

7d - Solve systems of equations using substitution or elimination.

When is it easiest to use substitution?

To solve for substitution, you need a $x=$ or $y=$ equation

- already in $x=$ or $y=$ form
- coefficient of 1 or -1 ($1x$, $1y$, $-1x$, $-1y$)
- can easily get to $x=$ or $y=$ form

When is it easiest to use elimination?

- Standard Form
- Opposites
- No opposites, but no coefficients of 1

$$y=3x$$

$$3x+4y=30$$

$$y=3x$$

$$y=3(2)$$

$$y=6$$

Solu: (2,6)

$$3x+4y=30$$

$$3x+4(3x)=30$$

$$3x+12x=30$$

$$\frac{15x}{15} = \frac{30}{15}$$

$$x=2$$

intersecting lines.

$$2(2x - y) = -1 \rightarrow 4x - 2y = -2$$

$$3x + 2y = -12$$

$$\begin{array}{r} 4x - 2y = -2 \\ 3x + 2y = -12 \\ \hline \end{array}$$

$$\frac{7x}{7} = \frac{-14}{7}$$

$$\boxed{x = -2}$$

$$2x - y = -1$$

$$2(-2) - y = -1$$

$$-4 - y = -1$$

$$\begin{array}{r} -4 - y = -1 \\ +4 \quad \quad +4 \\ \hline \end{array}$$

$$-y = 3$$

$$\boxed{y = -3}$$

$$\text{Solu: } (-2, -3)$$

intersecting lines.

$$12x - 2y = 9$$

$$2(6x - y) = (11) - 2 \rightarrow \begin{array}{r} 12x - 2y = 9 \\ -12x + 2y = -22 \\ \hline \end{array}$$

$$0 \neq -13$$

false
no solu.
parallel lines

$$x - y = 2 \rightarrow$$

$$5x + 3y = 18$$

Solu: (3, 1)

$$\begin{array}{r} x - y = 2 \\ + y \quad + y \\ \hline x = 2 + y \end{array}$$

$$\begin{array}{r} x - y = 2 \\ x - 1 = 2 \\ + 1 \quad + 1 \\ \hline \boxed{x = 3} \end{array}$$

$$\begin{array}{r} 5x + 3y = 18 \\ 5(2 + y) + 3y = 18 \\ 10 + 5y + 3y = 18 \\ 10 + 8y = 18 \\ -10 \quad -10 \\ \hline 8y = 8 \\ \frac{8}{8} \quad \frac{8}{8} \\ \hline \boxed{y = 1} \end{array}$$

$$2x - 3y = 12$$

$$x + 3y = 12$$

$$3x = 24$$

$$\frac{3}{3} = \frac{24}{3}$$

$$\boxed{x = 8}$$

$$x + 3y = 12$$

$$\begin{array}{r} 8 + 3y = 12 \\ -8 \quad \quad -8 \end{array}$$

$$3y = 4$$

$$\frac{3}{3} = \frac{4}{3}$$

$$\boxed{y = 4/3}$$

Solu: $(8, 4/3)$

intersecting lines

$$5(6x + 3y) = (6)5 \rightarrow 30x + 15y = 30$$

$$3(8x + 5y) = (12)3 \rightarrow 24x + 15y = 36$$

$$\frac{6x}{6} = \frac{-6}{6}$$

$$\boxed{x = -1}$$

Solu: (-1, 4)

intersecting.

$$\begin{array}{r} 6x + 3y = 6 \\ 6(-1) + 3y = 6 \\ -6 + 3y = 6 \\ +6 \quad \quad -6 \\ \hline 3y = 12 \\ \frac{3y}{3} = \frac{12}{3} \\ \boxed{y = 4} \end{array}$$

HW: worksheet