

-1 pt for each small error, more for larger error  
 - pts if work not shown

MAT 111 - section \_\_\_\_\_  
 Test # 1, version A  
 Chapter 1, and sections 2.1 & 2.2

100

Name: Key  
 Seat #: \_\_\_\_\_  
 September 18, 2009

**Directions:** Show all work algebraically unless otherwise indicated. If solving graphically, label the graph and the solution on the graph. If rounding is necessary, round to the nearest hundredth.

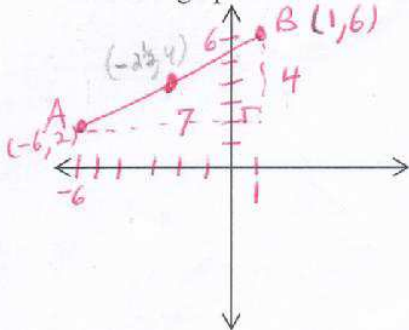
1. Given the points A (-6, 2) and B (1, 6), find the following.

(2 points)

(6 points)

(4 points)

- a. Sketch a graph to illustrate these.    b. Find the length of  $\overline{AB}$ .    c. Find the midpoint of  $\overline{AB}$ .



$$d = \sqrt{(1 - (-6))^2 + (6 - 2)^2}$$

$$d = \sqrt{7^2 + 4^2}$$

$$d = \sqrt{49 + 16}$$

$$d = \sqrt{65} \approx 8.06$$

Ave of endpoints

$$\left( \frac{-6+1}{2}, \frac{2+6}{2} \right)$$

$$\left( -\frac{5}{2}, \frac{8}{2} \right)$$

$$\left( -2\frac{1}{2}, 4 \right) \text{ or } \left( -\frac{5}{2}, 4 \right)$$

(9 points)

2. Solve. Illustrate your solution on a number line.

Use **interval notation** to express your solution.

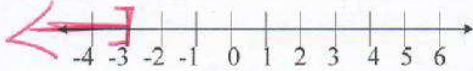
$$-4x + 9 \geq 21$$

5 pts 
$$-4x \geq 12$$
  

$$x \leq -3$$

-2 pts if  $x \geq -3$   
 + graphed this

2 pts



2 pts

Interval notation:  $[-\infty, -3]$

Note

3. Find the equation of a line through the

two points (2, 3) and (-4, 5).

(Graph your line to check your answer.)

3 pts slope  $m = \frac{\Delta y}{\Delta x} = \frac{5-3}{-4-2} = \frac{2}{-6} = -\frac{1}{3}$

4 pts

eq.

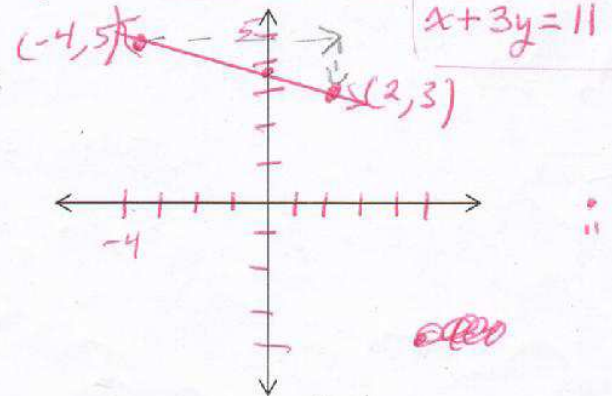
$$y - 3 = -\frac{1}{3}(x - 2)$$

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

$$y = -\frac{1}{3}x + \frac{11}{3} \text{ or } x + 3y = 11$$

y-int  $\frac{11}{3}$

2 pts



- If just plotted pts & didn't graph then eq. to check.

Solve the following equations. Find all solutions.

(10 points)

4.  $\sqrt{4x-7} = x-3$

(Check your solutions)

6pts work

$$(\sqrt{4x-7})^2 = (x-3)^2$$

$$4x-7 = x^2 - 6x + 9$$

$$0 = x^2 - 10x + 16$$

$$0 = (x-8)(x-2)$$

2pts

$x=8$ ,  ~~$x=2$~~

2pts

Check!

$\sqrt{4(8)-7} = 8-3$	$\sqrt{4(2)-7} = 2-3$
$\sqrt{25} = 5$	$\sqrt{1} = -1$
$5 \neq 5$	$1 \neq -1$

(-1pt if checked + still left  $x=2$ )

(10 points)

6.  $x^2 + 3x + 5 = 0$

6pts work

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{9-20}}{2}$$

$$x = \frac{-3 \pm \sqrt{-11}}{2}$$

4pts

$x = \frac{-3 \pm \sqrt{-11}i}{2}$

(10 points)

5.  $|3x+2| = 5$

5pts

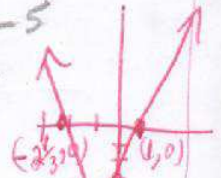
$3x+2=5$  or  $3x+2=-5$

$3x=3$  or  $3x=-7$

$x=1$  or  $x=-\frac{7}{3}$

could graph  $\begin{cases} y_1 = |3x+2| \\ y_2 = 5 \end{cases}$   
+ find x-coord of intersection

or graph  $y = |3x+2| - 5$   
+ find x-intercepts



(10 points)

7.  $2x - 4y = 2$

$(3x + 2y = 3) \cdot 2$

(write your solution as a point)

5pts

(mult. + add to eliminate variable)

$$\begin{array}{r} 2x - 4y = 2 \\ + \quad 6x + 4y = 6 \\ \hline 8x = 8 \end{array}$$

$x = 1$

$2(1) - 4y = 2$

$-4y = 0$

$y = 0$

$(1, 0)$

5pts

or substitute

$$-4y = -2x + 2$$

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

$3x + 2(\frac{1}{2}x - \frac{1}{2}) = 3$

$3x + x - 1 = 3$

$4x = 4$

$x = 1$

$y = \frac{1}{2}(1) - \frac{1}{2} = 0$

$(1, 0)$



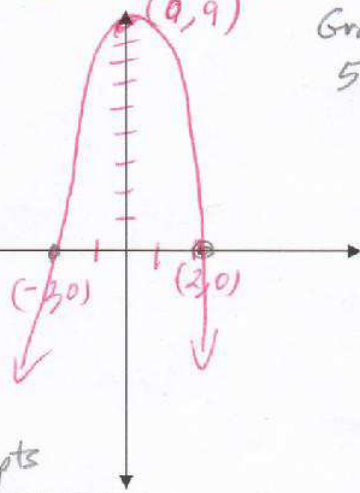
8. For this equation,  $9x^2 + 4y = 36$ , determine the intercepts and the type of symmetry of its graph. Sketch the graph and label the intercepts.

if  $x=0$ ,  $9(0)^2 + 4y = 36$   
 $y = 9$

y-int.  $(0, 9)$  1pt

if  $y=0$ ,  $9x^2 + 4(0) = 36$   
 $x^2 = 4$   
 $x = \pm 2$

x-int  $(-2, 0)$   
 $(2, 0)$  2pts



The graph is symmetric with respect to the y-axis 2pts

(10 points)

9. Solve:  $(x-1) \left( \frac{x}{x-1} + 8 \right) = \left( \frac{1}{x-1} \right) (x-1)$  1pt

$x + 8(x-1) = 1$  3pts  
 $x + 8x - 8 = 1$   
 $9x = 9$  4pts  
 $x = 1$

but  $x \neq 1$  since fraction has 0 in denominator  
 $\therefore$  there is No solution 2pts

(10 points)

10. A chemistry experiment calls for 2.4 liters of a 2% acid solution. The lab has containers of 1% acid solution and 5% acid solution. How much of each must be mixed in order to have what is needed for the experiment? Tell what your variable represents, show your equation, your work and your solution.

Let  $x = \text{Vol of 1% soln}$  1pt  
 $(2.4-x) = \text{Vol of 5% soln}$   
 $(.02)(2.4) = (.01)(x) + (.05)(2.4-x)$  Soln<sub>1</sub> + Soln<sub>2</sub>

OR Solve with 2 variables + 2 eqs  $\Rightarrow$

4pts  $(.02)(2.4) = .01x + .05(2.4-x)$

3pts work  $.048 = .01x + .12 - .05x$   
 $-.072 = -.04x$

1pt  $\rightarrow 1.8 \text{ liters } x$  1% solution

1pt  $(2.4 - 1.8) = .6 \text{ liters } 5\% \text{ solution}$

Let  $x = \overset{\text{Vol of}}{1\% \text{ sdn.}}$

$y = \text{Vol of } 5\% \text{ acid sdn}$

$$x + y = 2.4$$

$$.01x + .05x = .02(2.4)$$

$$.01x + .05x = .048$$

solve for  $y$  + substitute

$$y = (2.4 - x)$$

$$.01x + .05(2.4 - x) = .048$$

etc as on other side  $\rightarrow$