Name: _____   Date: _____   Period: _____

Writing the Equation of a Line

There are two different formats for writing the equation of a line.

# Slope – intercept Form	# Point - Slope Form

$$y = mx + b$$

slope   y-intercept

$$(y - y_1) = m(x - x_1)$$

y – value from point given   slope   x – value from point given

Slope-intercept form is useful when we know the
y - intercept of a line.
However, we are not always given this information.

When we know the slope and one point
(**not** the y-intercept),
we can write the equation in point - slope form.

1. **When given the slope and y-intercept: Use Slope-Intercept Form**

   1] Substitute for m
   2] Substitute for b   **For example:** Write the equation of the line whose slope is
   3] Write your equation in y = mx + b format   -3 and y-intercept is 8.

   $$y = -3x + 8$$

YOUR TURN: Write the equation of the line whose slope is 4 and y-intercept is -2.

2. **When given the slope and one point: Use either format**

For example: Write the equation (using EACH format) of the line whose **slope is 4** that passes through the point **(3, 5)**.

## Using Slope-Intercept Form	## Using Point – Slope Form
1] Substitute for m	1] Substitute for m
2] Substitute for x and y from the point (x, y)	2] Substitute for x_1 and y_1 from the point (x, y)
3] Solve for b	3] Verify
4] Write the equation in y = mx + b format.	

1] Substitute for m:	2] Substitute for x and y:	1] Substitute for m:	2] Substitute for x_1 and y_1:
$y = \underline{m}x + b$ $y = \underline{4}x + b$	$\underline{y} = 4\underline{x} + b$ $\underline{5} = 4(\underline{3}) + b$	$(y - y_1) = \underline{m}(x - x_1)$ $(y - y_1) = \underline{4}(x - x_1)$	$(y - 5) = \underline{4}(x - 3)$ This is the format you should leave your equation in

3] **Solve** for b:	4] Write in y = mx + b format	To verify this equation, if you distribute and solve for y, you should get the same y = mx + b equation:
$5 = \ 12 \ + b$ $\underline{-12 = -12}$ $-7 = b$	$y = 4x - 7$	$y - 5 = 4x - 12$ $\underline{+5 \qquad + 5}$ $y = 4x - 7$

These should match

YOUR TURN: Write the equation (using EACH format) of the line whose slope is 2 that passes through the point (-3, 4).

Using Slope-Intercept Form:

1] Substitute for m:	2] Substitute for x and y:
3] **Solve** for b:	4] Write in y = mx + b format

Using Point – Slope Form

1] Substitute for m:	2] Substitute for x_1 and y_1:
Verify:	

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3. **When given two points: Use either format**

For example: Write the equation (using EACH format) of the line that passes through the points (2, 5) and (4, 11).

Using Slope-Intercept Form:	Using Point – Slope Form
1] Find m using the slope formula	1] Find m using the slope formula
2] Substitute for m	2] Substitute for m
3] Substitute for x and y from EITHER point (x, y)	3] Substitute for x_1 and y_1 from EITHER point (x, y)
4] Solve for b	4] Verify
5] Write the equation in y = mx + b format.	

1] Find m (since the first step is the same for both formats, you only have to find the slope once:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{11 - 5}{4 - 2} = \frac{6}{2} = \frac{3}{1}$$

2] Substitute for m:	3] Substitute for x and y:	2] Substitute for m:	3] Substitute for x_1 and y_1:
y = **m**x + b y = **3**x + b	**y** = 3**x** + b **5** = 3(**2**) + b	(y − y_1) = **m**(x − x_1) (y − y_1) = **3**(x − x_1)	(y − 5) = **3**(x − 2) This is the format you should leave your equation in
4] **Solve** for b: 5 = 3(2) + b 5 = 6 + b -6 = -6 -1 = b	5] Write in y = mx + b format y = 3x - 1	Verify:	

YOUR TURN: Write the equation (using EACH format) of the line that passes through the points (3, 1) and (9, 7).

1] Find m:

2] Substitute for m:	3] Substitute for x and y:	2] Substitute for m:	3] Substitute for x_1 and y_1:
4] **Solve** for b:	5] Write in y = mx + b format	Verify:	