

Solving Systems of Equations with Substitution

Big Ideas: A "solution" to a set of linear equations (system) is where the lines cross (this is where they are equal).

Using Substitution is usually best when equations are in slope-intercept form.

Example:

A poster shop is choosing a paper delivery service. Paper Palace charges \$1 per sheet plus a \$24 delivery fee. Supply Co. charges \$4 per sheet plus a \$2 delivery fee.

a. Write a system of equations to represent this situation.

$$\begin{cases} y = x + 24 \\ y = 4x + 2 \end{cases}$$

b. Sketch a Graph of this situation.

c. Solve this system using substitution to find the "solution," (break-even point). Label this important point on your sketch.

$$\begin{array}{r} x + 24 = 4x + 2 \\ -x \quad -x \\ \hline 24 = 3x + 2 \end{array}$$

$$\begin{array}{r} 24 = 3x + 2 \\ -2 \quad -2 \\ \hline 22 = 3x \end{array}$$

$$\frac{22}{3} = \frac{3x}{3}$$

$$\{7\frac{1}{3} = x\}$$

$$y = x + 24$$

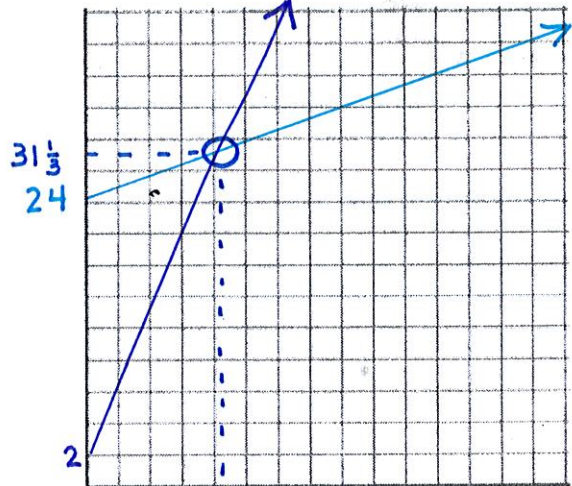
$$y = 7\frac{1}{3} + 24$$

$$y = 31\frac{1}{3}$$

Point of Intersect

$$(7\frac{1}{3}, 31\frac{1}{3})$$

Total Cost



d. Which company would you choose if you needed 5 sheets?

Supply Co. ... it's cheaper!

e. Which company would you choose if you needed 200 sheets?

Paper Palace ... it's cheaper!