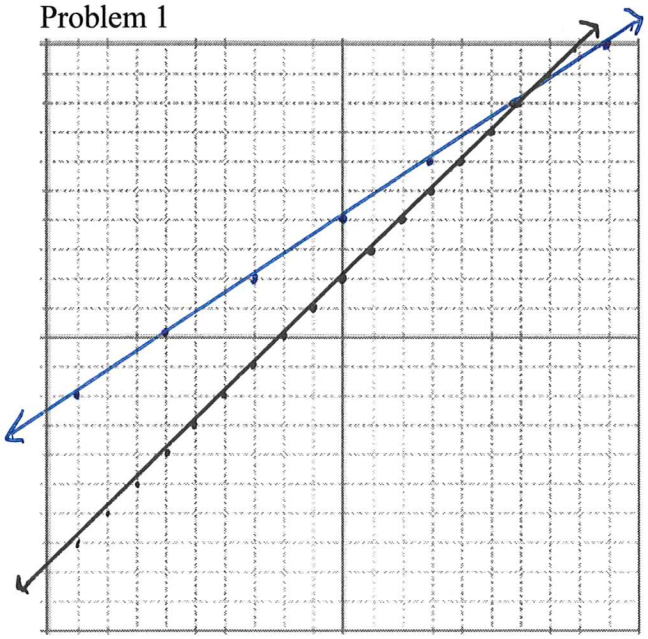
Graph each equation to find the point of intersection.

Test Name KEY

*Remember to find a **nice starting point**, then use **the slope** to find other nice points.*

Problem 1

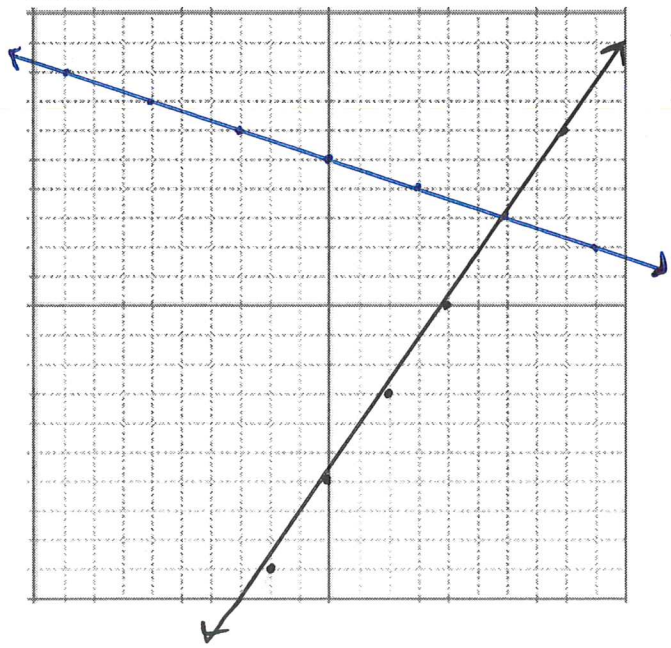


$y = \frac{2}{3}x + 4$ → m = 2/3 (0,4)

$x - y = -2$ → m = 1/1 (0,2)

Pt of Intersection (6, 8)

Problem 2

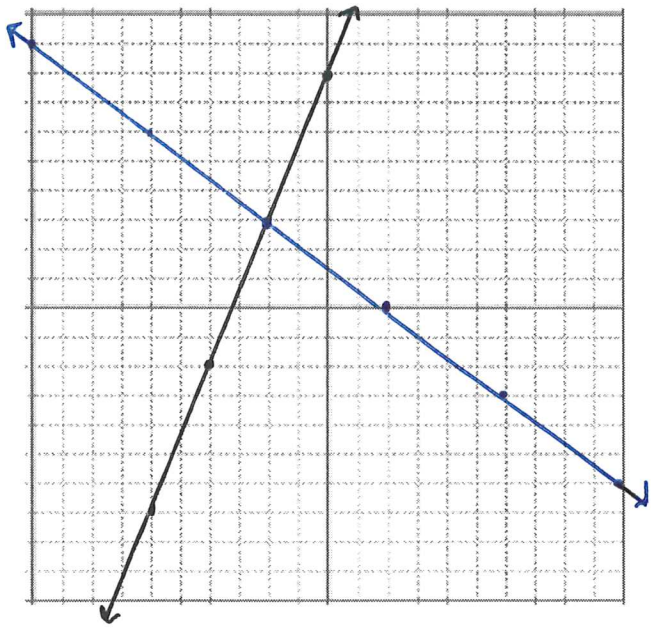


$x + 3y = 15$ → m = -1/3 (0,5)

$y = \frac{3}{2}x - 6$ → m = 3/2 (0,-6)

Pt of Intersection (6, 3)

Problem 3

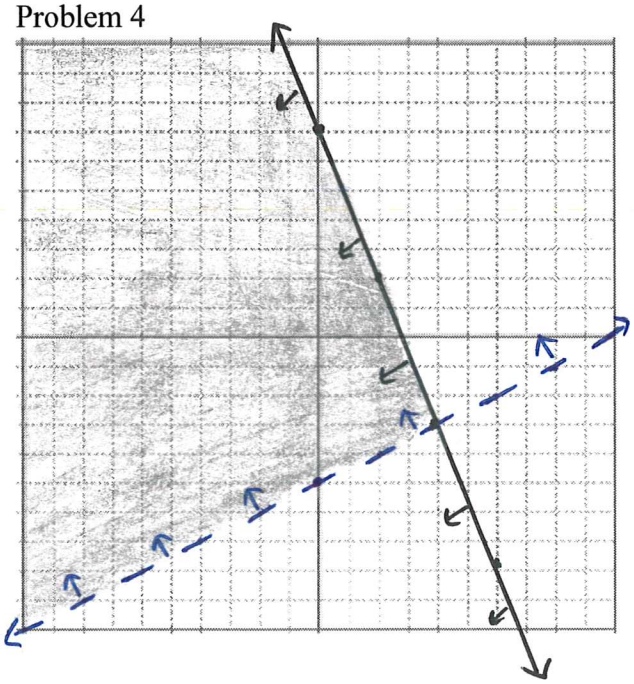


$3x + 4y = 6$ → $m = -3/4$ $(2,0)$

$y = \frac{5}{2}x + 8$ → $m = 5/2$ $(0,8)$

Pt of Intersection $(-2, 3)$

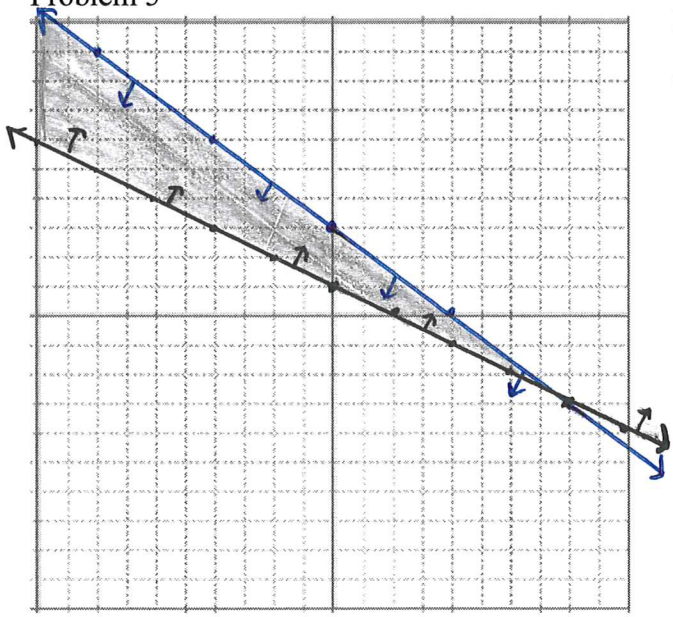
Problem 4



$y > \frac{1}{2}x - 5$ → $m = 1/2$ $(0,-5)$

$5x + 2y \leq 14$ → $m = -\frac{5}{2}$ $(0,7)$

Problem 5



$y \le \frac{-3}{4}x + 3$ → m = -3/4 (0, 3)

$x + 2y \ge 2$ → m = -1/2 (0, 1)

Solve each system of equations using **substitution. Show your work!**

Problem 6

E_1: 2x – 3y = –7

E_2: x + 3y = 10

Pt of Intersection (1, 3)

E_2: $x = -3y + 10$

E_1: $2[-3y+10] - 3y = -7$

$-6y + 20 - 3y = -7$

$-9y = -27$

$y = 3$

$x = -3[3] + 10$

$x = -9 + 10$

$x = 1$

Problem 7

E_1: x – 3y = 14

E_2: 3x + 2y = –13

Pt of Intersection (-1, -5)

E_1: $x = 3y + 14$

E_2: $3[3y+14] + 2y = -13$

$9y + 42 + 2y = -13$

$11y + 42 = -13$

$11y = -55$

$y = -5$

$x = 3[-5] + 14$

$x = -15 + 14$

$x = -1$

Problem 8

E_1: 5x + y = 4

E_2: x – 2y = 3

Pt of Intersection (1, -1)

E_1: $y = -5x + 4$

E_2: $x - 2[-5x+4] = 3$

$x + 10x - 8 = 3$

$11x = 11$

$x = 1$

$y = -5[1] + 4$

$y = -1$

Solve each system of equations using **substitution. Show your work!**

Problem 9

E_1: $x - 5y = -2$

E_2: $2x + 5y = -4$

Pt of Intersection $(-2, 0)$

E_1: $x = 5y - 2$

E_2: $2[5y - 2] + 5y = -4$

$10y - 4 + 5y = -4$

$15y = 0$

$y = 0$

$x = 5[0] - 2$

$x = -2$

Problem 10

E_1: $-2x + y = -20$

E_2: $4x + 3y = 30$

Pt of Intersection $(9, -2)$

E_1: $y = 2x - 20$

E_2: $4x + 3[2x - 20] = 30$

$4x + 6x - 60 = 30$

$10x = 90$

$x = 9$

$y = 2[9] - 20$

$y = 18 - 20$

$y = -2$

Solve each system of equations using **Linear Combination / Elimination. Show your work!**

Problem 11

E_1: $5x - y = -6$

E_2: $x - y = -2$

Pt of Intersection $(-1, 1)$

E_1: $5x - y = -6$

$-E_2$: $-x + y = 2$

$4x = -4$

$x = -1$

$-1 - y = -2$

$-y = -1$

$y = 1$

Problem 12

E_1: $x + 4y = 12$

E_2: $2x - y = 15$

Pt of Intersection $(8, 1)$

$-2E_1$: $-2x - 8y = -24$

E_2: $2x - y = 15$

$-9y = -9$

$y = 1$

$x + 4[1] = 12$

$x = 8$

Solve each system of equations using **Linear Combination / Elimination. Show your work!**

Problem 13

E_1: $x - y = 9$
E_2: $5x + y = 33$

$6x = 42$
$\frac{6x}{6} = \frac{42}{6}$
$x = 7$

$7 - y = 9$
$-y = 9 - 7$
$-y = 2$
$y = -2$

Pt of Intersection $(7, -2)$

Problem 14

E_1: $x = 3y + 14$
E_2: $3x + 2y = -2$

E_1': $x - 3y = 14$
E_2': $3x + 2y = -2$

$2E_1$: $2x - 6y = 28$
$3E_2$: $9x + 6y = -6$
$11x = 22$
$x = 2$

$3[2] + 2y = -2$
$6 + 2y = -2$
$\frac{2y}{2} = \frac{-8}{2}$
$y = -4$

Pt of Intersection $(2, -4)$

Problem 15

E_1: $y = 3x - 7$
E_2: $x + y = 5$

E_1: $-3x + y = -7$
$3E_2$: $3x + 3y = 15$
$4y = 8$
$y = 2$

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

Pt of Intersection $(3, 2)$

Solve each system of equations using **Cramer's Rule. Show your work!**

Problem 16

E_1: $y = -x - 5$
E_2: $2x - y = -13$

E_1: $x + y = -5$
E_2: $2x - y = -13$

$$x = \frac{\begin{vmatrix} C & Y \\ -5 & 1 \\ -13 & -1 \end{vmatrix}}{\begin{vmatrix} X & Y \\ 1 & 1 \\ 2 & -1 \end{vmatrix}} = \frac{5 - (-13)}{-1 - 2} = \frac{18}{-3} = -6$$

$$y = \frac{\begin{vmatrix} X & C \\ 1 & -5 \\ 2 & -13 \end{vmatrix}}{-3} = \frac{-13 - (-10)}{-3} = \frac{-3}{-3} = 1$$

Pt of Intersection $(-6, 1)$

Solve each system of equations using **Cramer's Rule. Show your work!**

Problem 17
$x - y = 7$
$2x + 3y = -1$

$$y = \frac{\begin{vmatrix} x & c \\ 1 & 7 \\ 2 & -1 \end{vmatrix}}{5} = \frac{-1-14}{5} = \frac{-15}{5} = -3$$

Pt of Intersection $(4, -3)$

$$x = \frac{\begin{vmatrix} c & y \\ 7 & -1 \\ -1 & 3 \end{vmatrix}}{\begin{vmatrix} x & y \\ 1 & -1 \\ 2 & 3 \end{vmatrix}} = \frac{21-(1)}{3-(-2)} = \frac{20}{5} = 4$$

Problem 18
$y = x - 13$
$2x - 5y = 5$

$$y = \frac{\begin{vmatrix} x & c \\ -1 & -13 \\ 2 & 5 \end{vmatrix}}{3} = \frac{-5-(-26)}{3} = \frac{21}{3}$$

Pt of Intersection $(20, 7)$

E_1: $-x + y = -13$
E_2: $2x - 5y = 5$

$$x = \frac{\begin{vmatrix} c & y \\ -13 & 1 \\ 5 & -5 \end{vmatrix}}{\begin{vmatrix} x & y \\ -1 & 1 \\ 2 & -5 \end{vmatrix}} = \frac{65-5}{5-2} = \frac{60}{3} = 20$$

Problem 19
$2x + 3y = 8$
$3x + y = 5$

$$y = \frac{\begin{vmatrix} x & c \\ 2 & 8 \\ 3 & 5 \end{vmatrix}}{-7} = \frac{10-24}{-7} = \frac{-14}{-7} = 2$$

Pt of Intersection $(1, 2)$

$$x = \frac{\begin{vmatrix} c & y \\ 8 & 3 \\ 5 & 1 \end{vmatrix}}{\begin{vmatrix} x & y \\ 2 & 3 \\ 3 & 1 \end{vmatrix}} = \frac{8-15}{2-9} = \frac{-7}{-7} = 1$$

Problem 20
$2x + 3y = 6$
$x + 2y = 1$

$$y = \frac{\begin{vmatrix} x & c \\ 2 & 6 \\ 1 & 1 \end{vmatrix}}{1} = \frac{2-6}{1} = -4$$

Pt of Intersection $(9, -4)$

$$x = \frac{\begin{vmatrix} c & y \\ 6 & 3 \\ 1 & 2 \end{vmatrix}}{\begin{vmatrix} x & y \\ 2 & 3 \\ 1 & 2 \end{vmatrix}} = \frac{12-3}{4-3} = \frac{9}{1} = 9$$

Solve each system with the **method of your choosing**.

Problem 21

E_1: $y = 2x - 6$

E_2: $x + 2y = 13$

E_2: $x + 2[2x-6] = 13$

$x + 4x - 12 = 13$

$5x = 25$

$x = 5$

$y = 2[5] - 6$

$y = 4$

Pt of Intersection $(5, 4)$

Problem 22

E_1: $2x - 3y = -11$

E_2: $5x + 2y = 1$

$2E_1$: $4x - 6y = -22$

$3E_2$: $15x + 6y = 3$

$19x = -19$

$x = -1$

$2[-1] - 3y = -11$

$-3y = -9$

$y = 3$

Pt of Intersection $(-1, 3)$

Problem 23

E_1: $4x + 2y = 2$

E_2: $3x + y = -2$

E_1: $4x + 2y = 2$

$-2E_2$: $-6x - 2y = 4$

$-2x = 6$

$x = -3$

$3[-3] + y = -2$

$-9 + y = -2$

$y = 7$

Pt of Intersection $(-3, 7)$

Problem 24

E_1: $3x + 8y = 13$

E_2: $x + 4y = 5$

E_2: $x = -4y + 5$

E_1: $3[-4y + 5] + 8y = 13$

$-12y + 15 + 8y = 13$

$\frac{-4y}{-4} = \frac{-2}{-4}$

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

$x = -4[\frac{1}{2}] + 5$

$x = -2 + 5$

$x = 3$

Pt of Intersection $(3, \frac{1}{2})$