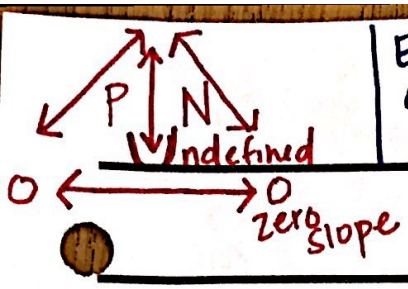

Equation of a Line: $y = mx + b$ (m: SLOPE, b: y-intercept)

SLOPE: $\frac{RISE}{RUN}$ $m = \frac{y_2 - y_1}{x_2 - x_1}$

Writing Equations of Lines Day 1

$y = mx + b$

y-intercept: where line crosses the y-axis $(0, b)$

Name_____ **Class Period**_____

Writing an equation of a line <u>given m and b</u>.

1. <u>Write</u> down $y = mx + b$.
2. <u>Substitute</u> slope for m and y-intercept for b.
3. <u>Simplify</u> the equation.

- Horizontal Lines ↔ $y = \#$
- Vertical Lines ↕ $x = \#$

<u>Ex. 1</u>: Slope is -5 and y-intercept is 2. ($m = -5$, $b = 2$)

$y = -5x + 2$

<u>Ex. 2</u>: Slope is -1/2 and y-intercept is -2. ($m = -\frac{1}{2}$, $b = -2$)

$y = -\frac{1}{2}x + -2$ or $y = -\frac{1}{2}x - 2$

<u>Ex. 3</u>: Slope is 0 and y-intercept is 3. ($m = 0$, $b = 3$)

$y = 0x + 3 \rightarrow y = 0 + 3 \rightarrow \boxed{y = 3}$

<u>Ex. 4</u>: Slope is 1/3 and y-intercept is 0. ($m = \frac{1}{3}$, $b = 0$)

$y = \frac{1}{3}x$

Writing an equation of a line <u>given m and a point</u>.

1. <u>Write</u> down $y = mx + b$. [Fill in for m]
2. <u>Substitute</u> ~~slope for m~~ and the point (x, y).
3. <u>Solve</u> for b.
4. <u>Substitute</u> m and b back into the equation. [write your answer]

<u>Ex. 5</u>: m = 2 and Point: (2, 3)

① $y = 2x + b$
② $3 = 2(2) + b$
③ $3 = 4 + b$
$-4 \quad -4$
$b = -1$

④ $y = 2x - 1$

<u>Ex. 6</u>: m = ½ and Point: (-1, -2)

① $y = \frac{1}{2}x + b$
② $-2 = \frac{1}{2}(-1) + b$
③ $-2 = -\frac{1}{2} + b$
$+\frac{1}{2} \quad +\frac{1}{2}$
$b = -1.5$

④ $y = \frac{1}{2}x - 1.$

<u>Ex. 7</u>: m = 0 and Point: (3, – 2)

Horizontal Line

$\boxed{y = -2}$

<u>Ex. 8</u>: m = undefined and Point (3, 6)

Vertical line

$\boxed{x = 3}$

Writing an equation of a line given TWO points.

1. Write down y = mx + b.
2. Use the slope formula to find m. $\frac{y_2-y_1}{x_2-x_1}$
3. Pick one of the ordered pairs and substitute slope for m and the point (x, y).
4. Solve for b.
5. Substitute m and b back into the equation. [write equation]

Example 9: Points: (2, 3) and (4, 5)

$m = \frac{5-3}{4-2} = \frac{2}{2} = m = 1$

$y = 1x + b$

$3 = 1(2) + b$

$3 = 2 + b \quad b = 1$

$-2 \quad -2$

$y = 1x + 1$

Example 10: Points: (2, 3) and (-4, 15)

$m = \frac{15-3}{-4-2} = \frac{12}{-6} = m = -2$

$y = -2x + b$

$15 = -2(-4) + b$

$15 = 8 + b \quad b = 7$

$-8 \quad -8$

$y = -2x + 7$

Example 11: Points: (2, 2) and (0, 4)

Example 12: Points: (2, 3) and (1, 4)

Example 13: Points (4, 5) and (5, 2)

Example 14: Points: (6, – 8) and (2, – 8)