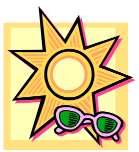
Gearing Up for Honors Geometry!

Honors Geometry is right around the corner and you need to make sure you are ready! Many of the concepts you learned in Algebra I will be used in Geometry and you will be expected to remember them. Please take some time this summer and work through this review packet. Refreshing your memory of the concepts learned in Algebra I will help you hit the ground running in Geometry in the fall. Even though no one likes to do "homework" over summer vacation, putting in a little time up front will definitely help



pay off next year. This packet is designed to take about a couple hours to do the entire thing so spread out the work. If you do a little each day, it will be done in no time! It will be collected next fall by your Honors Geometry teacher in preparation for our first test. Have a great summer, looking forward to meeting you in September!! ~Mrs. Vernier (Honors Geometry teacher at North)

Topics Covered in Algebra I that you need to know for Honors Geometry

- Solving Linear Equations
- Solving Systems of Equations
- Factoring
- Solving Quadratic Equations
- Simplifying Radicals
- Distance Formula
- Midpoint Formula
- Pythagorean Theorem
- Graphing Lines
- Writing Equations of Lines

Plus more!!

Topics Covered in Middle School that you need to know for Geometry

Lots of what you will learn in Geometry next year has already been introduced to you during your elementary and middle school math experiences. A basic understanding of shapes, terminology, and simple area and volume formulas in addition to a good memory of concepts learned in Algebra I will keep you on the road to success in Geometry.

Thinking Skills Needed for Geometry

Geometry requires a different type of thinking than Algebra I. Algebra I is mostly a procedural course. A step-by-step method is taught for how to solve a particular problem and you get lots of practice mastering these skills on similar problems. In Geometry, success depends more on your ability to think logically and figure out problems that you may not have seen an exact replica of before.

- Spatial relation skills
- Problem solving skills
- Logical thinking

SOLVING EQUATIONS

Solving Linear Equations: SHOW ALL WORK and NO DECIMAL ANSWERS!

1. $x+3=23$	**2.** $19 = y-15$	**3.** $24 = 3a$
4. $44 = -4w$	**5.** $\frac{1}{3}k = -2$	**6.** $30 = -\frac{4}{3}w$
7. $5x+3=23$	**8.** $8-5w=-37$	**9.** $\frac{x}{2}+4=3$
10. $4x-9=7x+12$	**11.** $5x-22-7x+2=40$	**12.** $2x=x+3$
13. $4(180-x)=90-x$	**14.** $2(180-x)+45=3x$	**15.** $2(90-x)+180-x=45$

16. $\frac{4}{3}x+2(3-x)=5$	**17.** $2x-3(x+4)=-1$	**18.** $\frac{2x-5}{7}=4$
19. $8(y-2)+6=2(y+1)$	**20.** $\frac{1}{2}z-\frac{3}{4}=z-\frac{5}{8}$	**21.** $-3x+4=\frac{1}{3}x-\frac{8}{3}$

Solving Proportions: SHOW ALL WORK and NO DECIMAL ANSWERS!

Remember to solve proportions using cross multiplication. Here is an **EXAMPLE** if you are stuck:

$$\frac{2+x}{5}=\frac{3x-1}{9}$$

$$9(2+x)=5(3x-1)$$
$$18+9x=15x-5$$
$$18=6x-5$$
$$23=6x$$
$$x=\frac{23}{6}\ OR\ 3\,{}^{5}\!/_{6}$$

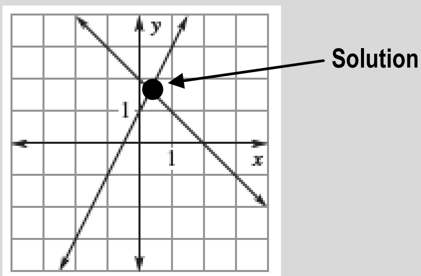
22. $\frac{5}{k}=\frac{7}{16}$	**23.** $\frac{a}{6}=\frac{-5}{2}$	**24.** $\frac{2k}{3}=\frac{k+1}{2}$	**25.** $\frac{j+3}{-5}=\frac{j-2}{3}$

SOLVING SYSTEMS OF EQUATIONS

A system of equations is two equations with two variables, usually x and y. You can't solve each equation individually, but with 2 equations you can use either substitution or elimination to solve. The solution of the system is the ORDERED PAIR that works in both equations. If you remember that each equation represents a line, you are just trying to find the ordered pair where the two lines intersect.

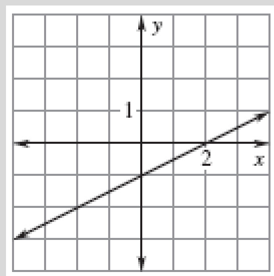
POSSIBILITIES:

One Solution



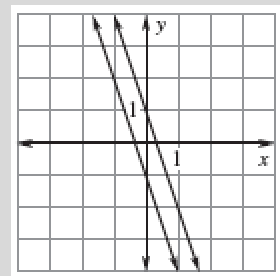
The lines intersect and the solution is the ordered pair where the two lines meet.

Infinite # of Solutions



The lines are exactly the same so lie right on top of each other. The solution is all real numbers or you can just write the equation of the line as the solution because every point on the line works.

No Solution



The lines don't intersect because they are parallel so no solution exists. Your answer would be no solution or Ø.

Solve using the SUBSTITUTION method. Solutions must be written as an ordered pair, no solution Ø, or the equation of the line!

Here is an **EXAMPLE** if you are stuck:

$$y = x - 1 \qquad 2x - y = 1$$

Since y is the same as x−1, we can replace y with x−1 in the second equation!

$$2x - (x-1) = 1$$
$$2x - x + 1 = 1$$
$$x = 0$$

Now that you know x, you can just plug x into either equation to find the value of y.

$$y = (0) - 1$$
$$y = -1$$

SOLUTION: (0, −1)

26. $y = x + 8$ $2y + x = 1$	**27.** $x = \frac{1}{2}y$ $4x - 2y = 12$

28.
$$y = -2x + 5$$
$$3x - 2y = 4$$

29.
$$x + 4y = 5$$
$$5x - 7y = -2$$

Solve using the <u>ELIMINATION</u> method. <u>Solutions must be written as an ordered pair, no solution Ø, or the equation of the line!</u>

Here are two **EXAMPLES** if you are stuck:

Try to eliminate one of the variables by adding or subtracting the equations. Sometimes the equations are all set for you like EXAMPLE A, but then there are those like EXAMPLE B when you will need to force one of the variables to eliminate by multiplying each equation by a number.

A.

$$\begin{array}{r} x + y = 5 \\ + x - y = 1 \\ \hline 2x = 6 \\ x = 3 \end{array}$$

Now that you know x, you can just plug x into either equation to find the value of y.

$$(3) + y = 5$$
$$y = 2$$

SOLUTION: (3, 2)

B.

$$\begin{array}{l} 2x + 4y = -18 \\ 3x - y = 1 \end{array} \Rightarrow \begin{array}{l} 2x + 4y = -18 \\ 4(3x - y = 1) \end{array}$$

$$\begin{array}{r} 2x + 4y = -18 \\ +12x - 4y = 4 \\ \hline 14x = -14 \\ x = -1 \end{array}$$

Now that you know x, you can just plug x into either equation to find the value of y.

$$2(-1) + 4y = -18$$
$$-2 + 4y = -18$$
$$4y = -16$$
$$y = -4$$

SOLUTION: (−1, −4)

30.
$$2x + y = 1$$
$$3x - y = 14$$

31.
$$x - 2y = 6$$
$$x - 3y = 4$$

32. $5x + 3y = -9$ $2x - 5y = -16$	**33.** $x + 2y = 8$ $2x - 3y = -19$

NOW CHOOSE THE METHOD YOU WANT TO USE TO SOLVE THE SYSTEM!

34. $8y = x - 1$ $2x = 10y + 5$	**35.** $8x - 5y = 14$ $10x - 2y = 9$

MULTIPLYING BINOMIALS—FOIL

FOIL- Multiply the FIRST terms, then the OUTER terms, then INNER, and finish with the LAST terms of each grouping. Combine all like terms for your final answer.

Here is an **EXAMPLE** if you are stuck:

$$(x + 2)(x - 3)$$
$$x^2 - 3x + 2x - 6$$
$$x^2 - 1x - 6$$

36. $(x + 2)(x - 2)$	**37.** $(x - 1)^2$	**38.** $(4x + 5y)(2x - 7y)$

FACTORING

FACTORING- For factoring, you break up a polynomial into factors or parts, which is the opposite of multiplying like FOIL. There are many types of factoring so let's separate them into types.

GCF-Greatest Common Factor

Pulling out (dividing by) a GCF is the opposite of distributing. Take out the GCF and then write what is left in parentheses. Here is an **EXAMPLE** if you are stuck:

$$3x^2 - 12x = 3x(x-4)$$

39. $6a^2 + a$	**40.** $2a + 8a^2$	**41.** $2x^3 + 8x^2 + 6x$

DOS-Difference of Perfect Squares

Here is an **EXAMPLE** if you are stuck:

$$x^2 - 36 = (x+6)(x-6)$$

42. $x^2 - 16$	**43.** $4x^2 - 25$	**44.** $16x^2 - 225$

Trinomials

When you factor a trinomial, make sure you find numbers that multiply to the last term and add to the middle term. Watch your signs! FOIL your answer to check! Here are two **EXAMPLES** if you are stuck:

No number in front of the squared term:	**Number in front of the squared term:**
$c^2 + 8c + 12 = (c+6)(c+2)$	$3x^2 + 4x - 7 = (3x+7)(x-1)$

45. $x^2 - 10x + 21$	**46.** $c^2 + c - 42$	**47.** $a^2 - 6a + 8$
48. $x^2 + 18x + 81$	**49.** $9x^2 - 12x + 4$	**50.** $25x^2 + 80x + 64$
51. $2x^2 + 5x + 2$	**52.** $5a^2 - 11a + 2$	**53.** $15k^2 - k - 2$

SOLVING QUADRATICS

Solving Quadratic Equations by Factoring

STEPS for solving a quadratic equation, $ax^2 + bx + c = 0$, by factoring:

1. Get the equation equal to zero
2. Factor
3. Set each factor or part equal to zero
4. Solve each equation algebraically to get the two solutions.

The factoring is mixed in the practice problems below. Here is an **EXAMPLE** if you are stuck:

$$x^2 + 2x - 15 = 0$$

$$(x+5)(x-3) = 0$$

$$x+5=0 \qquad x-3=0$$

$$x=-5 \qquad x=3$$

These 3 examples are already factored for you—just solve!

54. $(x-3)(x+2)=0$	**55.** $(2x+5)(3x-1)=0$	**56.** $7x(3x-2)=0$

Factor and Solve! You should have 2 answers for each.

57. $2x^2+6x=0$	**58.** $x^2-9=0$	**59.** $x^2-x-12=0$
60. $2x^2+3x-2=0$	**61.** $x^2+2x-15=0$	**62.** $x^2+6x+9=0$
63. $4x^2-9=0$	**64.** $x^2+14x=-49$	**65.** $x^2+5x=150$
66. $x^2-19x=0$	**67.** $25x^2=1$	**68.** $3m^2-14m-5=0$

Solving Quadratic Equations using the Quadratic Formula

STEPS for solving a quadratic equation, $ax^2 + bx + c = 0$, using the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. Get the equation equal to zero
2. Determine a, b, and c
3. Plug a, b, and c into the formula
4. Solve algebraically to get the two solutions.

The factoring is mixed in the practice problems below. Here is an **EXAMPLE** if you are stuck:

$2x^2 - 5x - 12 = 0$

a = 2 b = −5 c = −12

1. After making sure that one side is equal to 0, identify a, b, and c. Be sure to include the signs on a, b, and c.

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - (4)(2)(-12)}}{2(2)}$$

2. Fill in the blanks of the formula with the values of a, b, c.

$$x = \frac{5 \pm \sqrt{25 + 96}}{4}$$

$$x = \frac{5 \pm \sqrt{121}}{4}$$

$$x = \frac{5 \pm 11}{4}$$

3. Start under the root and follow the order of operations to simplify.

4. Once the root is simplified, split the problem into two.

$$x = \frac{5+11}{4} and x = \frac{5-11}{4}$$

$$x = \frac{16}{4} \ and \ x = \frac{-6}{4}$$

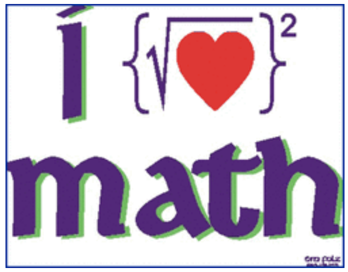
5. If possible, simplify. If not, leave your answer in simplest form.

x = 4 and x = −1.5

Solve using the quadratic formula. Round all answers to the nearest hundredth.

69. $2x^2 - 5x - 2 = 0$	**70.** $x^2 + 4x = -2$

SIMPIFYING RADICALS—NO CALCULATORS THAT DO THE WORK FOR YOU!



Simplify radical expressions:

Break down a radical expression by finding the LARGEST perfect square that divides out of the number under the square root. You might want to review perfect squares:

List the largest perfect squares up to and including 225:

Here is an **EXAMPLE** if you are stuck:

$$\sqrt{50}$$

$$\sqrt{25} \cdot \sqrt{2}$$

$$5\sqrt{2}$$

Simplify the following radical expressions. NO DECIMAL ANSWERS!

71. $\sqrt{12}$	72. $\sqrt{20}$	73. $\sqrt{72}$	74. $\sqrt{200}$
75. $5\sqrt{90}$	76. $2\sqrt{12}$	77. $\sqrt{8} \cdot \sqrt{6}$	78. $\sqrt{5} \cdot \sqrt{15}$

79. $2\sqrt{14} \cdot \sqrt{21}$	**80.** $\sqrt{5} \cdot 3\sqrt{5}$	**81.** $\left(\sqrt{3}\right)^2$	**82.** $\left(2\sqrt{3}\right)^2$

Dividing radical expressions:

You may not leave a radical expression in the denominator of a fraction. If you have a radical in the denominator, you will need to RATIONALIZE THE DENOMINATOR.

Here is an **EXAMPLE** if you are stuck:

$$\frac{1}{\sqrt{3}}$$

$$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Simplify the following radical expressions. NO DECIMAL ANSWERS!

83. $\frac{1}{\sqrt{2}}$	**84.** $\frac{1}{\sqrt{7}}$	**85.** $\frac{3}{\sqrt{5}}$	**86.** $\frac{4}{\sqrt{3}}$

Distance Formula:

Use the distance formula when you want to find the length of a line segment or the distance between 2 ordered pairs.

$$D = \sqrt{\left(x_2 - x_1\right)^2 + \left(y_2 - y_1\right)^2}$$

Find the distance between each set of ordered pairs. Simplify any radical expressions. NO DECIMAL ANSWERS!

87. (9, 7) and (1, 1)	**88.** (0, 6) and (−3, −2)	**89.** (5, 2) and (8, −2)

Midpoint Formula:

Use the midpoint formula when you want to find the midpoint of a line segment with the specified endpoints. Write your answer as an ordered pair.

$$Midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Find the midpoint between each set of ordered pairs.

90. (2, 4) and (6, 8)

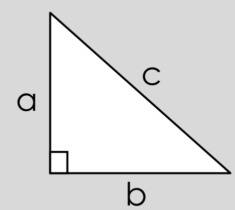
91. (0, 6) and (−3, −2)

92. (−2, 6) and (8, 6)

Pythagorean Theorem:

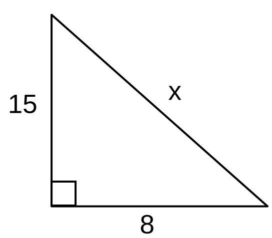
Use the Pythagorean Theorem to find a missing side of a right triangle.

$$a^2 + b^2 = c^2$$

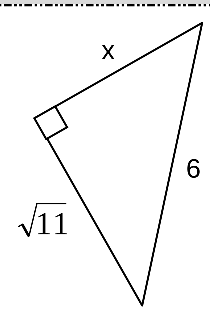


Find the value of x. Simplify all radical expressions. NO DECIMAL ANSWERS!

93.



94.



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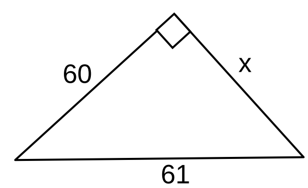


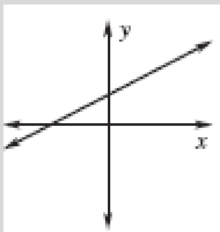
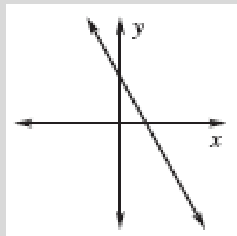
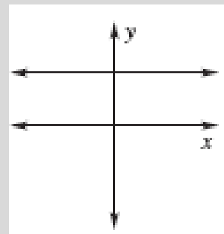
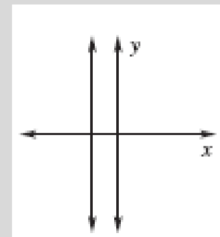
LINEAR EQUATIONS

Slope:

Slope is the measure of the steepness of a line. To find the slope between two ordered pairs, use the following formula:

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

There are four types of slope shown below:

Positive Slope	**Negative Slope**	**Zero Slope**	**Undefined Slope**
			

Find the slope between each set of ordered pairs.

96. (2, 4) and (6, 8)	**97.** (0, 6) and (7, −2)	**98.** (−2, 6) and (8, 6)

Graphing Linear Equations:

For the following linear equations, determine the slope and y-intercept. Then graph the lines on each coordinate plane. See the example below to help if you have forgotten slope-intercept form from Algebra I:

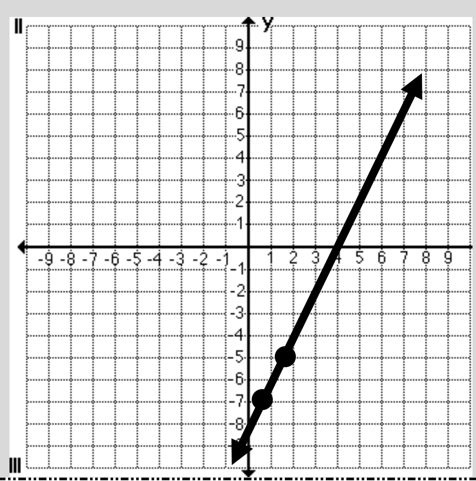
$Slope - Intercept\ Form: y = mx + b$

$Equation\ in\ SIF: \quad y = 2x - 7$

$m = \frac{2}{1} \qquad y - intercept = (0, -7)$

$m = \frac{2}{1} = \frac{up\ 2}{right\ 1}$

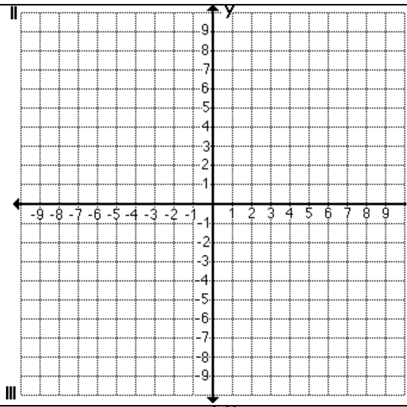
1) Plot the y-intercept.
2) Use the slope to plot another point on the line.
3) Connect the points and draw the line. Put arrows on both ends.



99. $y = x + 3$

m = ______

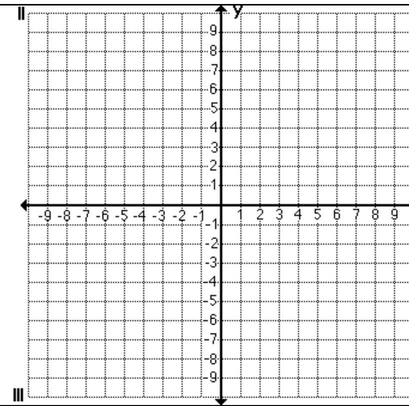
y-intercept = ________



100. $y = -2x - 5$

m = ______

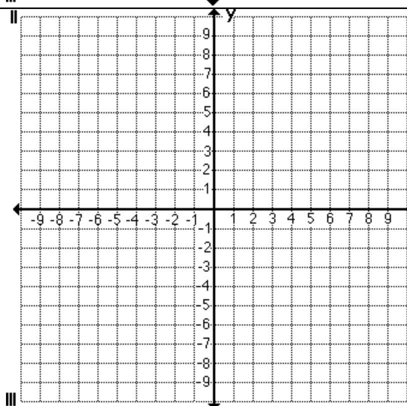
y-intercept = ________



101. $y = -\frac{1}{2}x + 8$

m = ______

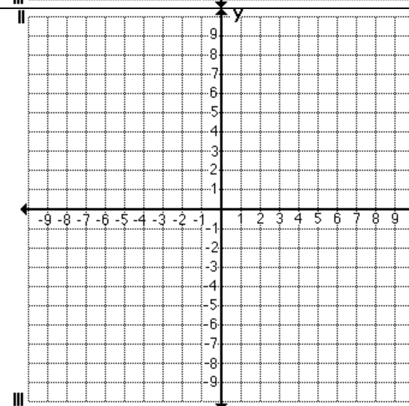
y-intercept = ________



102. $y = \frac{2}{3}x - 6$

m = ______

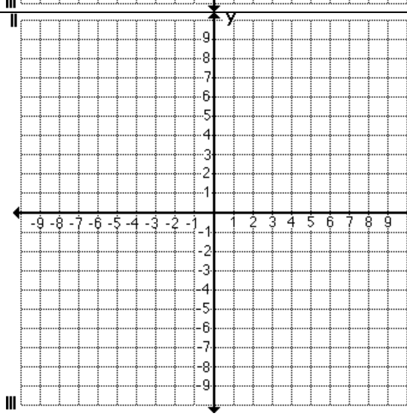
y-intercept = ________



103. $y = -x + 4$

m = ______

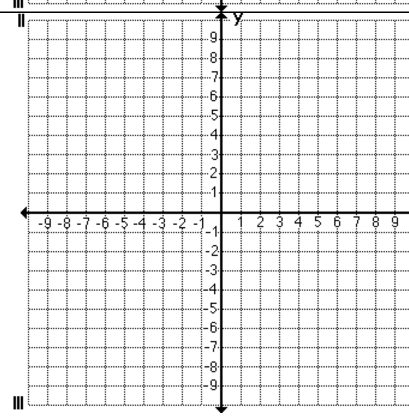
y-intercept = ________



104. $y = \frac{5}{2}x$

m = ______

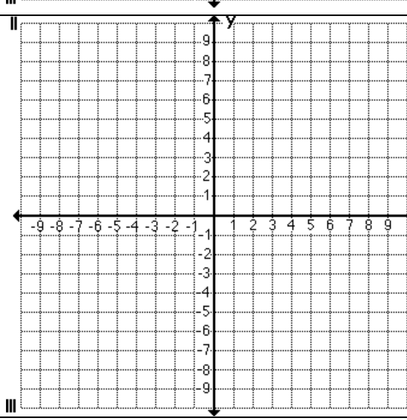
y-intercept = ________



****105.** $x = -6$

m = ______

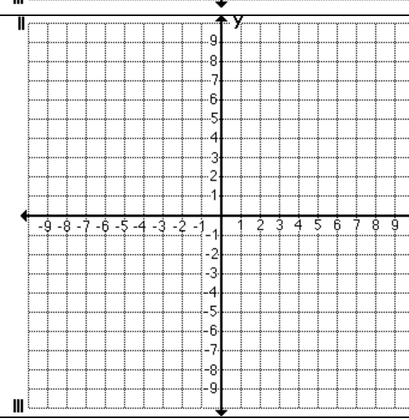
y-intercept = ________



****106.** $y = 3$

m = ______

y-intercept = ________



Writing Equations of Lines in Slope-Intercept Form:

When you write the equation of a line in slope-intercept form, you need both the slope and the y-intercept (where the line touches the y-axis). Sometimes you have this information and sometimes you need to do a little work to find them. Remember that slope-intercept form looks like: $y = mx + b$

There are a couple methods you can use to write an equation in slope intercept form. Use whichever one you like best because both will give you the same equation. Look at the following examples to choose your favorite method:

EXAMPLE:

Write the equation of the line that goes through the points (−1, −2) and (1, 4).

Use only slope-intercept form

1) Find the slope of the line.

$$m = \frac{4-(-2)}{1-(-1)}$$
$$m = \frac{6}{2}$$
$$m = 3$$

2) Find the y-intercept by plugging the slope and one of the ordered pairs into slope-intercept form.

$$m = 3 \quad (1, 4)$$
$$(4) = (3)(1) + b$$
$$4 = 3 + b$$
$$b = 1$$

3) Plug the slope and the y-intercept into slope-intercept form and you are done! ☺

$$y = 3x + 1$$

Use point-slope form to put the equation into slope-intercept form

1) Find the slope of the line.

$$m = \frac{4-(-2)}{1-(-1)}$$
$$m = \frac{6}{2}$$
$$m = 3$$

2) Find the equation of the line in slope-intercept form by plugging in the slope and one of the ordered pairs into point-slope form.

$$m = 3 \quad (1, 4)$$
$$y - y_1 = m(x - x_1)$$

$$y - (4) = (3)(x - (1))$$
$$y - 4 = 3(x - 1)$$
$$y - 4 = 3x - 3$$
$$\quad +4 \qquad +4$$

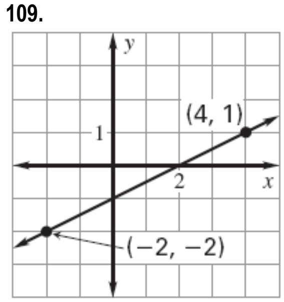
$$y = 3x + 1$$

Write the equation of each line described in slope-intercept form.

107. $m = -\frac{2}{3}, b = 4$

108. $m = 4$ and given point $(5, 3)$

109.



110. $(2, 3)$ and $(2,7)$	111. $(-1,0)$ and $(-3,-1)$	112. $(2,-5)$ and $(-2,3)$