

Sec. 6.4 Applications of Linear Systems

Break-even point: point at which income equals expenses



Review: When to use each method to solve systems

- Graphing: ① Inequalities $<, >, \leq, \geq$
- visual display or estimate

- Substitution: When one variable is already solved for, or when it's easy to solve for a variable

- Elimination: When coefficients of a variable are opposites, or when the other methods aren't convenient.

Ex:

$$\begin{array}{l} \text{a. } y = 3x - 1 \\ y = 4x \\ y = 4(-1) \\ y = -4 \end{array} \quad \begin{array}{l} 4x = 3x - 1 \\ -3x \quad -3x \\ \hline x = -1 \end{array} \quad \begin{array}{l} (-1, -4) \end{array}$$

$$\begin{array}{l} \text{b. } 1(3m - 4n = 1) \rightarrow 3m - 4n = 1 \\ -1(3m - 2n = -1) \rightarrow -3m + 2n = 1 \\ \hline 3m - 2(-1) = -1 \\ 3m + 2 = -1 \\ -2 \quad -2 \\ \hline 3m = -3 \\ \frac{3m}{3} = \frac{-3}{3} \\ m = -1 \end{array} \quad \begin{array}{l} -2n = 2 \\ \frac{-2n}{-2} = \frac{2}{-2} \\ n = -1 \end{array}$$

c.

$$4s - 3t = 8 \rightarrow 4s - 3\left(\frac{2s-1}{t}\right) = 8$$

$$t = 2s - 1$$

$$t = \frac{2(-5)}{1} - 1$$

$$t = -5 - 1$$

$$t = -6$$

$$\left(-\frac{5}{2}, -6\right)$$

$$4s - 6s + 3 = 8$$

$$-2s + 3 = 8$$

$$\begin{array}{r} -2s + 3 = 8 \\ -3 \quad -3 \\ \hline -2s = 5 \\ \frac{-2s}{-2} = \frac{5}{-2} \\ s = -\frac{5}{2} \end{array}$$

Problem 1:

A carpenter makes rocking chairs.

The material for each chair costs \$22.50.

The chairs sell for \$75 each. If the carpenter spends \$420 on advertising, how many chairs must she sell to break even?

① Write the system of equations.

x = the number of chairs sold

y = total dollars, income or expenses

Expenses:

$$y = 22.50x + 420$$

Income:

$$y = 75x$$

Substitution

$$\begin{array}{r} 75x = 22.50x + 420 \\ -22.50x \quad -22.50x \\ \hline \end{array}$$

$$\frac{52.50x}{52.50} = \frac{420}{52.50}$$

$$x = 8$$

$$\textcircled{5} \quad P = 24 \text{ in.}$$

$$l = 3w$$

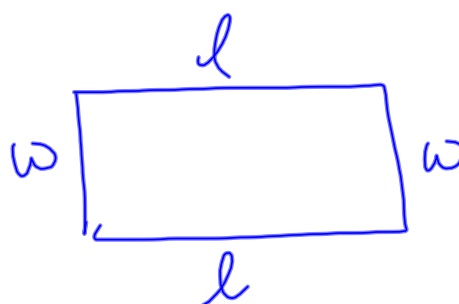
$$P = 2l + 2w$$

$$24 = 2l + 2w$$

$$l = 3w$$

$$l = 3(3)$$

$$l = 9 \text{ in}$$



$$24 = 2(3w) + 2w$$

$$24 = 6w + 2w$$

$$\frac{24}{8} = \frac{8w}{8}$$

$$3 \text{ in} = w$$