Slope-Intercept and Point-Slope Forms of a Linear Equation

I. Slope-Intercept Form of a Linear Equation

A. The **standard form** of a linear equation: \( Ax + By = C \).  
   Ex: \( 4x - 6y = 12 \)

B. In section 2.6 you were asked to rewrite equations in \( y = mx + b \) form. This is called the **slope-intercept form** of a linear equation.

   \[ y = mx + b, \quad m \text{ is the slope and } y\text{-intercept is } (0,b) \]

C. Determine the slope and y-intercept of the line represented by each equation.

1) \( y = 2x - 4 \)  
2) \( -2x + y = 5 \)

D. Graph the line using the slope and y-intercept. Your line must have at least 3 points.

3) \( 3x + 2y = 4 \)  
4) \( 3x = 4y + 8 \)

\[ m = \quad y\text{-int: } (\quad, \quad) \]

5) \( y = 3x - 1 \)  
6) \( 2x + 3y = 6 \)

\[ m = \quad y\text{-int: } (\quad, \quad) \]
E. Determine the equation (in slope-intercept form) of each line.
What info do you need to write this equation? _______________ and _____________

1) ![Graph](image1)
2) ![Graph](image2)
3) ![Graph](image3)
4) ![Graph](image4)

II. Point-Slope Form of a Linear Equation
What if you are not given the graph but rather some info about it? How will you find the equation of the line?

The **point-slope form** of a linear equation: \( y - y_1 = m(x - x_1) \)

\( m \) is the slope; \( (x_1, y_1) \) is a point on the line

We never leave equations in this form. Think of this equation as an ‘in-between’ step.
If given a point and the slope:
1. Plug the given point and the given slope into the point-slope equation.
2. Rewrite the equation in slope-intercept form, \( y = mx + b \).

Example: Write the equation of each line, with the given properties, in slope-intercept form.

1) through \((-3,4)\) with \(m = 2\)

2) through \((8,-5)\) with \(m = -\frac{3}{4}\)

If you are given two points:
1. Use the slope formula to find the slope of the line.
2. Pick ONE of the points.
3. Plug in the slope and the chosen point into the point-slope equation.
4. Rewrite the equation in slope-intercept form, \( y = mx + b \).

3) through \((1,2)\) and \((2,-1)\)
4) through (8, -1) and (-7,4)

Your turn:

5) through (-6,7) with m = \(-\frac{2}{3}\)

6) through (-4,6) and (2,3)

7) through (-2,4) and (0,-3)