Warm-up

Determine if the three points $R(-7, -5)$, $S(5, 2)$ and $T(12, 6)$ are collinear. Justify your answer. (Think: If all three are on the same line, what must be true about the slopes of $\overline{RS}$ and $\overline{ST}$?)

$RS = \frac{y-y}{x-x} = \frac{-5-2}{-7-5} = \frac{-7}{-12}$

$= \frac{7}{12}$

$ST = \frac{6-2}{12-5} = \frac{4}{7}$

Not same slope so not collinear

Name:_____ Date:_____

Geometry Notes CG - 2: Equations of Lines

slope

y-int

$y = mx + b$

Ex: Graph the following

a. $x = 3$ — Vertical

x is *always* 3; y can be anything.

Slope Undefined

x	y
3	1
3	2
3	3

b. $y = -2$ — Horizontal

y is *always* –2; x can be anything.

Slope - zero

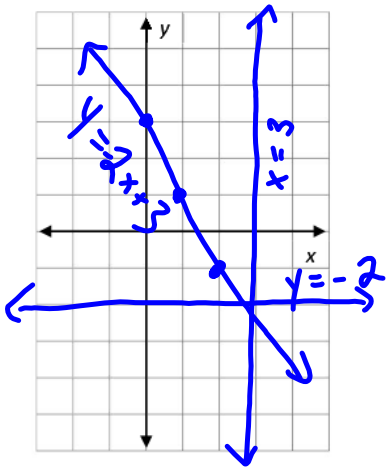
x	y
1	-2
2	-2
3	-2

c. $y = -2x + 3$

x can be anything; y "depends on" x.

slope -2

x	y
0	3
1	1
2	-1



Summary

$x = a$ (where a is a number): Vertical line through a on the x-axis. Undefined slope.

$y = b$ (where b is a number): Horizontal line through b on the y-axis. Slope = 0.

$y = mx + b$ (m, b both numbers): Diagonal line (unless $m = 0$). Slope of m.

Passes through b on the y-axis (y-intercept is b).

Solid line → $\leq$ $\geq$

Get y by itself Dased line

Ex: Graph the inequality $2x - 5y < 15$

$-2x \quad -2x$

$\frac{-5y}{-5} < \frac{-2x + 15}{-5} \quad \frac{}{-5}$

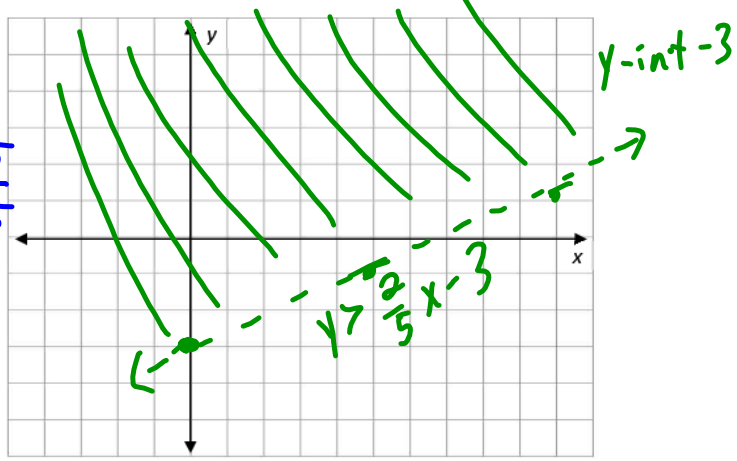
$y > \frac{2}{5}x - 3$

$y = mx + b$

* when you ÷ by a negative # Switch sign

$m = \frac{2}{5}$

y-int -3

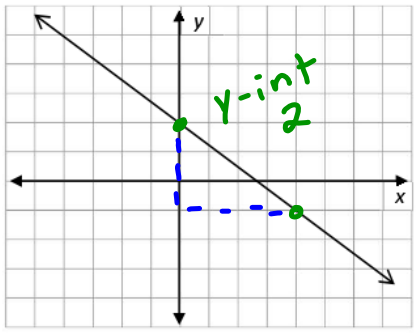


Slope y-int

Ex: Write an equation for the line in the graph:

$y = mx + b$

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

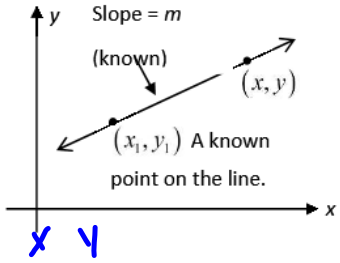


$m = \frac{-3}{4}$

Point - Slope Equation of a Line:

$m = \frac{y-y}{x-x}$

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



Ex: Write an equation for the line having slope $\frac{2}{5}$ and passing through the point (–4, 7).

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

$y - 7 = \frac{2}{5}(x - (-4))$

Ex: Write an equation of the line that passes through the points (–3, 12) and (9, –8).

$m = \frac{y-y}{x-x} = \frac{12+(8)}{-3-9} = \frac{20}{-12} = \frac{5}{-3}$

x y

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

$y - 12 = \frac{5}{-3}(x + (+3))$

$y - 12 = \frac{5}{-3}x - 5$

$+12 \quad +12$

$y = \frac{5}{-3}x + 7$

Ex: Write an equation of the line parallel to the line $3x + 2y = 5$ and passing through the point (–8, 3)

same slope

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

$y - 3 = -\frac{3}{2}(x + (+8))$

$y - 3 = -\frac{3}{2}x - 12$

$+3 \quad +3$

$y = -\frac{3}{2}x - 9$

$3x + 2y = 5$

$-3x \quad -3x$

$\frac{2y}{2} = \frac{-3x}{2} + \frac{5}{2}$

slope

$y = -\frac{3}{2}x + \frac{5}{2}$

Name:_____ Date:_____

Geometry HW: CG - 2

1. Find the slope and *y*-intercept for each of the following lines. Then graph each line on graph paper. (The lines may all be graphed on one set of axes but *label* each line.)

m = 0 m = −2 m = −1

a. $y = 5$ b. $y = -2x$ c. $y = 8 - x$ d. $3x - 6y = 12$

y-int 5 y-int 0 y-int 8

$-3x \quad -3x$

$\frac{-6y}{-6} = \frac{-3x}{-6} + \frac{12}{-6}$

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

2. On a ***new*** set of axes, graph and label the following:
   a. $y \geq x + 1$ b. $2x + 3y < 12$ c. $x \geq 6$

y = mx + b

3. Write the equation of the line having the given slope and *y*-intercept:

   a. slope = –2, *y*-intercept is 6 b. slope = $\frac{1}{2}$; *y*-intercept at the origin c. slope = 0, *y*-intercept is 4

4. Find the equation of the line having slope 3 and passing through the point (4, –3).

y − y = m(x − x)

5. Find the equation of the line that passes through the points (3, 2) and (6, –4).

6. Find the equation of the line passing through the points (3, –2) and (3, 4).

7. a. Graph the line $y = 3x - 7$.

   b. For the line in part (a), how much does *y* change when *x* increases by 1 unit? Does *y* increase or decrease?

   c. Graph the line $y = -\frac{1}{2}x + 3$. (This may go on the same axes as part *a*.)

   d. For the line in part (c), how much does *y* change when *x* increases by 1 unit?

   e. For the line $y = -\frac{3}{8}x + 6$, how much does *y* change when *x* increases by one unit? Does *y* increase or decrease? (Note: you should be able to answer this without needing to graph the line.)

8. The speed of sound at sea-level depends on temperature according to the equation $S = 0.60T + 331.45$ where S is the speed in meters per second and T is the temperature in degrees Celsius.

   a. What is the slope of the line?

   b. What is the speed of sound at 0°C?

   c. Every time the temperature goes up by 1°C, by how much will the speed of sound change? Will it increase or decrease?