

7.1/7.2 Systems of Linear Equations and Solving Systems Graphically

Concepts #45
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Example 1) Solve the following systems by graphing

a) Graph the following lines

① $x + y = 8$

Step 1: Re-arrange equations into slope-intercept form ($y = mx + b$)

② $3x - 2y = 14$

Step 2: Use the y-int point and slope (rise/run) to graph each line. Use a ruler.

① $x + y = 8$

$y = -x + 8$
slope y-int

Step 3: Find the point where the lines intersect.

② $3x - 2y = 14$

$-2y = -3x + 14$

$y = \frac{3}{2}x - 7$
slope y-int

b) What are the coordinates of the point where

both lines meet? (This is the solution to a linear system)

$(6, 2)$

c) Verify your solution algebraically

Substitute $(6, 2)$ into both equations. Make sure the left side of the equation equals the right side. Then you can conclude that the point satisfies both equations, and therefore is a point on both lines. So it has to be the point where they intersect

$x = 6$ ① $x + y = 8$
 $y = 2$ $6 + 2 = 8$
 $8 = 8$ ✓

② $3x - 2y = 14$
 $3(6) - 2(2) = 14$
 $18 - 4 = 14$
 $14 = 14$ ✓

YOUR TURN

Solve the following system by graphing

① $x - y = 3$

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$-y = -x + 3$

$y = x - 3$

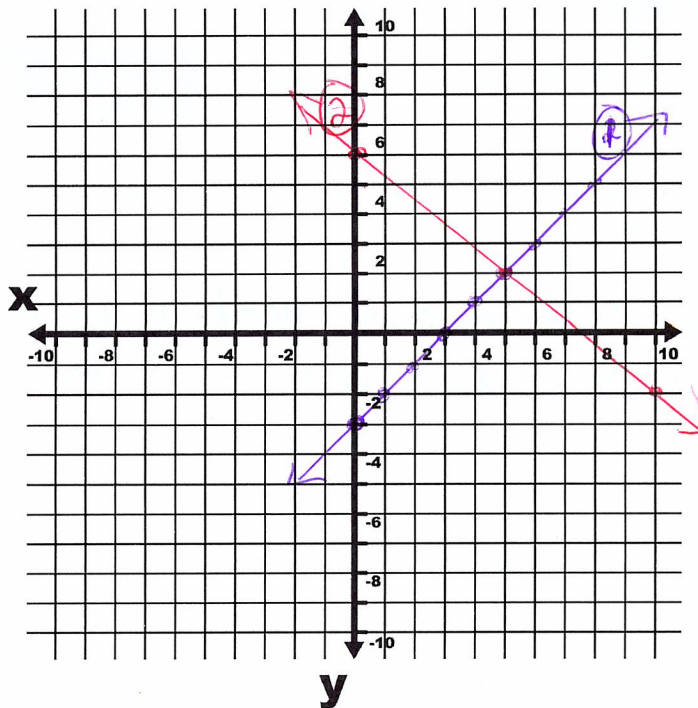
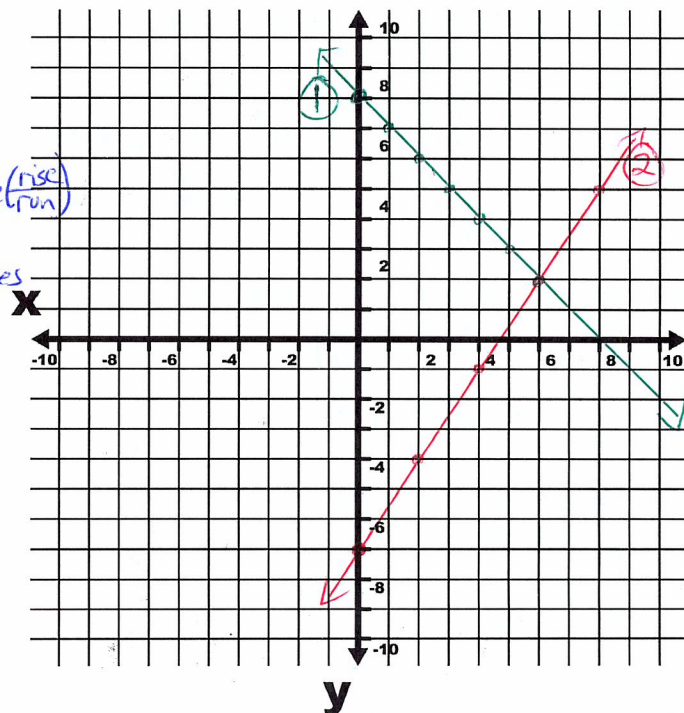
② $4x + 5y = 30$

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$5y = -4x + 30$

$y = -\frac{4}{5}x + 6$

Solution: $(5, 2)$



Example 2) Tickets are sold for the Campbell Musical. Stasia buys 3 adult tickets and 2 student tickets. She pays \$31. Vincent buys 1 adult ticket and 1 student ticket. He pays \$12. What is the cost of each type of ticket?

a) Choose variables to represent the problem and write "let" statements

Let a = price of adult tickets
 s = price of student tickets

b) Write equations to represent the problem

$$3a + 2s = 31$$
$$a + s = 12$$

c) What solutions will work in both your equations?

$$a = \$7$$
$$s = \$5$$

d) What is the cost of each type of ticket?

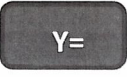
An adult ticket costs \$7.00 and a student ticket costs \$5.00

e) Can you solve this graphically?

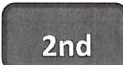
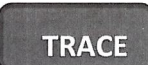
Yes


Use your Graphing Calculator to find Solutions to Systems

Step 1: Re-write equations using y and x variables. Rearrange equations so they are in slope intercept form.

Step 2: Hit  button. Type both slope- intercept form equations in each line Y_1 and Y_2 . (Hint: Put brackets around fractions)

Step 3: Hit  button. Each line will appear.

Step 4: To solve the system (The point of intersection) Hit   . Which is the calculate button. Choose #5 INTERSECT.

Step 5: The calculator will ask you which lines you want to find the intersection of , their equations will appear at the top. Hit  3 times

Note: The intersection point needs to be in the window to find it.
Adjust window size if it does not appear.

YOUR TURN Campbell sold 94 smoothies to raise money for charity. A banana smoothie costs \$3 and a peach mango smoothie cost \$5. The school raised \$394 How many of each type of smoothie did Campbell sell?

a) Choose variables to represent the problem and write "let" statements

Let $b = \#$ of banana smoothies sold
 $m = \#$ of peach mango smoothies sold

b) Write equations to represent the problem

$$\begin{aligned} b + m &= 94 \\ 3b + 5m &= 394 \end{aligned}$$

c) What solutions will work in both equations? Solve graphically using your graphing calculator.

$$\begin{aligned} x + y &= 94 - x & 3x + 5y &= 394 - 3x \\ y &= -x + 94 & \frac{5y}{5} &= \frac{-3x + 394}{5} \\ & & y &= -\frac{3}{5}x + \frac{394}{5} \end{aligned}$$

d) How many of each type of smoothie did Campbell sell?

Example 3) Which pair of values is a solution for this linear system?

$$x = 2y + 2$$

Solution A: $x=4$ and $y=1$ or **Solution B:** $x=-2$ and $y=-2$

$$x + 2y = -6$$

For one of these points to be a solution they must satisfy both equations and therefore be the point where they intersect.

A: (4, 1)

$$4 = 2(1) + 2$$

$$4 = 4$$

✓

$$4 + 2(1) = -6$$

$$6 \neq -6$$

B: (-2, -2)

$$-2 = 2(-2) + 2$$

$$-2 = -4 + 2$$

$$-2 = -2 \checkmark$$

$$-2 + 2(-2) = -6$$

$$-2 - 4 = -6$$

$$-6 = -6 \checkmark$$

Solution B is the solution to this linear system.

Assignment

Pg 401 #6, 5 (~~use graph paper~~) and graph

Pg 409 #3, #5 (use graph paper) #12, 13 (may use graphing calc.)

