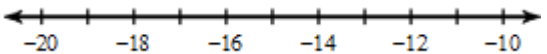
$>$	$<$	\geq	\leq
Greater than Open circle	Less than Open circle	Greater than or equal to Closed circle	Less than or equal to Closed circle
<p><i>Example 1:</i> Graph the solution set of the inequality on the given number line.</p> <p style="text-align: center;">$n > -2$</p>  <p><i>Explanation:</i> Place an open circle at '-2' since -2 is not included in the solution set of n. Shade an arrow pointing to all numbers greater than -2 (to the right).</p>		<p><i>Example 2:</i> Graph the solution set of the inequality on the given number line.</p> <p style="text-align: center;">$p \leq -4$</p>  <p><i>Explanation:</i> Place a closed circle at '-4' since -4 is included in the solution set of p. Shade an arrow pointing to all numbers less than -4 (to the left).</p>	

Graph the solution set of the following inequalities on the given number lines.

89. $n < 4$	90. $k < -5$
	
91. $x \geq -3$	92. $b \geq -2$
	
93. $m > -1$	94. $a \leq 6$
	
95. $x \leq 3$	96. $r \geq 4$
	

<p><i>Example 3:</i> Solve and graph the inequality below.</p> $2x - 5 \geq 7$ $\underline{+5 \quad +5}$ $2x \geq 12$ $\underline{\frac{2x}{2} \geq \frac{12}{2}}$ $x \geq 6$ <p style="text-align: center;"><i>Solve just as you would an equation.</i></p> 	<p><i>Example 4:</i> Solve and graph the inequality below.</p> $-3x \leq 6$ $\underline{-3x \geq 6}$ $\underline{\frac{-3x}{-3} \geq \frac{6}{-3}}$ $x \geq -2$ <p style="text-align: center;"><i>Solve just as you would an equation. NOTE! If you multiply or divide by a negative number, you MUST flip the inequality symbol.</i></p> 
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Solve and graph the following inequalities

97. $3 + \frac{m}{2} \leq 1$	98. $-8 + \frac{k}{-4} < -5$
	
99. $-6v - 7 \leq -31$	100. $\frac{k}{4} - 7 \leq -9$
