Ch 2 Notes Video

Monday, September 5, 2022 8:01 AM

2.1 Notes: Slope

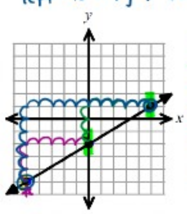
Slope: What does it mean? Watch this video, from the start to 4:40:
https://www.youtube.com/watch?v=zihsQC0IUd8&ab_channel=MashupMath

Slope can be thought of as:
#, describe the slant of a line

slope = m = $\frac{\text{rise}}{\text{run}}$ = $\frac{\updownarrow}{\leftrightarrow}$

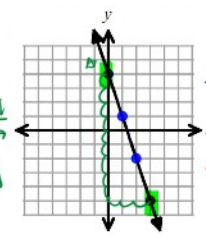
Examples: Find the slope of each line from the graphs shown. Write your answer in simplified form.
left to right (2 pts)

1)



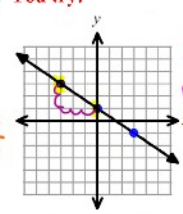
$\frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

2)



$\frac{-9}{3} = -3$; $\frac{-3}{1} = -3$; $\frac{\text{rise}}{\text{run}} = \frac{3}{-1} = -3$

3) You try!



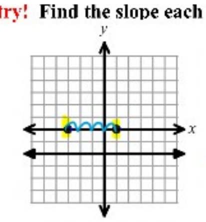
$\frac{-2}{3}$; $-\frac{2}{3}$

Types of slope (positive, negative, zero, undefined):

start; ascending; uphill; positive slope	downhill; descending; negative slope	flat; horizontal; slope = 0	vertical; slope = undef or "no slope"

You try! Find the slope each line graphed below.

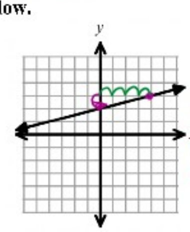
4)



$\frac{0}{4} = 0$

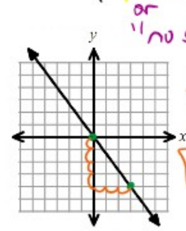
0

5)



$\frac{1}{4}$; $\frac{1}{4}$

6)



$\frac{-4}{3}$; $\frac{-4}{3}$

Alg 1 Credit Recovery Sem 1 **Ch 2 Notes: Graphing Lines**

The Slope Formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$$

(m = slope; rise ↕, run ↔)

Examples: Use the Slope formula to find the slope of the line connecting the two listed points.

7) (5, 3) and (7, 6)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{6-3}{7-5} = \boxed{\frac{3}{2}}$

8) (10, -2) and (16, 20)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{20+2}{16-10} = \frac{22 \div 2}{6 \div 2} = \boxed{\frac{11}{3}}$

9) (3, 13) and (7, 1)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{1-13}{7-3} = \frac{-12}{4} = \boxed{-3}$

You try!

10) (6, 1) and (12, 4)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{4-1}{12-6} = \frac{3 \div 3}{6 \div 3} = \boxed{\frac{1}{2}}$

11) (-4, 1) and (5, -2)

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{-2-1}{5+4} = \frac{-3 \div 3}{9 \div 3} = \boxed{\frac{-1}{3}}$

12) (7, 1) and (12, 1)

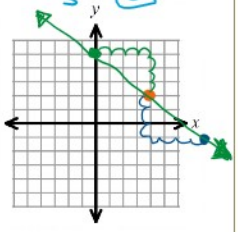
$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{1-1}{12-7} = \frac{0}{5} = \boxed{0}$

Example 13: Use the graph to draw a line that goes through the point (4, 2) and has a slope of $-\frac{3}{4}$.

x y

$\frac{-3 \downarrow}{+4 \rightarrow}$ or $\frac{+3 \uparrow}{-4 \leftarrow}$

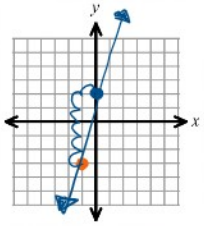


You try!

Example 14: Use the graph to draw a line that goes through the point (-1, -3) and has a slope of 5. Hint: think of the slope as a fraction.

x y

$m = \frac{5 \uparrow}{1 \rightarrow}$



2.2 Notes: Graphing Lines in $y = mx + b$ form

slope-intercept form

What is a line?

→ straight (same slope all the way through the line)

→ go on forever (to infinity in both directions)

→ made up points

Slope-intercept form of a line:

$y = mx + b$

m = slope

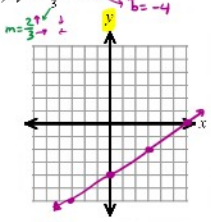
b = y-intercept

Graphing lines in slope-intercept form:

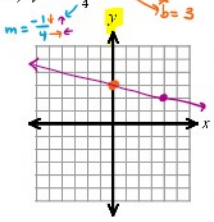
1) *begin* with the *b*-value (the y-intercept)
2) use the slope *m* to *move* to the next point.
   Reminder: slope = $\frac{\text{rise}}{\text{run}}$

Examples: Graph each line in slope intercept form below. You need *at least* two points on your graph.

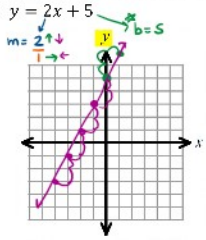
1) $y = \frac{2}{3}x - 4$



2) $y = -\frac{1}{4}x + 3$

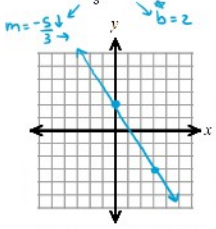


3) $y = 2x + 5$

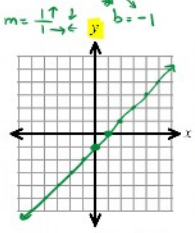


You try!

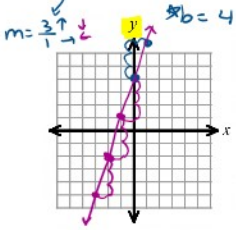
4) $y = -\frac{5}{3}x + 2$



5) $y = |x - 1$

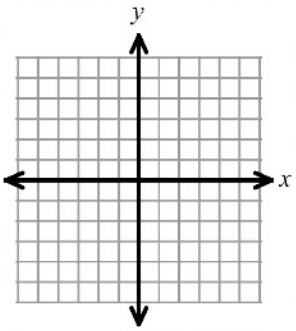


6) $y = 3x + 4$



Alg 1 Credit Recovery Sem 1 **Ch 2 Notes: Graphing Lines**

Activity: Use the coordinate system below, along with a spaghetti noodle, to quickly graph the equations given by your teacher.



Writing Equations of Lines in Slope-Intercept Form:

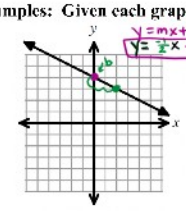
$y = mx + b$

m: pick 2 pts, $\frac{\text{rise}}{\text{run}}$

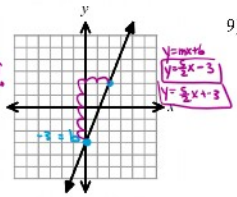
b: y-int

Examples: Given each graph, write the equation of the line shown in slope-intercept form.

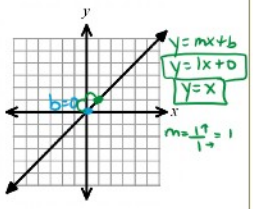
7)



8)

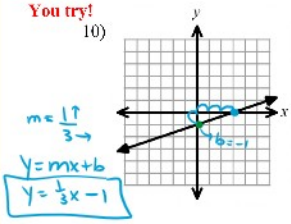


9)

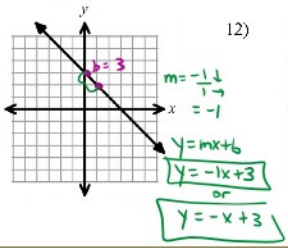


You try!

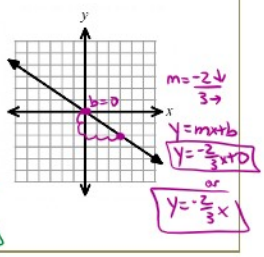
10)



11)



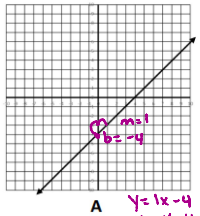
12)



Alg 1 Credit Recovery Sem 1 **Ch 2 Notes: Graphing Lines**

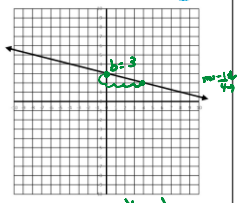
The equation for each problem DOES NOT MATCH the graph below it. Find the correct match and write the letter of that graph in the blank.

1. Graph y = 4x – 2 E



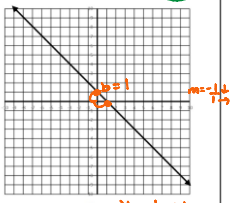
A $y=1x-4$ $y=x-4$

2. Graph y = ½ x + 5 F



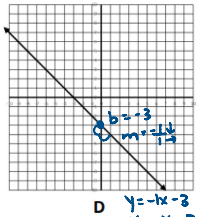
B $y=-\frac{1}{4}x+3$

3. Graph y = - ¼ x + 3 B



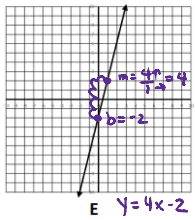
C $y=-1x+1$ $y=-x+1$

4. Graph y = x – 4 A



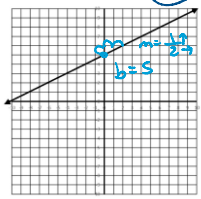
D $y=-1x-3$ $y=-x-3$

5. Graph y = -x + 1 C



E $y=4x-2$

6. Graph y = -x – 3 D

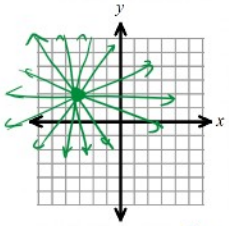


F $y=\frac{1}{2}x+5$

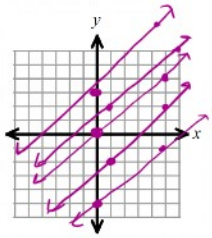
2.3 Notes: Graphing Lines in (h, k) form

Exploration:

- A line goes through the point (-3, 2). Draw as many lines as possible that meet this requirement.



- A line has slope of $m = \frac{4}{5}$. Draw as many lines as possible that meet this requirement.



$y = mx + b$

*one point *one slope

(h, k) form of a line:

$y = m(x - h) + k$

m: slope; (h, k): point; *h changes sign

Graphing lines in (h, k) form:

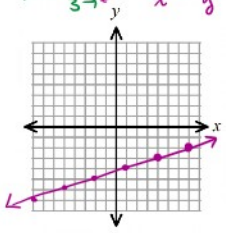
- plot (h,k) point
- use m to move to 2nd pt.

$y = m(x - h) + k$

Examples: Graph each line.

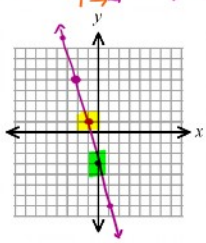
1) $y = \frac{1}{3}(x - 4) - 3$

m = $\frac{1}{3}$ (4, -3)



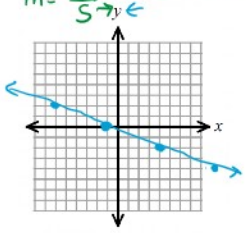
2) $y = -4(x + 2) + 5$

m = $\frac{-4}{1}$ (-2, 5)



3) $y = -\frac{2}{5}(x + 1) + 0$

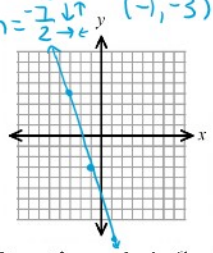
m = $\frac{-2}{5}$ (-1, 0)



More practice: Graph each line.

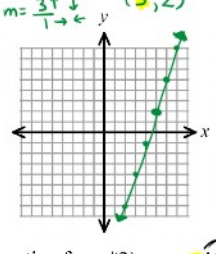
4) $y = -\frac{7}{2}(x + 1) - 3$

m = $\frac{-7}{2}$ (-1, -3)



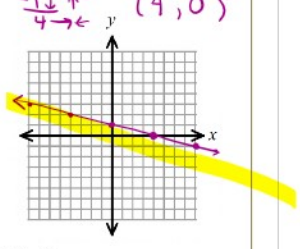
5) $y = 3(x - 5) + 2$

m = $\frac{3}{1}$ (5, 2)



6) $y = -\frac{1}{4}(x - 4) + 0$

m = $\frac{-1}{4}$ (4, 0)



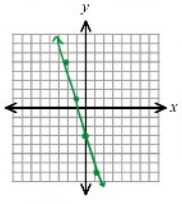
Alternative method: Consider the equation from #2) $y = -4(x + 2) + 5$
Convert this equation into slope-intercept form, and then graph the line.
Compare to your result from #2.

*distribute
*combine like terms

$y = -4x - 8 + 5$

$y = -4x - 3$

m = $\frac{-4}{1}$, b = -3



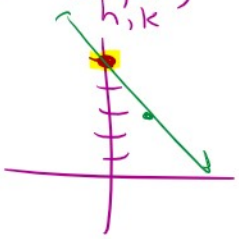
$y = -2x + 5$

$y = -2(x) + 5$

$y = -2(x - 0) + 5$

m = -2 (0, 5) b

h, k



m = -4/1 ↓ ↑ ← → b = -3

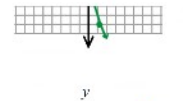
7) Use the equation from #5. Convert this into slope-intercept form, and then graph. Compare with your result from #5.

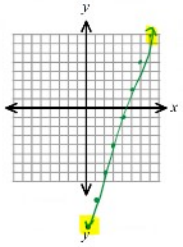
$y = 3(x-5)+2$

$y = 3x - 15 + 2$

$y = 3x - 13$

m = 3↑ / 1→



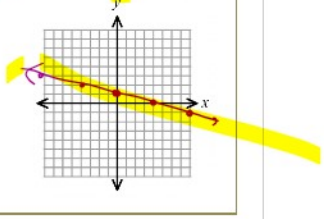


8) Use the equation from #6. Convert this into slope-intercept form, and then graph. Compare with your result from #6.

$y = -\frac{1}{4}(x-4)$

$y = -\frac{1}{4}x + 1$

m = -1/4 ↓ ↑ ← → b = 1*



Alg 1 Credit Recovery Sem 1 — Ch 2 Notes: Graphing Lines

2.4 Notes: Graphing Lines in Standard Form

Standard Form of a Line

$Ax + By = C$

A, B, C: numbers

Converting Equations to Slope-Intercept Form — 2.2 Notes

$y = mx + b$

① Cancel the x-term (+ or −)

② ÷ to isolate y.

alone → $y = mx + b$

Examples: Each line is in standard form. Convert each line to slope-intercept form.

1) $3x + y = -2$

$-3x \quad -3x$

$y = -3x - 2$

2) $-4x + 2y = 6$

$+4x \quad +4x$

$\frac{2y}{2} = \frac{4x}{2} + \frac{6}{2}$

$y = 2x + 3$

3) $7x - 5y = -10$

$-7x \quad -7x$

$\frac{-5y}{-5} = \frac{-7x}{-5} - \frac{10}{-5}$

$y = \frac{7}{5}x + 2$

4) $-x + 4y = 12$

$+x \quad +x$

$\frac{4y}{4} = \frac{1x}{4} + \frac{12}{4}$

$y = \frac{1}{4}x + 3$

5) $-8x + 10y = 11$

$+8x \quad +8x$

$\frac{10y}{10} = \frac{8x}{10} + \frac{11}{10}$

$y = \frac{4}{5}x + 1.1$

6) $6x - y = 14$

$-6x \quad -6x$

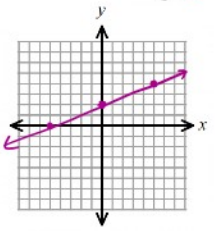
$\frac{-1y}{-1} = \frac{-6x}{-1} + \frac{14}{-1}$

$y = 6x - 14$

Examples: Each line is in standard form. Convert each line to slope-intercept form. Then graph each line.

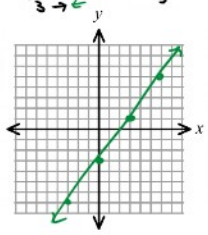
7) $-2x + 5y = 10$

$y = \frac{2}{5}x + 2$, $m = \frac{2}{5}$, $b = 2$



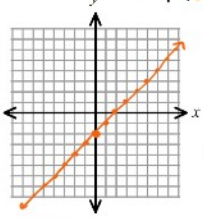
8) $4x - 3y = 9$

$y = \frac{4}{3}x - 3$, $m = \frac{4}{3}$, $b = -3$



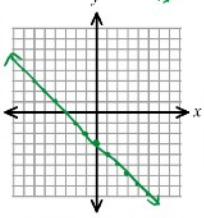
9) $7x - 7y = 14$

$y = 1x - 2$, $m = \frac{1}{1}$, $b = -2$



10) $-x - y = 3$

$y = -1x - 3$, $m = \frac{-1}{1}$, $b = -3$

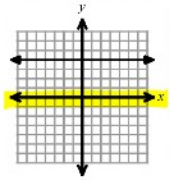


2.5 Notes: Graphing Special Lines

* not slanted lines
horizontal
vertical

Exploration! Work with your group or partner.

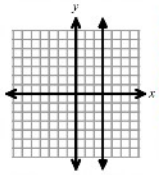
A. Consider the horizontal line shown below. Name 5 points on this line. What do these points have in common?



(x, y)
(0, 4)
(2, 4)
(6, 4)
(-1, 4)
(-4, 4)
(-2, 4)
(-3, 4)
(-2.5, 4)

always have 4 in the y-position
y = 4

B. Consider the vertical line shown below. Name 5 points on this line. What do these points have in common?



(x, y)
(3, 0)
(3, 1)
(3, 5)
(3, -2)
(3, -7)

all the x-coords always be 3
x = 3

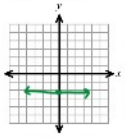
Equations of Special Lines

Horizontal Lines ↔ $y = \#$

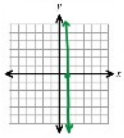
Vertical Lines ↕ $x = \#$

Examples: Graph each special line below.

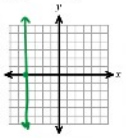
1) $y = -2$



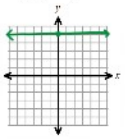
2) $x = 1$



3) $x = -4$

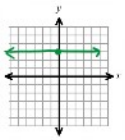


4) $y = 5$

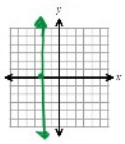


You try!

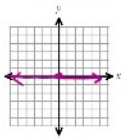
5) $y = 3$



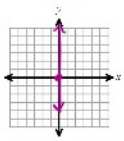
6) $x = -2$



7) $y = 0$ x-axis



8) $x = 0$ y-axis



slanted lines

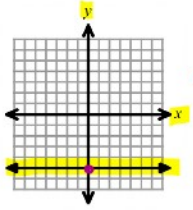
$y = mx + b$

$y = m(x - h) + K$

$Ax + By = C$

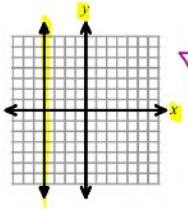
Examples: For each special line graphed below, write its equation.

9)



$y = -5$

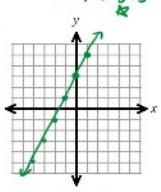
You try! 10)



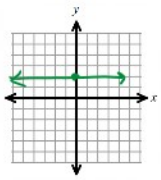
$x = -4$

As a reminder, not all lines are special lines. Graph the lines below, which is a mix of special lines and slanted lines.

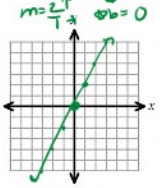
11) $y = 2x + 3$ slanted $m = \frac{2}{1}$ $b = 3$



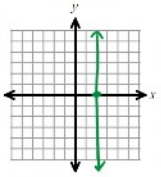
12) $y = 2$ ↔



13) $y = 2x$ slanted $y = 2x + 0$ $m = \frac{2}{1}$ $b = 0$

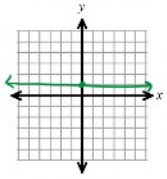


14) $x = 2$ ↕

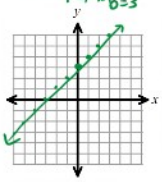


You Try!

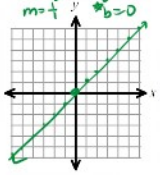
15) $y = 1$ ↔



16) $y = 1x + 3$ slanted $m = \frac{1}{1}$ $b = 3$



17) $y = x$ slanted $y = 1x + 0$ $m = 1$ $b = 0$



18) $x = 1$ ↕