

Chapter 7

Systems of Linear Equations & Inequalities

Section 7.1 Solving Linear Systems by Graphing

System of Linear Equations Two (or more) linear EQ that are related by the same var.

Solution of a System of Linear Equations An ordered pair that satisfies all linear EQ in a system.

Solving a Linear System Using Graph-and-Check

1. Write each equation in a form that is easy to graph.
2. Graph both equations in the same coordinate plane. *usually $y = mx + b$* (label each EQ)
3. Estimate the coordinates of the point of intersection. *l_1, l_2*
4. Check the coordinates algebraically by substituting into each equation of the original linear system. *(x, y)*
✓ twice

EXAMPLES

1. Decide whether the ordered pair is a solution of the system of linear equations.

a. $-3x + y = 10$
 $7x + y = 20$, $(1, 13)$ *x, y*

$$\begin{aligned} -3(1) + 13 &= 10 \\ 10 &= 10 \text{ yes} \\ 7(1) + 13 &= 20 \\ 20 &= 20 \text{ yes} \end{aligned}$$

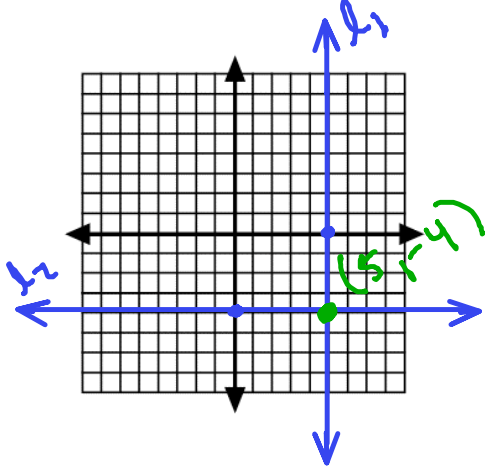
b. $2y + x = 13$
 $x + y = 7$, $(6, 1)$

$$\begin{aligned} 2(1) + 6 &\neq 13 \\ \text{No!!} \end{aligned}$$

2. Solve the linear system graphically.

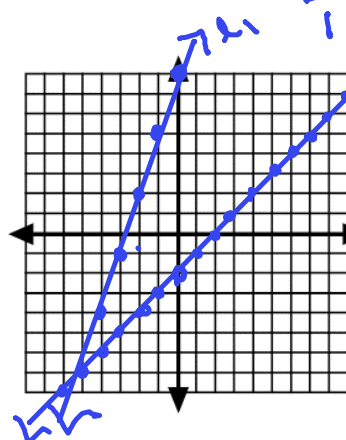
a. $l_1: x = 5$
 $l_2: y = -4$

HOY UUX
 $5 = 5$
 $-4 = -4$ ✓



b. $l_1: y = 3x + 8$
 $l_2: y = x - 2$

$m = 3$ $b = 8$
 $m = 1$ $b = -2$



$(-5, -7)$
 $-7 = 3(-5) + 8$
 $-7 = -15 + 8$
 $-7 = -7$ ✓
 $-7 = -5 - 2$
 $-7 = -7$ ✓

c. $3x - 4y = 4$
 $x + 2y = 8$

$3x - 4y = 4$
 $-3x$
 $-4y = -3x + 4$
 $-4y = -4 = -4$
 $y = 1$

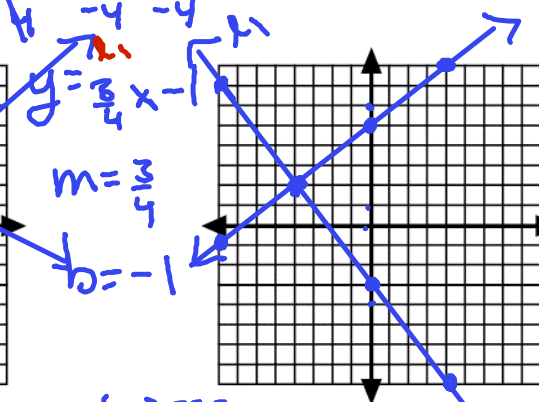
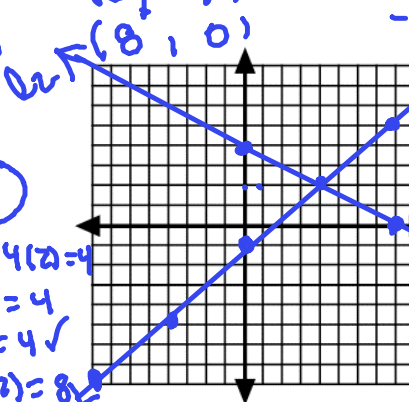
d. $5x + 4y = -12$
 $3x - 4y = -20$

$5x + 4y = -12$
 $y = \frac{-5x - 12}{4}$
 $b = -3$
 $m = \frac{-5}{4}$

$\frac{3x}{2} = \frac{8}{2}$
 $y = 4$
 $(0, 4)$
 $(8, 0)$

$(4, 2)$

$l_1: 3(4) - 4(2) = 4$
 $12 - 8 = 4$
 $4 = 4$ ✓
 $l_2: 4 + 2(2) = 8$
 $4 + 4 = 8$
 $8 = 8$ ✓



$3(-4) - 4(2) = -20$
 $-12 - 8 = -20$
 $-20 = -20$ ✓
 $(-4, 2)$
 ✓

$5(-4) + 4(2) = -12$
 $-20 + 8 = -12$
 $-12 = -12$ ✓

$\frac{-4y}{-4} = \frac{-3x - 20}{-4}$
 $y = \frac{3}{4}x + 5$
 $b = 5$
 $m = \frac{3}{4}$