

Write a system of linear equations to represent each problem situation. Define each variable. Then, graph the system of equations and estimate the break-even point. Explain what the break-even point represents with respect to the given problem situation.

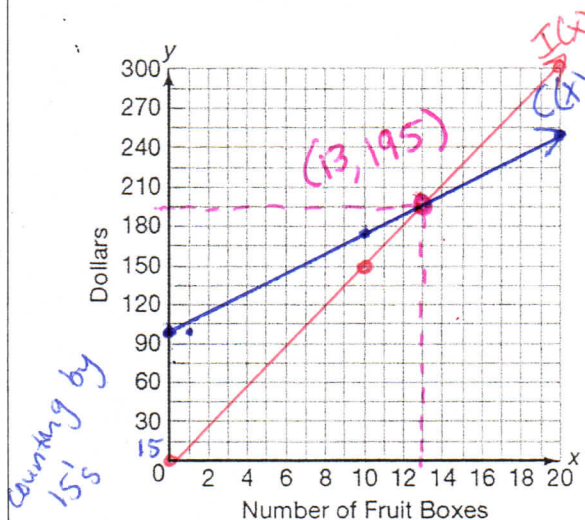
The Spanish Club is selling boxes of fruit as a fundraiser. The fruit company charges the Spanish Club \$7.50 for each box of fruit and a shipping and handling fee of \$100 for the entire order.

The Spanish Club sells each box of fruit for \$15.

x = # of boxes of fruit

$C(x)$ = cost of selling x boxes of fruit

$I(x)$ = Income from selling x boxes of fruit



$C(x) = 7.50x + 100$
 $I(x) = 15x$

costs

x	C(x)
0	100
10	175
20	250

Income

x	I(x)
0	0
10	150
20	300

I estimate the break-even point to be (13, 195). This means that selling about 13 boxes of fruit should cost the same amount as the money you would make selling those boxes, \$195

Solve each system of equations by substitution. Determine whether the system is consistent or inconsistent.

* solve both equations for y

$$\begin{cases} 0.3y = 2 - 0.8x \\ 1.1x = 3y - 0.4 \end{cases}$$

$$\frac{1.1x + 0.4}{3} = \frac{3y}{3}$$

$$0.37x + 0.13 = y$$

$$0.37x + 0.13 = 6.67 - 2.67x$$

$$+2.67x \quad +2.67x$$

$$3.04x + 0.13 = 6.67$$

$$-0.13 \quad -0.13$$

$$3.04x = 6.54$$

$$\frac{3.04x}{3.04} = \frac{6.54}{3.04}$$

$x = 2.15$

$$y = 0.37x + 0.13$$

$$y = 0.37(2.15) + 0.13$$

$$y = 0.79599 + 0.13$$

$$y = 0.93$$

Solution is (2.15, 0.93)
 System is consistent

* plug x into one of the equations and solve for y

$$\frac{0.3y}{0.3} = \frac{2 - 0.8x}{0.3}$$

$$y = 6.67 - 2.67x$$

* set equations equal to each other and solve for x

$$\begin{cases} \frac{5}{4}x - 3 = \frac{1}{6}y \\ \frac{2}{5}x + \frac{1}{5}y = \frac{9}{5} \end{cases}$$

$$\frac{2}{5}x + \frac{1}{5}y = \frac{9}{5}$$

$$-\frac{2}{5}x \quad -\frac{2}{5}x$$

$$\frac{5}{1} \cdot \left(\frac{1}{5}y = \frac{2}{5}x + \frac{9}{5} \right)$$

$$y = -2x + 9$$

* set equal and solve

$$(-2x + 9 = \frac{15}{2}x - 18) \cdot 2$$

$$-4x + 18 = 15x - 36$$

$$-15x \quad -15x$$

$$-19x + 18 = -36$$

$$-18 \quad -18$$

$$-19x = -54$$

$$\frac{-19x}{-19} = \frac{-54}{-19}$$

$x = 2.84$

* multiply by 2 gets rid of the fraction

$$y = -2x + 9$$

$$y = -2(2.84) + 9$$

$$y = -5.68 + 9$$

Solution (2.84, 3.32)