Chapter 3 (cont'd)

Note Title 2/5/2015

Homework Qs

7.4 #3]

$$\frac{2b^2-b-3}{2b^2-3b-9} \div \frac{b^2-1}{4b+6}$$

$$= \frac{2b^2-b-3}{2b^2-3b-9} \cdot \frac{4b+6}{b^2-1}$$

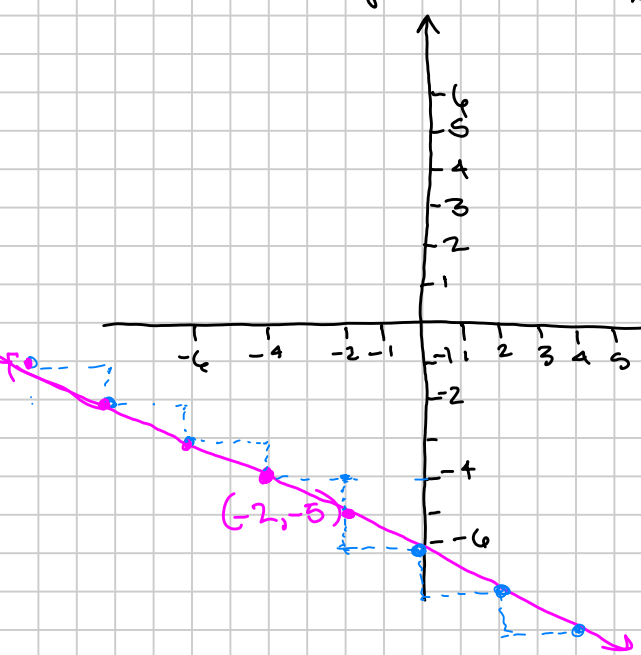
$$= \frac{(2b-3)(b+1)}{(2b+3)(b-3)} \cdot \frac{2(2b+3)}{(b+1)(b-1)}$$

$$= \boxed{\frac{2(2b-3)}{(b-3)(b-1)}}$$

Section 3.3 cont'd

Ex: Graph the line with slope $-\frac{1}{2}$ that passes through $(-2,-5)$.

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2-y_1}{x_2-x_1} = \frac{\text{vertical change}}{\text{horizontal change}}$$



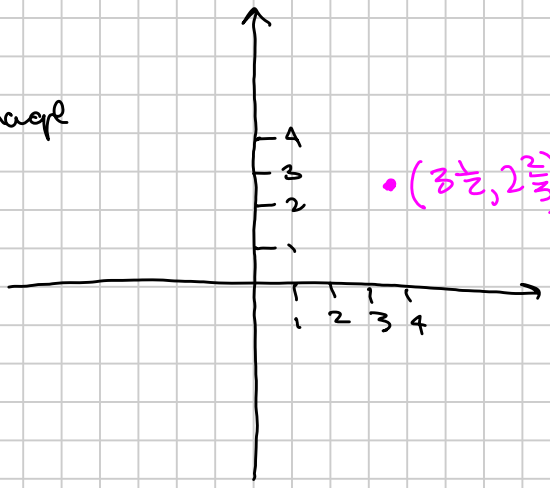
slope: $-\frac{1}{2}$

vertical change: 1

horizontal change: 2

slope is neg, so ↘

Ex. plot $(\frac{7}{2}, \frac{8}{3})$



Change to mixed numbers:

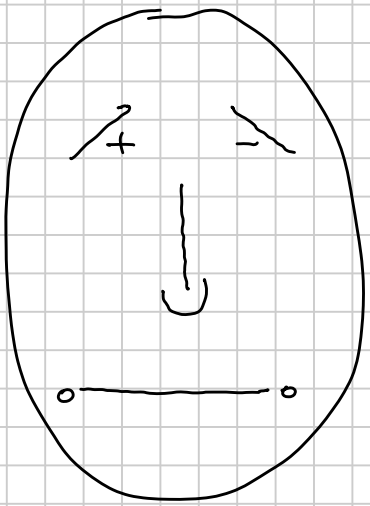
$x = \frac{7}{2} = 3\frac{1}{2}$

$y = \frac{8}{3} = 2\frac{2}{3}$

Point is $(3\frac{1}{2}, 2\frac{2}{3})$

Note: positive slopes go uphill from left to right ↗

Mr. Slope Guy



Ex: Graph the line $2x+y=7$ (Section 3.2)

x	y
0	7
$3\frac{1}{2}$	0
1	5
−1	9
3	1

Find y-intercept: Set $x=0$:

$2(0)+y=7$

$y=7$

y-intercept: 7
I would accept (0,7)

Find x-intercept: Set $y=0$:

$2x+y=7$

$2x+0=7$

$2x=7$

$x=\frac{7}{2}=3\frac{1}{2}$

x-intercept: $3\frac{1}{2}$
or $(3\frac{1}{2}, 0)$

$x=1 \Rightarrow$ $2x+y=7$

$2(1)+y=7$

$2+y=7$

$y=5$

$(1,5)$

$x=-1$ $2(-1)+y=7$

$-2+y=7$

$y=9$

$(-1,9)$

$y=1 \Rightarrow$ $2x+1=7$

$2x=6$

$x=3$

$(3,1)$

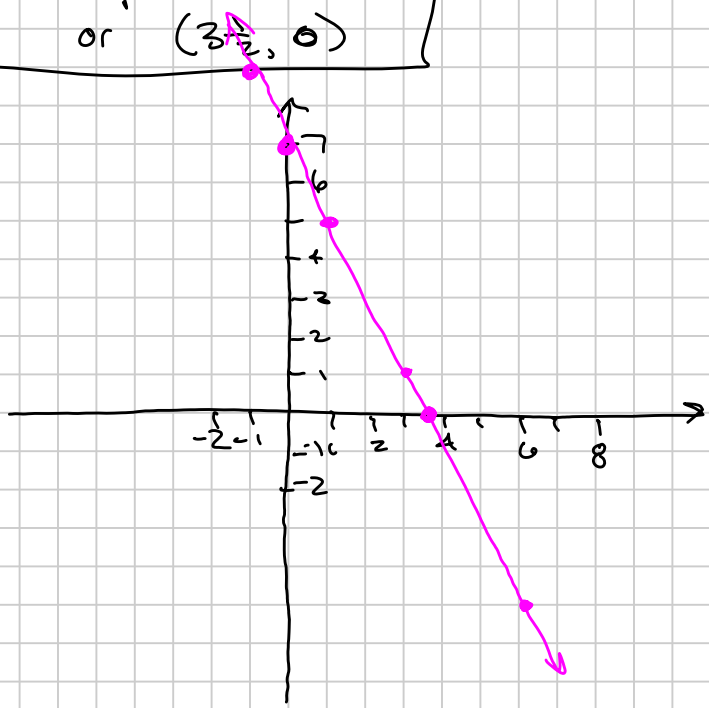
$x=6 \Rightarrow$ $2x+y=7$

$2(6)+y=7$

$12+y=7$

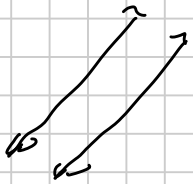
$y=-5$

x	y
0	7
$3\frac{1}{2}$	0
1	5
−1	9
3	1
6	−5



Slopes of perpendicular and parallel lines

Parallel lines: never intersect

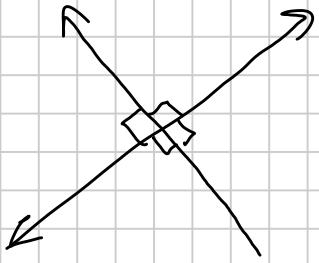


etc

Parallel lines have the same slope

Slopes of parallel lines are equal.

Perpendicular lines: Intersect at a 90° angle (square corner)



Perpendicular lines have slopes that are opposite reciprocals

(in other words, $m_1 = -\frac{1}{m_2}$

Also $m_1 m_2 = -1$)

Ex: Graph lines that pass through (0,0) and have slopes -3 and $\frac{1}{3}$.

1st line

$m_1 = -3 = -\frac{3}{1} = \frac{\text{rise}}{\text{run}}$

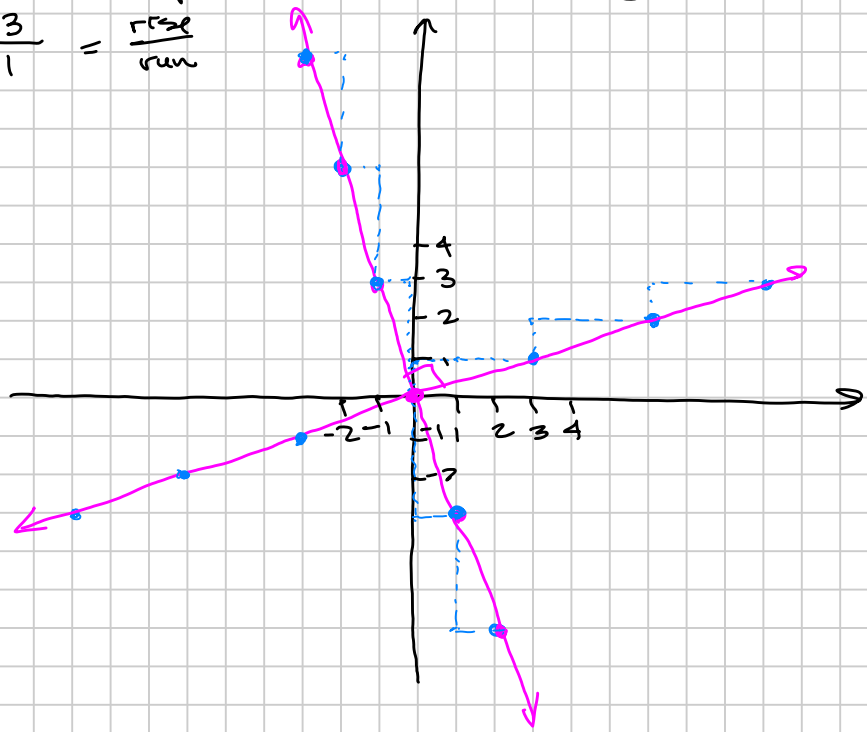
→ ↘

2nd line

$m_2 = +\frac{1}{3}$

↑ +

vertical: 1
horiz: 3



Ex: If a line has slope $\frac{3}{5}$, what is the slope of all lines that are perpendicular to it?

$\boxed{-\frac{5}{3}}$

Ex: If a line has slope -2, what is the slope of all lines perpendicular to it?

Slope of given line: $m_1 = -2 = -\frac{2}{1}$

Slope of perpendicular line: $m_1 = m_2 = +\boxed{\frac{1}{2}}$

Ex: If a line has slope $-\frac{2}{7}$, what is the slope of all lines parallel to it?

$\boxed{-\frac{2}{7}}$

3.4: Slope-intercept form for a linear equation

Slope-intercept form for a line: $y = mx + b$, where m is the slope and b is the y-intercept.

Ex: Graph the line.

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

m = slope $= \frac{1}{2} = +\frac{1}{2}$

vertical change: 1
horiz. change: 2

y-intercept is $b = -4$.

ordered pair: $(0, -4)$

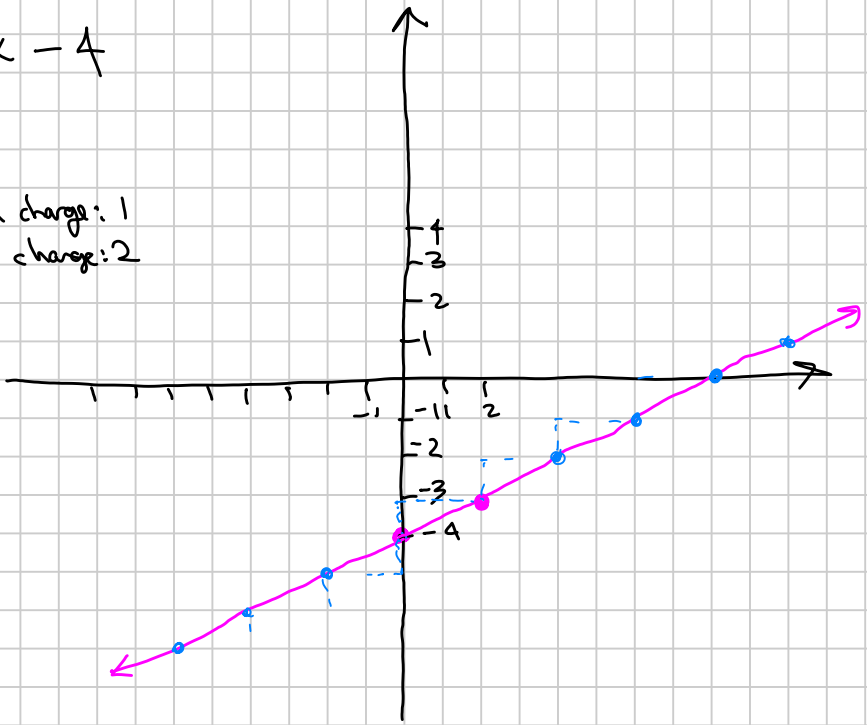
Note:

$x = 0 \Rightarrow y = \frac{1}{2}(0) - 4$

$= 0 - 4$

$= -4$

$(0, -4)$



Ex: Graph the line $2x+3y=9$ by putting it into slope-intercept form.

We want to write it as $y=mx+b$. So we solve for y.

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

(m = slope, b = y-intercept)

$y=mx+b$

Slope: $m=-\frac{2}{3}$

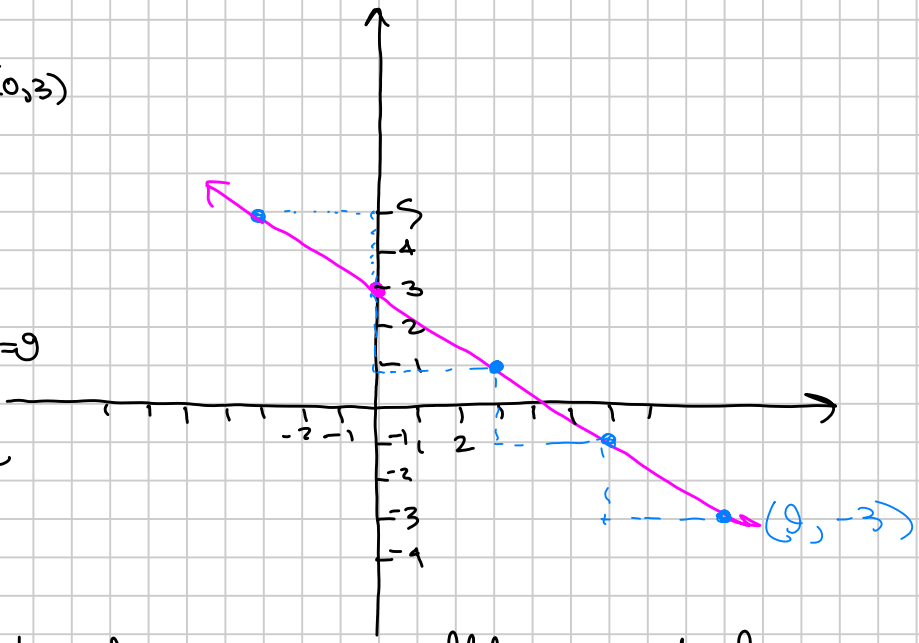
vertical change: 2
horiz change: 3

y-intercept: $b=3$
ordered pair: $(0,3)$

Check: using $(9,-3)$

$2x+3y=9$

$x=9, y=-3 \Rightarrow \quad 2(9)+3(-3)=9$
$18-9=9$
$9=9$ ✓ true



Ex: Determine if the two lines are parallel, perpendicular, or neither.

$$4x+5y=26$$
$$5x-4y=60$$

Need to find the slopes.

Put both lines in slope-intercept form $y=mx+b$.

$$4x+5y=20$$

Solve for y: $5y=-4x+20$

$$\frac{5y}{5}=\frac{-4x}{5}+\frac{20}{5}$$
$$y=-\frac{4}{5}x+4$$

slope: $m_1=-\frac{4}{5}$

$$5x-4y=60$$
$$-4y=-5x+60$$
$$\frac{-4y}{-4}=\frac{-5x}{-4}+\frac{60}{-4}$$
$$y=\frac{5}{4}x-15$$

$m_2=\frac{5}{4}$

Slopes are opposite reciprocals, so the lines are perpendicular.

Ex: Graph the line $2x + 1 = 3$

$2x = 2$

$\frac{2x}{2} = \frac{2}{2}$

$x = 1$

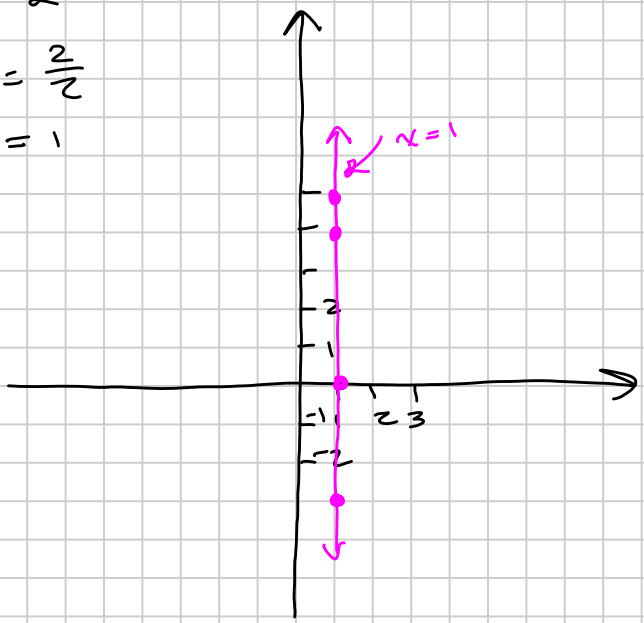
Points on the line:

$(1, 0)$

$(1, 5)$

$(1, -3)$

$(1, 4)$



Ex: graph the line $4y = -12$

$\frac{4y}{4} = \frac{-12}{4}$

$y = -3$

$(2, -3)$

$(4, -3)$

$(6, -3)$

$(-1, -3)$

$(0, -3)$