### SECTION 2.1 SUMMARY
Solving Systems of Equations by Graphing

<table>
<thead>
<tr>
<th>REVIEW: GRAPHING A LINEAR EQUATION IN SLOPE-INTERCEPT FORM</th>
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</thead>
<tbody>
<tr>
<td>$y = mx + b$</td>
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</tbody>
</table>

1. **y-Intercept ($b$):** Plot the $b$ value on the $y$-axis.  
   **Example:** Graph $y = -\frac{2}{3}x + 1$
   
   $b = 1$

2. **Slope ($m$):** Start at the $y$-intercept, use the slope to count $\frac{\text{rise}}{\text{run}}$ to plot another point.  
   **Example:** Graph $-2x + y = -4$
   
   $b = -4$
   $m = \frac{2}{1} = \frac{\text{Up 2}}{\text{Right 1}}$

3. **Graph:** Draw a line through the two points.

#### SLOPE-INTERCEPT METHOD
1. Solve the equation for $y$ and write the equation as $y = mx + b$.  
   **Example:** Graph $-2x + y = -4$
   
   $-2x + y = -4$
   $y = 2x - 4$

2. Plot the $b$ value on the $y$-axis.

3. Use the slope and count $\frac{\text{rise}}{\text{run}}$ to plot another point.

4. Draw a line through the two points.

#### X AND Y INTERCEPT METHOD
1. To get the $x$-intercept, set $y = 0$, and solve for $x$.  
   **Example:** Graph $-2x + y = -4$
   
   $x$-intercept
   $-2x + y = -4$
   $-2x + 0 = -4$
   $-2x = -4$
   $x = 2$

2. To get the $y$-intercept, set $x = 0$, and solve for $y$.  
   **Example:** Graph $-2x + y = -4$
   
   $y$-intercept
   $-2x + y = -4$
   $-2(0) + y = -4$
   $0 + y = -4$
   $y = -4$

3. Plot the two points.

4. Draw a line through the 2 points.

**Notice that both methods produced the same line.**

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#### SOLVING A SYSTEM OF LINEAR EQUATIONS BY GRAPHING

**System of Equations:** two or more equations that are solved together

**Solution of a System of Two Linear Equations:** the ordered pair that satisfies both equations

1. Graph both lines on the **same set of axes**.
   - If the equation is in the form $y = mx + b$, try the Slope-Intercept Method first.
   - If the equation is NOT in that form, try the $x$ and $y$ Intercept Method first.
   - If one method doesn’t work well, try the other.

2. Determine the intersection point for the two lines and write it as an ordered pair.

3. Check the solution by substituting the coordinates of the intersection point in the original equations.

**Special Cases:**
- If the two lines are parallel (do not intersect), then the system of equations has **No Solution** ($\emptyset$).
- If the two lines are the same line (overlapping), then the system has **Infinite Solutions**.

**Example:** $x - 2y = 6$

1st Equation: $x - 2y = 6$

<table>
<thead>
<tr>
<th>$x$-intercept</th>
<th>$y$-intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x - 2y = 6$</td>
<td>$x - 2y = 6$</td>
</tr>
<tr>
<td>$x - 2(0) = 6$</td>
<td>$0 - 2y = 6$</td>
</tr>
<tr>
<td>$x = 6$</td>
<td>$y = -3$</td>
</tr>
</tbody>
</table>

(6, 0)

(0, -3)

2nd Equation: $y = -\frac{3}{2}x + 1$

<table>
<thead>
<tr>
<th>$b$</th>
<th>$m$</th>
<th>Answer</th>
</tr>
</thead>
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<tr>
<td>$b = 1$</td>
<td>$m = \frac{-3}{2}$</td>
<td>$(-2, 2)$</td>
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**Answer:** $(-2, 2)$