

# The Beginners Guide to Honors Algebra II

A Note To Our Students: WELCOME! This packet is designed to help you make the transition into this challenging course as smooth as possible. The entire content of this suggested practice set will be covered in the first week of school.

Our suggestion: First look through the whole packet and read all the directions. Begin with the problems that you recognize and are confident with—you will notice that every problem is Algebra I material.

For the concepts you are unfamiliar with: **Impress us!!** Show us your resourcefulness and see what you can find. Perhaps try an Algebra book, a math website, a classmate, relative, or anyone you know.

One thing is for sure: The more you do now, the easier it will be when school starts and the more comfortable you will feel with the pace of the class.

Instructions: Feel free to use a calculator to check a solution or two, **but ALL problems are designed to be done without one.** NEATLY show all your work for each problem. You are encouraged to try every problem. This is not a mandatory assignment but is designed to help maximize your success at the beginning of the school year. **BRING THE PACKET ON THE FIRST DAY OF CLASS.** We will be going over any questions or concepts you need help with and will be giving a test on these topics the first week of the year. Give us your best work...while giving yourself the opportunity to get off to a great start.

WE LOOK FORWARD TO MEETING YOU IN AUGUST!!!

--THE HONORS ALGEBRA II TEACHERS--

1.) Simplify each of the following expressions.

a.)  $\frac{8}{11} - \frac{5}{3}$       $\frac{8}{11} \left(\frac{3}{3}\right) - \frac{5}{3} \left(\frac{11}{11}\right)$       $\frac{24}{33} - \frac{55}{33}$

$-\frac{31}{33}$

b.)  $\frac{5}{9} \cdot \frac{4}{7}$       $\frac{20}{63}$

$\frac{20}{63}$

c.)  $\frac{9}{14} \div \frac{3}{7}$       $\frac{3}{2} \cdot \frac{7}{14}$

$\frac{3}{2}$

d.)  $\frac{\frac{5}{2}}{\frac{6}{11}}$       $\frac{5}{2} \cdot \frac{11}{6}$

$\frac{55}{12}$

e.)  $5\sqrt{3} + 7\sqrt{3} - 5\sqrt{2}$

$12\sqrt{3} - 5\sqrt{2}$

f.)  $2\sqrt{7}(5 - 3\sqrt{2})$       $10\sqrt{7} - 6\sqrt{14}$

$10\sqrt{7} - 6\sqrt{14}$

g.)  $\frac{3\sqrt{9}}{\sqrt{5}} \left(\frac{\sqrt{5}}{\sqrt{5}}\right) = \frac{3\sqrt{45}}{5}$       $\frac{9\sqrt{5}}{5}$

$\frac{9\sqrt{5}}{5}$

h.)  $(3x - 1)(4x + 5)$

$12x^2 + 11x - 5$

i.)  $\sqrt{20ab^5}$

$2b^2\sqrt{5ab}$

j.)  $5\sqrt{18u^2z^7}$

$15uz^3\sqrt{2z}$

k.)  $52 \div 4 \cdot 11$

143

l.)  $2 \cdot (3 + 1)^2$

32

m.)  $5 - 2(3)^3 \div 6$

-4

$5 - 2(27) \div 6$

n.)  $2(m + 9) - 4(m - 2)$

$-2m + 26$

$2m + 18 - 4m + 8$

2.) Use  $f(x) = 2x^2 - 5x + 3$  and  $g(x) = 7x - 4$  for each of the following.

a.) Evaluate  $f(-2)$

$$2(-2)^2 - 5(-2) + 3 \quad 8 + 10 + 3$$

$$\underline{21}$$

b.) Evaluate  $g(13)$

$$\underline{87}$$

c.) Evaluate  $f(4)$

$$2(4)^2 - 5(4) + 3 \quad 32 - 20 + 3$$

$$\underline{15}$$

d.) Evaluate  $g(3x)$

$$7(3x) - 4$$

$$\underline{21x - 4}$$

e.) Evaluate  $f(x + 1)$

$$2(x+1)^2 - 5(x+1) + 3$$

$$2(x^2 + 2x + 1) - 5x - 5 + 3$$

$$\underline{2x^2 - x}$$

f.) Evaluate  $g(f(x))$

$$2x^2 + 4x + 2 - 5x - 2$$

$$\underline{14x^2 - 35x + 17}$$

$$7(2x^2 - 5x + 3) - 4$$

$$14x^2 - 35x + 21 - 4$$

3.) Use  $f(x) = \sqrt{x}$ ,  $g(x) = x^2$ , and  $h(x) = x$  for each of the following.

a.) List the Domain & Range for  $f(x)$ .

$$D: x \geq 0 \quad [0, \infty)$$

$$R: y \geq 0 \quad [0, \infty)$$

b.) List the Domain & Range for  $g(x)$ .

$$D: \mathbb{R} \quad (-\infty, \infty)$$

$$R: y \geq 0 \quad [0, \infty)$$

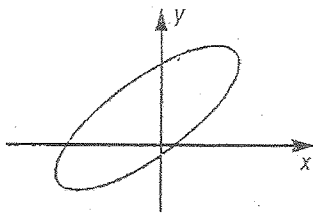
c.) List the Domain & Range for  $h(x)$ .

$$D: \mathbb{R} \quad (-\infty, \infty)$$

$$R: \mathbb{R} \quad (-\infty, \infty)$$

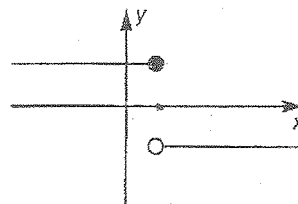
4.) Determine whether the relation graphed is a function.

a.)



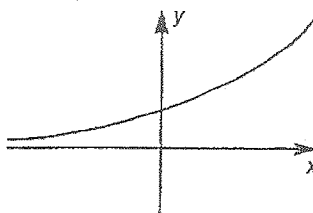
no

b.)



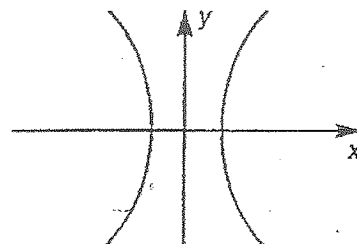
yes

c.)



yes

d.)



no

5.) Factor each of the following expressions completely,

a.)  $x^2 + 15x + 54$

$(x+9)(x+6)$

b.)  $x^2 - x - 72$

$(x-9)(x+8)$

c.)  $2x^2 + 8x - 24$

$x^2 + 4x - 12$

$2(x+6)(x-2)$

d.)  $x^2 - 16$

$(x+4)(x-4)$

e.)  $4x^2 - 9$

$(2x+3)(2x-3)$

f.)  $9x^3 - x$

$x(9x^2 - 1)$

$x(3x+1)(3x-1)$

g.)  $3x^2 + 19x - 14$

$(3x-2)(x+7)$

h.)  $5b^3 + 7b^2 + 25b + 35$

$b^2(5b+7) + 5(5b+7)$

$(b^2+5)(5b+7)$

i.)  $56bw - 49bk + 40xw - 35xk$

$7b(8w-7k) + 5x(8w-7k)$

$(7b+5x)(8w-7k)$

j.)  $2a^2 - 15a + 27$

$(2a-9)(a-3)$

k.)  $9x^2 + 15x + 4$

$9x^2 + 12x + 3x + 4$

$3x(3x+4) + 1(3x+4)$

$(3x+1)(3x+4)$

6.) Solve each of the following. If necessary write your answer as an improper fraction.

a.)  $-4(6v - 2) = 28 - 6v$

$-24v + 8 = 28 - 6v$

$-20 = 18v$

$\frac{-20}{18}$

$v = \frac{-10}{9}$

$$b.) 4(8 + m) - 1 = 4m - 21$$

no solution

$$32 + 4m - 1 = 4m - 21$$

$$31 = -21$$

$$c.) 1 = \frac{a}{3} + 5$$

$$\underline{a = -12}$$

$$-4 = \frac{a}{3}$$

$$d.) 4|4 - 2x| - 10 = 14$$

$$4 - 2x = 6$$

$$4 - 2x = -6$$

$$\underline{x = -1, x = 5}$$

$$|4 - 2x| = 6$$

$$x = -1$$

$$x = 5$$

$$e.) 3(2x - 5) - x = -7(x + 3)$$

$$\underline{x = -\frac{1}{2}}$$

$$6x - 15 - x = -7x - 21$$

$$5x = -7x - 6$$

$$12x = -6$$

$$f.) \frac{1}{2}x + 4 = -\frac{2}{3}x + \frac{1}{2}$$

$$\underline{x = -3}$$

$$\frac{1}{2} + \frac{2}{3} \quad \frac{7}{6}x = -\frac{7}{2}$$

$$\frac{3}{6} + \frac{4}{6} \quad x = -\frac{7}{2} \cdot \frac{6}{7}$$

$$g.) 8(v + 1) + 6v = -2(4v - 4) - 5v$$

$$\underline{v = 0}$$

$$8v + 8 + 6v = -8v + 8 - 5v$$

$$14v + 8 = -13v + 8$$

$$27v = 0$$

$$h.) 6x^2 + 17 = 167$$

$$\underline{x = \pm 5}$$

$$6x^2 + 17 = 167$$

$$6x^2 = 150$$

$$x^2 = 25$$

$$i.) x^2 + 5x + 6 = 0$$

$$\underline{x = -3, x = -2}$$

$$(x + 3)(x + 2) = 0$$

$$j.) x^2 - 4x + 3 = 0$$

$$\underline{x = 3, x = 1}$$

$$(x - 3)(x - 1) = 0$$

7.) Solve each of the following system of linear equations. Remember to write your answer as a point.

$$a.) \begin{cases} 3x + 3y = -6 \\ y = 7x + 14 \end{cases}$$

$$y = 7(-2) + 14$$

$$\underline{(-2, 0)}$$

$$3x + 3(7x + 14) = -6$$

$$3x + 21x + 42 = -6$$

$$24x = -48$$

$$b.) \begin{cases} -6x - 10y = 14 \\ 4x + 5y = -16 \end{cases}$$


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$$8x + 10y = -32$$


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$$2x = -18$$

$$x = -9$$

$$4(-9) + 5y = -16$$

$$-36 + 5y = -16$$

$$5y = 20$$

$$y = 4$$

$$\underline{(-9, 4)}$$

$$c.) \begin{cases} -6x + 2y = 0 \\ -3x + y = 4 \end{cases}$$


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$$6x - 2y = -8$$


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$$0 = -8$$

no solution

$$d.) \begin{cases} -20x - 16y = 8 \\ -10x - 8y = 4 \end{cases}$$


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$$20x + 16y = -8$$


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$$0 = 0$$

infinitely many solutions

8.) Solve each of the following inequalities. Write your answer in interval notation and then graph your solution on the number line.

$$a.) 5x - 7 > 13$$

$$5x > 20$$

$$x > 4$$

$$(4, \infty)$$

$$\underline{x > 4}$$



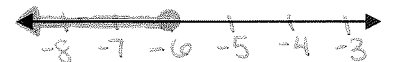
$$b.) 4 - 3x \geq 22$$

$$-3x \geq 18$$

$$x \leq -6$$

$$(-\infty, -6]$$

$$\underline{x \leq -6}$$



$$c.) 3 < 2x - 5 \leq 8$$

$$3 < 2x - 5 \quad 2x - 5 \leq 8$$

$$8 < 2x \quad 2x \leq 13$$

$$4 < x \quad x \leq \frac{13}{2}$$

$$x > 4 \text{ and } x \leq \frac{13}{2}$$

$$(4, \frac{13}{2}]$$



$$d.) 2 - 5|x - 8| \leq -38$$

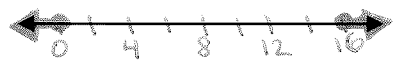
$$|x - 8| \geq 8 \quad x - 8 \leq -8$$

$$x - 8 \geq 8 \quad x \leq 0$$

$$x \geq 16$$

$$(-\infty, 0] \cup [16, \infty)$$

$$\underline{x \geq 16 \text{ or } x \leq 0}$$



$$e.) 3|2x - 4| - 1 < 11$$

$$2x - 4 < 4 \quad 2x - 4 > -4$$

$$x < 4 \quad x > 0$$

$$(0, 4)$$

$$\underline{x < 4 \text{ and } x > 0}$$



9.) Simplify each of the following expressions. Your answer should contain only positive exponents.

$$a.) x^2 y \cdot xy^4$$

$$\underline{x^3 y^5}$$

b.)  $(a^3b^4)^4$

$a^{12}b^{16}$

c.)  $\frac{2u^3v^{-4}}{3u \cdot 3u^{-4}}$

$\frac{2u^3u^4}{9uv^4}$

$\frac{2u^6}{9v^4}$

d.)  $\frac{(2x^3y^{-3})^{-2}}{x^2y \cdot 2xy}$

$\frac{2^{-2}x^{-6}y^6}{2x^3y^2} = \frac{y^6}{8x^9y^2}$

$\frac{y^4}{8x^9}$

e.)  $\left(\frac{xy^2}{z}\right)^2$

$\frac{x^2y^4}{z^2}$

$\frac{x^2y^4}{z^2}$

f.)  $\left(\frac{a^3b^2}{c^5}\right)^0$

1

10.) Name the form of each of the equations.

a.)  $y = mx + b$

slope-intercept

b.)  $y - y_1 = m(x - x_1)$

point-slope

c.)  $Ax + By = C$

standard

11.) Find the slope of the line passing through the given points.

a.)  $(2, -4) \text{ \& } (4, -1)$

$\frac{-1+4}{4-2}$

$\frac{3}{2}$

b.)  $(3, -6) \text{ \& } (-7, 3)$

$\frac{3+6}{-7-3}$

$-\frac{9}{10}$

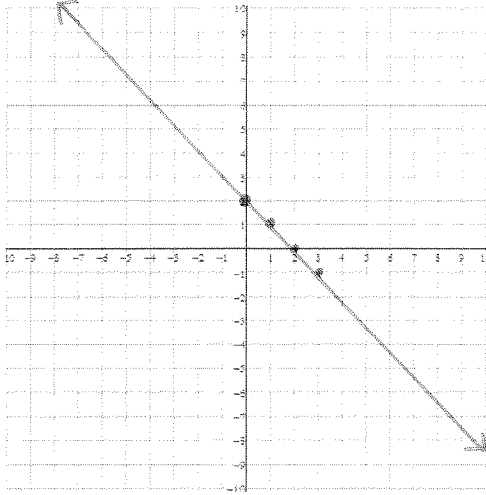
c.)  $(4, 4) \text{ \& } (4, 9)$

$\frac{9-4}{4-4}$

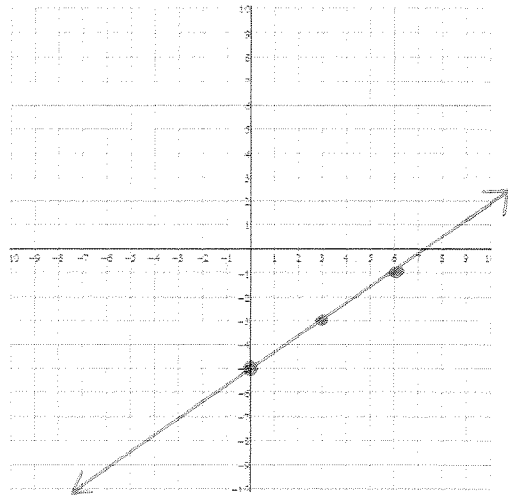
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12.) Graph the given equation or inequality.

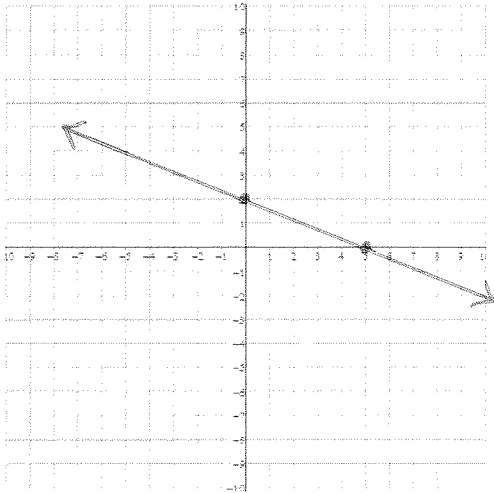
a.)  $y = -x + 2$



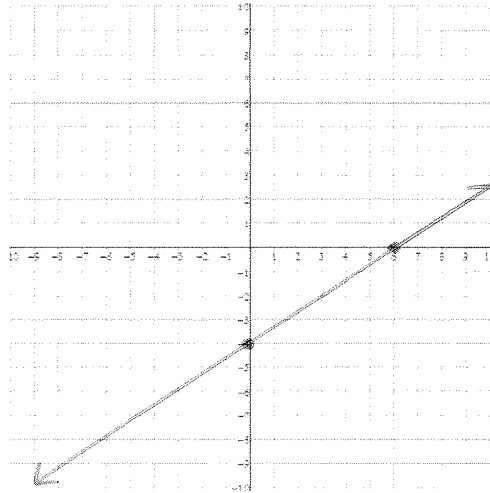
b.)  $y = \frac{2}{3}x - 5$



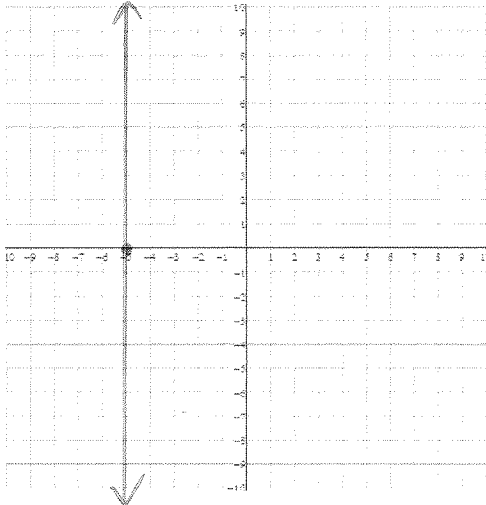
c.)  $2x + 5y = 10$



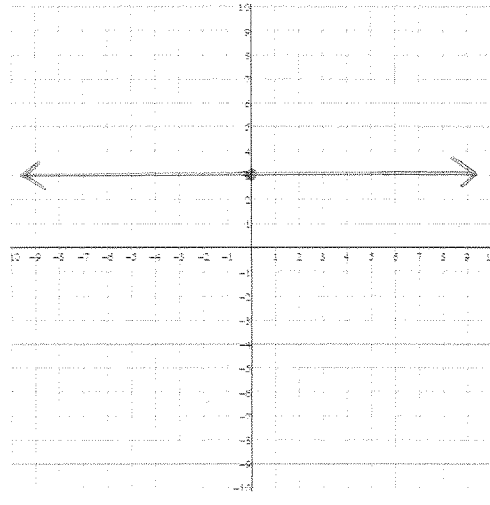
d.)  $2x - 3y = 12$



e.)  $x = -5$

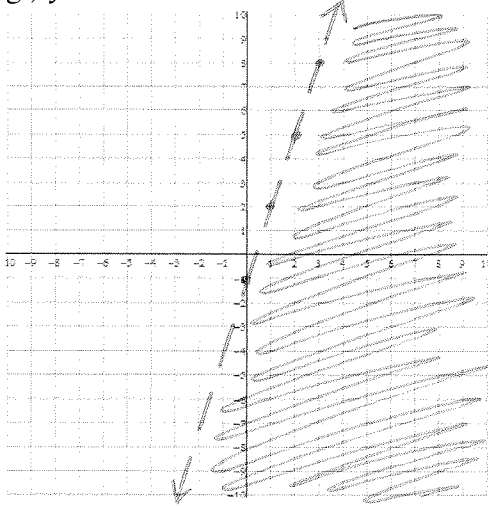


f.)  $y = 3$

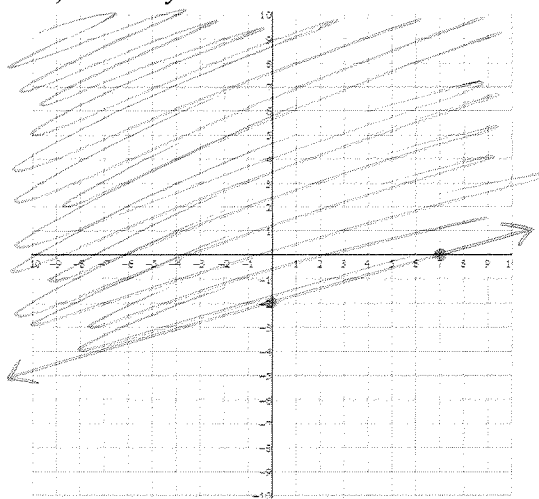




g.)  $y < 3x - 1$



h.)  $2x - 7y \leq 14$



13.) Write the equation of the line in slope-intercept form that satisfies the given conditions.

a.) Passes through the point  $(-5, -6)$  and has a slope of 4.

$$y + 6 = 4(x + 5)$$

$$y + 6 = 4x + 20$$

$y = 4x + 14$

b.) Passes through the point  $(-4, 2)$  and has a slope  $\frac{3}{2}$ .

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

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

$y = \frac{3}{2}x + 8$

c.) Parallel to the line  $y = 1 - 4x$  and passes through the point  $(-3, -5)$ .

slope = -4

$$y + 5 = -4(x + 3)$$

$$y + 5 = -4x - 12$$

$y = -4x - 17$

d.) Passes through the point  $(4, 1)$  and is perpendicular to the line  $y = \frac{1}{3}x + 3$ .

$$y - 1 = -3(x - 4)$$

$$y - 1 = -3x + 12$$

$$y = -3x + 13$$

slope = -3

$y = -3x + 13$

e.) Passes through the points  $(-1, 3)$  and  $(2, 9)$ .

$$\frac{9 - 3}{2 - (-1)} = \frac{6}{3}$$

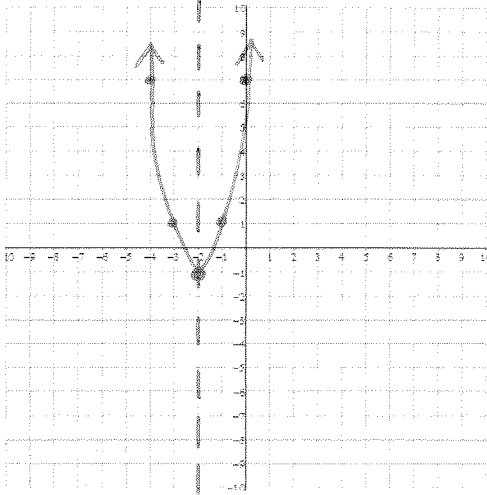
$$y - 9 = 2(x - 2)$$

$$y - 9 = 2x - 4$$

$y = 2x + 5$

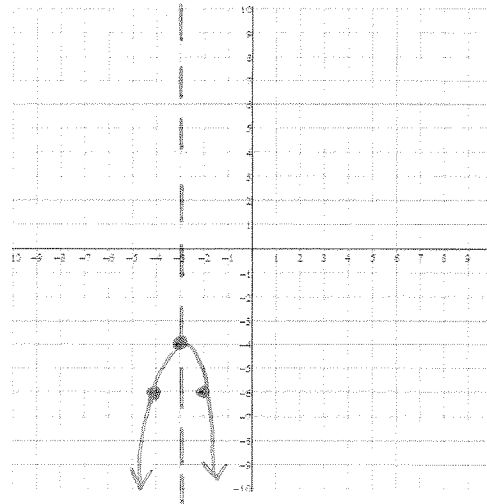
14.) Graph each of the following quadratic functions by plotting the vertex and at least two other points.

a.)  $f(x) = 2x^2 + 8x + 7$



AOS  
 $\frac{-8}{2(2)}$   
 $x = -2$   
 $2(-2)^2 + 8(-2) + 7$   
 $8 - 16 + 7$   
 $-1$   
 $(-2, -1)$

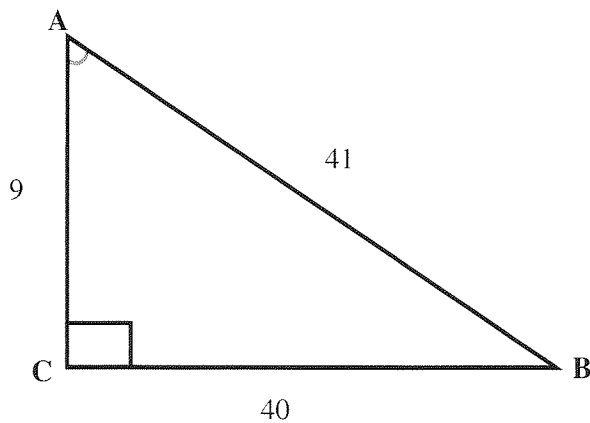
b.)  $f(x) = -2x^2 - 12x - 22$



AOS  
 $\frac{12}{2(-2)} = \frac{12}{-4} = -3$   
 $-2(-3)^2 - 12(-3) - 22$   
 $-18 + 36 - 22$   
 $-18 + 14 = -4$   
 $-2(-2)^2 - 12(-2) - 22$   
 $-8 + 24 - 22$   
 $-8 + 2$

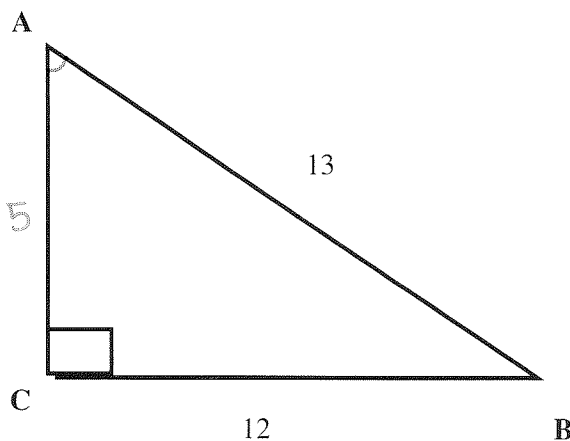
15.) For each of the following right triangles find  $\sin A$ ,  $\cos A$ , and  $\tan A$ .

a.)



$\sin A = \frac{40}{41}$   
 $\cos A = \frac{9}{41}$   
 $\tan A = \frac{40}{9}$

b.)



$\sin A = \frac{12}{13}$   
 $\cos A = \frac{5}{13}$   
 $\tan A = \frac{12}{5}$

$\frac{169}{-144}$   
 $\frac{25}{25}$

$(12)^2 + x^2 = (13)^2$

16.) Simplify each of the following and write in standard form.

a.)  $(3x^2 - 4x + 2) + (2x - 9)$

$3x^2 - 2x - 7$

b.)  $(2x^2 + 3x - 2) + (3x^2 + x + 4)$

$-x^2 + 2x + 2$

c.)  $(2x - 5)^2$

$4x^2 - 20x + 25$

d.)  $(x - 1)(4x^2 - 3x - 2)$

$4x^3 - 3x^2 - 2x$   
 $-4x^2 + 3x + 2$

$4x^3 - 7x^2 + x + 2$

17.) Solve each of the following by using the quadratic formula. Round to the nearest hundredth if necessary.

a.)  $x^2 - 5x - 6 = 0$      $x = \frac{5 \pm \sqrt{25 - 4(1)(-6)}}{2} = \frac{5 \pm 7}{2}$

$x = 6, x = -1$

b.)  $2x^2 = -3x + 7$

$2x^2 + 3x - 7 = 0$

$x = \frac{-3 \pm \sqrt{9 - 4(2)(-7)}}{2(2)} = \frac{-3 \pm \sqrt{65}}{4}$  ← exact

$x = 1.27, x = -2.77$   
↑ rounded

18.) Solve each of the following by using the square root method.

a.)  $-2x^2 = -72$

$x = \pm 6$

b.)  $2(x + 3)^2 - 1 = 31$

$(x + 3)^2 = 16$

$x + 3 = \pm 4$

$x + 3 = 4$      $x + 3 = -4$

$x = 1, x = -7$

