Name _____ Date _____ Period 1

Lines in the Coordinate Plane

Lesson Objective IWBAT graph lines in coordinate plane; determine whether 2 lines are ||, ⊥, or neither in the coordinate plane.

Algebra 1 Review

In Algebra 1, you learned how to find the slope of a line in the coordinate plane.

Slope: The slope of a line is a number that describes the steepness of the line.

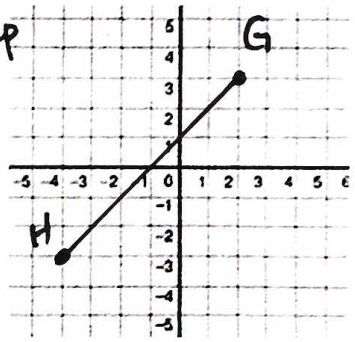
m → ANY two points can be used to determine the slope of a line or line segment.

The Δy is the difference in the y-values

The Δx is the difference in the x-values

The slope is the ratio of the Δy to the Δx.

less steep ↓ $0 \le |m| < \infty$ ↓ more steep

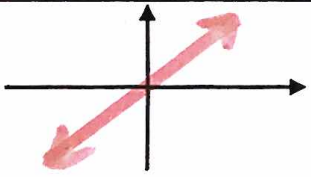
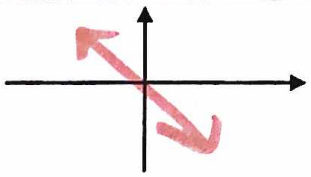
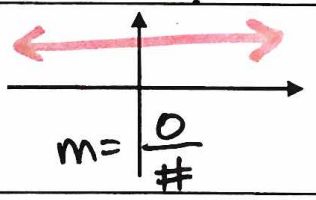
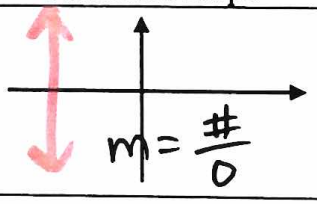


$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Examples:

1. Use the slope formula to determine the slope of $\overline{GH}$ if G(2, 3) and H(−4, −3).

$$m = \frac{-3-3}{-4-2} = \frac{-6}{-6} = 1$$

Summary: Slope of a Line			
Positive Slope	Negative Slope	Zero Slope	Undefined Slope
		 $m = \frac{0}{\#}$	 $m = \frac{\#}{0}$

More Algebra 1 Review

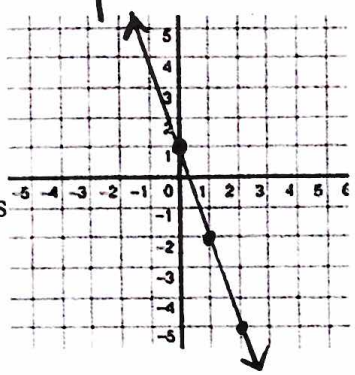
In Algebra 1, you learned how to graph lines in the coordinate plane using these formulas:

#1	**Slope-Intercept Form**	$y = mx + b$	m = slope b = y-int (0, b)
#2	**Point-Slope Form**	$y - y_1 = m(x - x_1)$	m = slope (x_1, y_1) = any point on the line

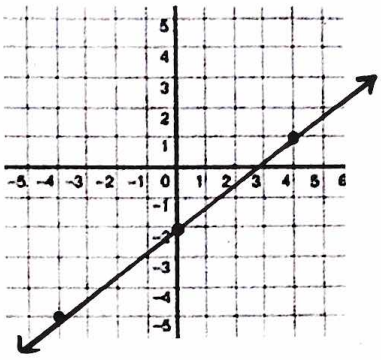
Graphing #1: Slope-Intercept Form

2. $y = -3x + 1$ $m = \frac{-3}{1}$

(1) Graph the y-int (b)
(2) From the y-int, plot new points using the slope (m) "rise/run"
(3) Make at least 3 points
(4) Connect the points with a straightedge



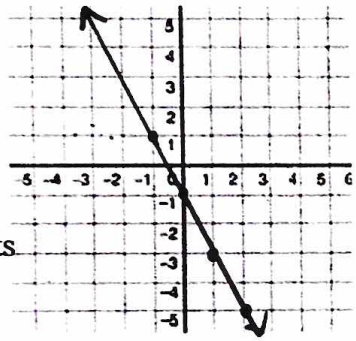
3. $y = \frac{3}{4}x - 2$



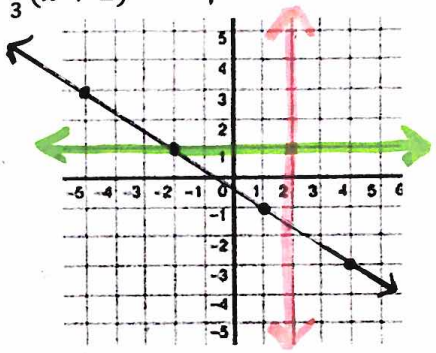
Graphing #2: Point-Slope Form

4. $y + 3 = -2(x - 1)$ pt (1, -3)

(1) Graph the point (x_1, y_1)
(2) From this point, plot new points using the slope (m) "rise/run"
(3) Make at least 3 points
(4) Connect the points with a straightedge



5. $y - 1 = -\frac{2}{3}(x + 2)$ pt (-2, 1)

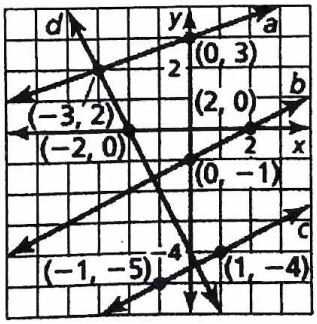


Vertical Lines	The equation of a vertical line is $x = \#$, where $\#$ is the x - intercept.	Example: $x = 2$
Horizontal Lines	The equation of a ~~vertical~~ horiz line is $y = \#$, where $\#$ is the y - intercept.	Example: $y = 1$

Connecting it to Geometry

Parallel Lines Theorem (∥ Lines Thm)	In a coordinate plane, two distinct non-vertical lines are parallel if and only if they have the same slope. Also, any two vertical lines are parallel.
Perpendicular Lines Theorem (⊥ Lines Thm)	In a coordinate plane, two distinct non-vertical lines are perpendicular if and only if the product of their slopes is -1. Also, horizontal lines are perpendicular to vertical lines.

Example:
6. Determine which of the lines are parallel and which of the lines are perpendicular.



$m_a = \frac{1}{3}$ $m_d = -2$ $(\frac{1}{2})(-2) = -1$

$m_b = \frac{1}{2}$ b∥c: same slope of $\frac{1}{2}$

$m_c = \frac{1}{2}$ b⊥d and c⊥d: slopes multiply to -1