Solve each of the following systems by GRAPHING:
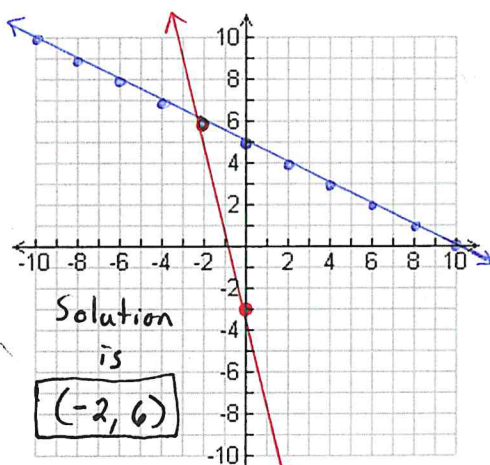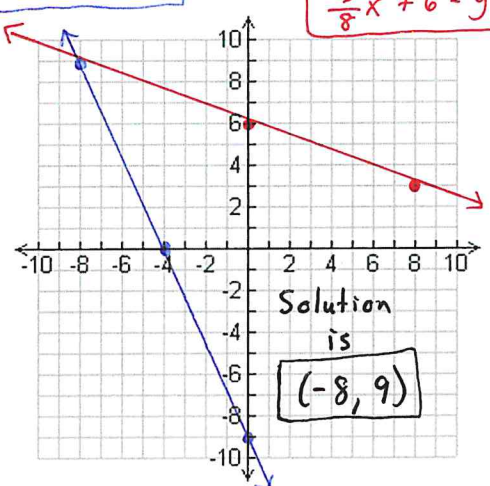
1. $2y = 10 - x$
$-3 = y + \frac{9}{2}x$

Top Equation

$2y = 10 - x$

$\frac{2y}{2} = \frac{-x}{2} + \frac{10}{2}$

$\boxed{y = \frac{-1}{2}x + 5}$

Bottom Equation

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

$-\frac{9}{2}x \qquad -\frac{9}{2}x$

$\boxed{-\frac{9}{2}x - 3 = y}$

Solution is

$\boxed{(-2, 6)}$

2. $36 = -9x - 4y$
$-9x = 24y - 144$

Top Equation

$36 = -9x - 4y$
$+9x \qquad +9x$

$\frac{9x + 36}{-4} = \frac{-4y}{-4}$

$\boxed{-\frac{9}{4}x - 9 = y}$

Bottom Equation

$-9x = 24y - 144$
$+144 \qquad\qquad +144$

$\frac{-9x + 144}{24} = \frac{24y}{24}$

$\frac{-9 \div 3}{24 \div 3}x + 6 = y$

$\boxed{-\frac{3}{8}x + 6 = y}$

Solution is

$\boxed{(-8, 9)}$

5 pts each.

Solve each of the following systems by using SUBSTITUTION:

3. $7x + 7y = -14$
$x - y = -14$

Using bottom Equation, solving for x

$x - y = -14$
$+y \quad +y$

$x = y - 14$

Replace x in the top equation with $y - 14$ & solve for y.

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

$7y - 98 + 7y = -14$
$+98 \qquad +98$

$7y + 7y = 84$

$\frac{14y}{14} = \frac{84}{14}$

$\boxed{y = 6}$

$x = y - 14$

$x = 6 - 14$

$\boxed{x = -8}$

Solution is $(-8, 6)$

4. $3x - 7y = 20$
$-x + 4y = -15$

Using bottom Equation, solving for x

$-x + 4y = -15$
$-4y \qquad -4y$

$\frac{-x}{-1} = \frac{-4y}{-1} - \frac{15}{-1}$

$x = 4y + 15$

Replace x in the top equation with $4y + 15$ & solve for y.

$3(4y + 15) - 7y = 20$

$12y + 45 - 7y = 20$
$\quad -45 \qquad -45$

$12y - 7y = -25$

$\frac{5y}{5} = \frac{-25}{5}$

$\boxed{y = -5}$

$x = 4y + 15$

$x = 4(-5) + 15$

$x = -20 + 15$

$\boxed{x = -5}$

Solution is $(-5, -5)$

4 pts each.

18 pts

Solve each of the following systems by ELIMINATION:

5. $-7x + 8y = -12$ mult top Eqn by -2
    $-x + 16y = 28$

$14x - 16y = 24$
$-1x + 16y = 28$
_____

$\dfrac{13x}{13} = \dfrac{52}{13}$

$\boxed{x = 4}$

Solution is
$(4, 2)$

Plug into one original equation...

$-1(4) + 16y = 28$

$-4 + 16y = 28$
$+4 \qquad +4$
_____

$\dfrac{16y}{16} = \dfrac{32}{16}$ $\boxed{y = 2}$

6. $4x + 3y = 23$ mult top eqn by 2
    $3x - 2y = -21$ mult bottom eqn by 3

$8x + 6y = 46$
$9x - 6y = -63$
_____

$\dfrac{17x}{17} = \dfrac{-17}{17}$

$\boxed{x = -1}$

Plug into one original equation...

$4(-1) + 3y = 23$

$-4 + 3y = 23$
$+4 \qquad\quad +4$
_____

$\dfrac{3y}{3} = \dfrac{27}{3}$

$\boxed{y = 9}$

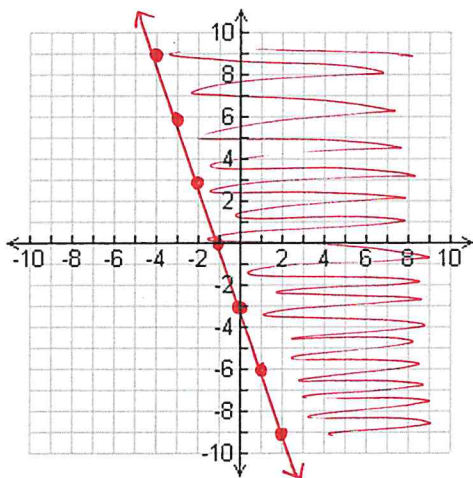Solution is
$(-1, 9)$

4 pts Each.

Sketch the graph of each of the following Linear Inequalities:

7. $y \geq -3x - 3$

y-int = -3

m $\approx$ $\dfrac{-3}{1}$

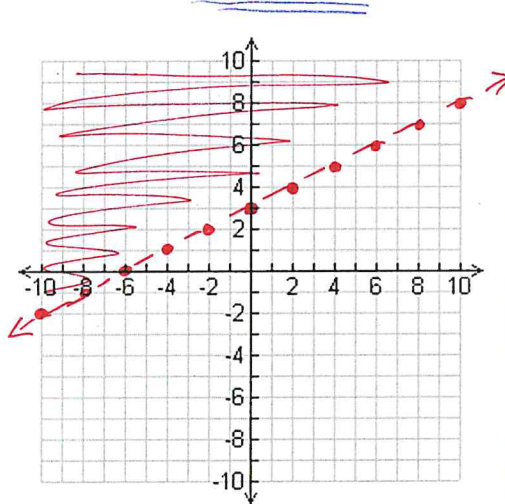$\geq$ means greater than or equal to shade above the **solid line**

8. $x - 2y < -6$
   $-x \qquad\qquad -x$
_____

$\dfrac{-2y}{-2} < \dfrac{-x}{-2} \dfrac{-6}{-2}$

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

$>$ means greater than; shade above the **dashed line**

5 pts

y-int
slope
solid/dashed
line
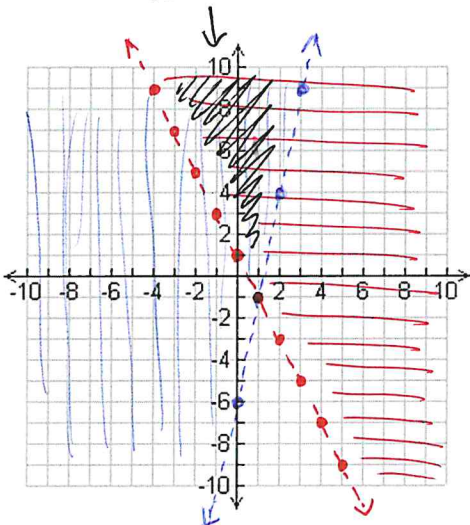shading

Sketch the solution to each of the following systems of Linear Inequalities:

9. $y > -2x + 1$
   $y > 5x - 6$

Top Inequality: $y\text{-int} = 1$
                         $m = \frac{-2}{1}$

Line is dashed
Shade above line

Bottom Inequality: $y\text{-int} = -6$
                             $m = \frac{5}{1}$

Line is dashed
Shade above line

solution

10. $2x + 3y \leq 21$
    $11x - 6y \geq 48$

Top Inequality:

$2x + 3y \leq 21$
$-2x \qquad -2x$
_____
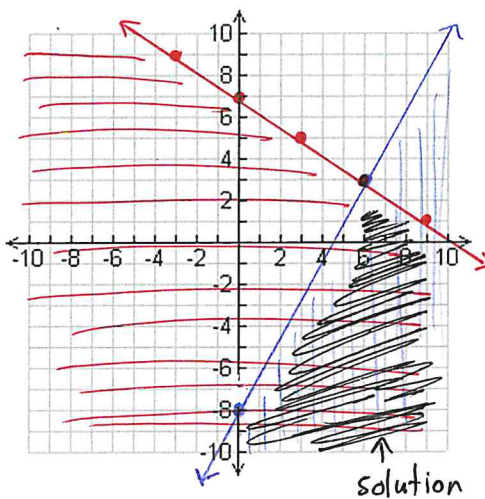$\dfrac{3y}{3} \leq \dfrac{-2x}{3} + \dfrac{21}{3}$

$y \leq -\frac{2}{3}x + 7$

$y\text{-int} = 7$
$m = -\frac{2}{3}$

Line is solid
shade below line

Bottom Inequality

$11x - 6y \geq 48$
$-11x \qquad\quad -11x$
_____
$\dfrac{-6y}{-6} \geq \dfrac{-11x}{-6} + \dfrac{48}{-6}$

$y \leq \frac{11}{6}x - 8$

$y\text{-int} = -8$
$m = \frac{11}{6}$

Line is solid
Shade below line

solution

|| each