

Target 3B. Solve a system of equations graphically and algebraically.

Target 3C. Understand the relationship between a system of equations and its number of solutions.

Use the system of equations for each of the following problems.

$$\begin{aligned} 4x + y &= 2 \\ 2x - 2y &= 6 \end{aligned}$$

What is the most efficient method to solve this problem?

1. Solve the system of equations by **elimination**.

2.  $(4x + y = 2)$  Eliminate y variable:  
 $2x - 2y = 6$  mult. top equation by 2!

$$\begin{array}{r} 8x + 2y = 4 \\ 2x - 2y = 6 \\ \hline 10x = 10 \end{array}$$

$$\frac{10x}{10} = \frac{10}{10}$$

$$x = 1$$

$$\begin{aligned} 4x + y &= 2 \\ 4(1) + y &= 2 \\ 4 + y &= 2 \\ -4 & \\ \hline y &= -2 \end{aligned}$$

$$\therefore \begin{pmatrix} x & y \\ 1 & -2 \end{pmatrix}$$

Easiest, most efficient method

2. Solve the system of equations by **substitution**.

Must solve one equation for a variable.

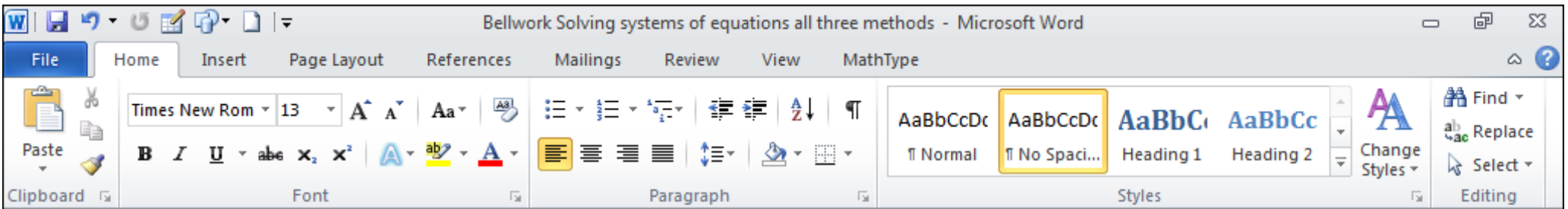
I choose to solve  $4x + y = 2$  for y because it's easy.

$$\begin{aligned} 4x + y &= 2 \\ -4x & \quad -4y \\ \hline y &= -4x + 2 \end{aligned}$$

$$\begin{aligned} 2x - 2y &= 6 \\ 2x - 2(-4x + 2) &= 6 \\ 2x + 8x - 4 &= 6 \\ 10x - 4 &= 6 \\ 10x &= 10 \\ \frac{10x}{10} &= \frac{10}{10} \\ x &= 1 \end{aligned}$$

$$\begin{aligned} y &= -4(1) + 2 \\ &= -4 + 2 \\ &= -2 \end{aligned}$$

$$\therefore \begin{pmatrix} x & y \\ 1 & -2 \end{pmatrix}$$



→ must solve each eq for y to get it in slope-intercept form.

3. Solve the system of equations by **graphing**.

$$\begin{array}{r} 4x + y = 2 \\ -1x \quad -4x \\ \hline y = -4x + 2 \end{array}$$

Slope:  $-\frac{4}{1}$   
 $\downarrow$   
 $\rightarrow$

y-int: 2

$$\begin{array}{r} 2x - 2y = 6 \\ -2x \quad -2x \\ \hline -2y = -2x + 6 \\ \underline{-2} \quad \underline{-2} \quad \underline{-2} \\ y = 1x - 3 \end{array}$$

$y = 1x - 3$

Slope:  $\frac{1}{1}$   
 $\downarrow$   
 $\rightarrow$

y-int: -3

