Study Tips from your classmates who made A's on the first test:

"I did all the problems assigned of the Ch. 2 review but did the hardest last so that I could have more time and got someone to walk me through one of the problems before I did them alone."

"I studied by doing the review activities, learning what we have written down in class and memorizing the structure of problems and formulas."

"I re-wrote my notes, and then made flash cards. I went over the review questions carefully and went to math lab for help and extra practice."

"I completed the old test and chapter review on my own as much as possible. If I didn't understand a certain kind of problem I attempted more problems of that style."

"I ran through all of my notes a few times, and after I was confident in my notes I started working practice problems from sections I've been having trouble in."

"I first made sure I did my homework each week. I then answered questions of the old test."

"I worked through the review questions, used the back of the book to check my answers, then reworked any problems I missed. I also went through my notes and studied all the terms I had written down."

A **linear function** is a function of the form $f(x) = mx + b$ or $y = mx + b$, where $m =$ **slope** $= \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$ and the point $(0, b)$ is the **y-intercept**, or the point where the graph of the function intersects the y-axis. The y-intercept of any function is found by plugging 0 in for x (evaluating $f(0)$).

$y = mx + b$ is called the **slope-intercept form** of the equation of a line.

$Ax + By = C$ is the **standard form** of the equation of a line.

A **horizontal line** has an equation of the form $y = b$, where b is the y-coordinate of every point on the line. A horizontal line has a slope of 0.

A **vertical line** has an equation of the form $x = a$, where a is the x-coordinate of every point on the line. A vertical line has no slope.

The **x-intercept**(s) of any function are the point(s) $(x, 0)$, found by substituting 0 in place of y in the equation (setting $f(x) = 0$) and solving for x.

3.3

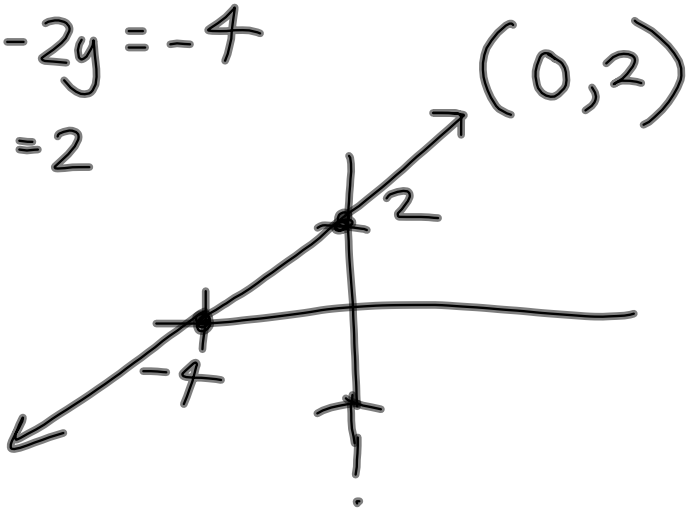
23. $x-2y=-4$

x-int: $x-2(0)=-4$ $(-4,0)$

$x=-4$

y-int: $0-2y=-4$

$y=2$

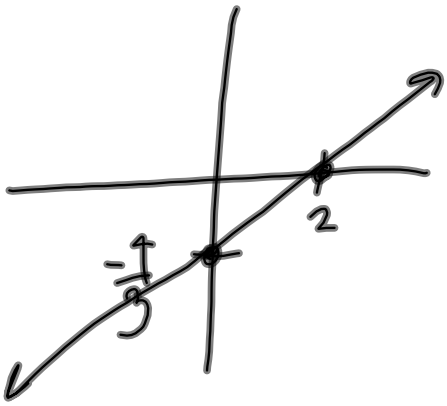


32. $2x-3y=4$

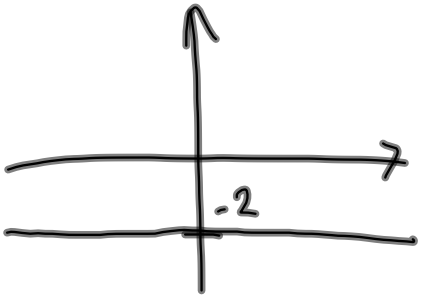
x-int: $2x=4$ y-int: $-3y=4$

$x=2$ $y=-4/3$

$(2,0)$ $(0,-4/3)$



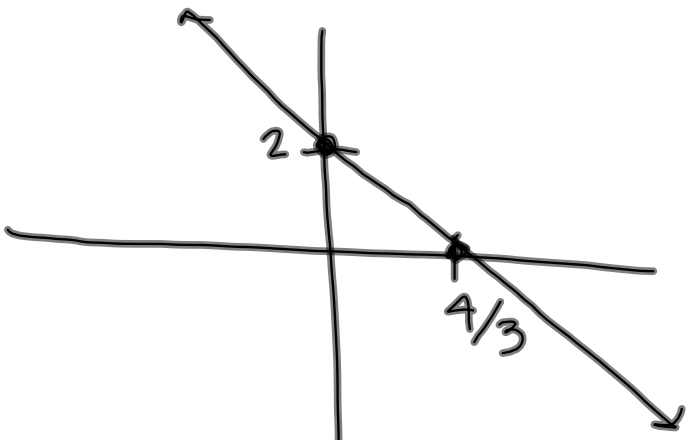
18. $y=-2$



31. $3x+2y=4$

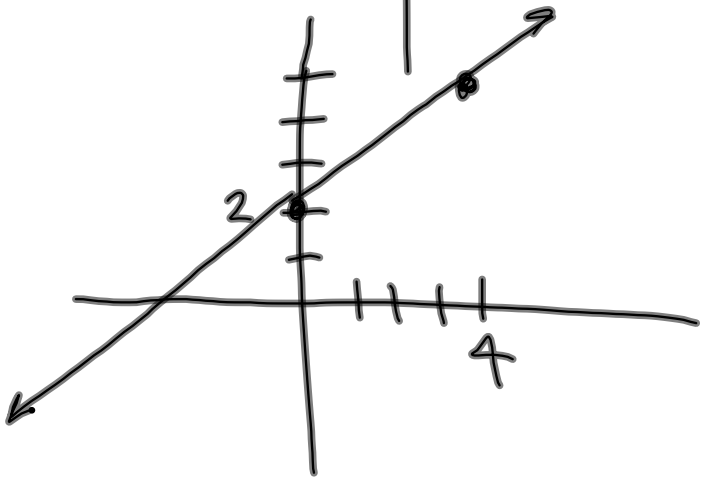
x-int: $3x=4$
$(4/3, 0)$ $x=4/3$

y-int: $2y=4$
$(0,2)$ $y=2$



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

y-int: $(0,2)$



Sections 3-3-3.6 Linear Functions

(x_1, y_1) m

Point-slope formula:

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

Note that rearranged, this looks like:

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

Recall:

Slope-intercept equation:

$y = mx + b$

Standard Equation:

$Ax + By = C$

Parallel & Perpendicular Lines:

Two lines with slopes m_1 and m_2 are **parallel** if and only if $m_1 = m_2$

*All vertical lines are parallel.

Two lines with slopes m_1 and m_2 are **perpendicular** if and only if $m_1 = -\frac{1}{m_2}$ $\left(m_2 = -\frac{1}{m_1}\right)$ negative reciprocals

*Vertical lines are perpendicular to horizontal lines

Find the slope-intercept (y=mx+b) equation of the line:

1. slope 2 ; passing through (3,7)

m x_1, y_1

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

$y - 7 = 2(x - 3)$

$y - 7 = 2x - 6$

$\boxed{y = 2x + 1}$

2. passes through (-5, 2) & (6, -1)

x_1, y_1 x_2, y_2

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

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

$y - 2 = -\frac{3}{11}(x - (-5))$

$y - 2 = -\frac{3}{11}(x + 5)$

$y - 2 = -\frac{3}{11}x - \frac{15}{11}$

$y = -\frac{3}{11}x - \frac{15}{11} + \frac{2}{1} \cdot \frac{11}{11}$

$y = -\frac{3}{11}x - \frac{15}{11} + \frac{22}{11}$

$\boxed{y = -\frac{3}{11}x + \frac{7}{11}}$

3. Given the line y=4x+3, find the equation of a line parallel to this that passes through (4, 1).

$(x_1, y_1) = (4, 1)$; $m = 4$

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

$y - 1 = 4(x - 4)$

$y - 1 = 4x - 16$

$\boxed{y = 4x - 15}$

4. Given the line y=-3x+7, find the equation of a line perpendicular to it that passes through (5,-8).

$(x_1, y_1) = (5, -8)$; $m = \frac{1}{3}$

$y - (-8) = \frac{1}{3}(x - 5)$

$y + 8 = \frac{1}{3}x - \frac{5}{3}$

$y = \frac{1}{3}x - \frac{5}{3} - \frac{8}{1} \cdot \frac{3}{3}$

$y = \frac{1}{3}x - \frac{5}{3} - \frac{24}{3}$

$\boxed{y = \frac{1}{3}x - \frac{29}{3}}$

Find the equation of the line:

5. Passes through (-7, 6) ; no slope ⇒ vertical line

$x = -7$

6. Passes through (43, -269) ; slope 0 ⇒ horizontal

$y = -269$

Are the two lines parallel, perpendicular, or neither?
3.6

4. $y = \frac{1}{2}$; $y = -4$ parallel (both horizontal)

10. $y = \frac{1}{2}x + \frac{3}{2}$; $y = -\frac{1}{2}x + \frac{3}{2}$ neither

14. $4x - 3y = 2$; $4x + 3y = -7$

$-3y = -4x + 2$ $\quad 3y = -4x - 7$

$y = \frac{4}{3}x - \frac{2}{3}$ $\quad y = \frac{-4}{3}x - \frac{7}{3}$ neither

20. $(3,5)\&(-3,3)$; $(2,-5)\&(-4,4)$

$m_1 = \frac{5-3}{3-(-3)}$ $\quad m_2 = \frac{-5-4}{2-(-4)}$

$= \frac{2}{6} = \frac{1}{3}$ $\quad = \frac{-9}{6} = -\frac{3}{2}$ neither

18. $(-1,2),(3,4)$; $(-1,3),(-4,1)$

$m_1 = \frac{2-4}{-1-3}$ $\quad m_2 = \frac{3-1}{-1-(-4)}$

$= \frac{-2}{-4} = \frac{1}{2}$ $\quad = \frac{2}{3}$ neither

Homework:

3.3 #12-20 find the slope of a line

3.4 #38-41 graph a line using the slope

3.5 #15-26 find equation given a point and the slope
#42-50 find equation given two points

3.6 #3-20 determine if two lines are parallel, perpendicular, or neither
#21-26 find equation of parallel / perpendicular lines

Quiz Friday on Linear Functions!