Math 115

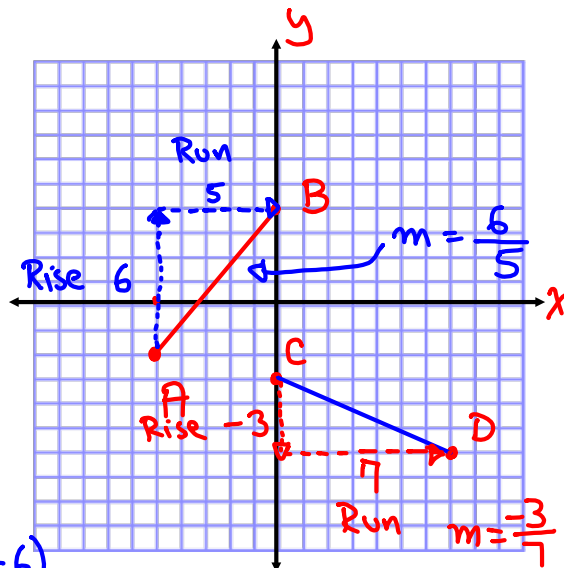# Spring 2017

Lecture 10

$A(-5,-2)$, $B(0,4)$

① Draw $\overline{AB}$

② show rise & run
    for slope

$$m = \frac{\text{Rise}}{\text{Run}}$$

Plot $C(0,-3)$ & $D(7,-6)$

Draw $\overline{CD}$, show
  rise & run of slope.

Run 5

Rise 6

$m = \frac{6}{5}$

B

A

C

Rise -3

D

Run 7

$m = \frac{-3}{7}$

Distance between $A(x_1, y_1)$ & $B(x_2, y_2)$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$A(0, -4)$, $B(3, 0)$

① Draw $\overline{AB}$

② Show rise & run of slope

Run 3

Rise 4

$m = \dfrac{Rise}{Run}$

$m = \dfrac{4}{3}$

③ Find $d(A, B)$

$$d = \sqrt{(0 - 3)^2 + (-4 - 0)^2}$$
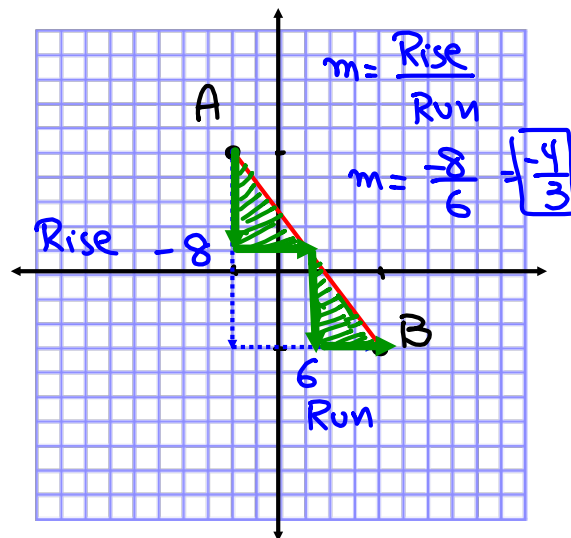$$= \sqrt{(-3)^2 + (-4)^2} = \sqrt{9 + 16} = \sqrt{25} = \boxed{5}$$
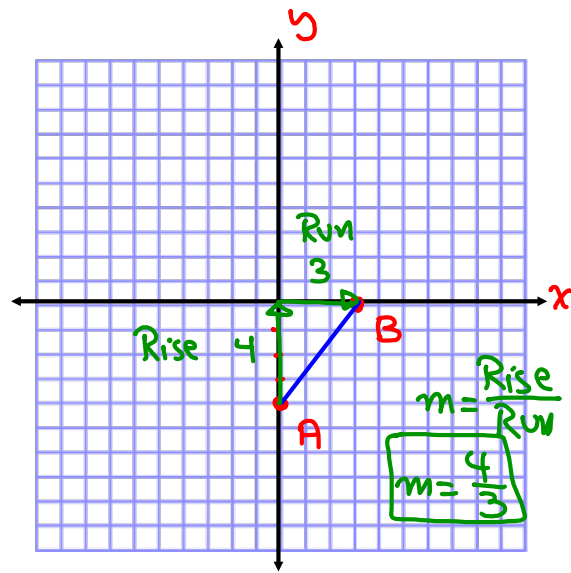
$A(-2, 5)$ $B(4, -3)$

① Draw $\overline{AB}$

② Find rise & run of slope

Rise -8

Run 6

$m = \dfrac{Rise}{Run}$

$m = \dfrac{-8}{6} = \boxed{\dfrac{-4}{3}}$

③ Find the distance

$$d = \sqrt{(-2 - 4)^2 + (5 - -3)^2}$$
$$= \sqrt{(-6)^2 + (8)^2} = \sqrt{36 + 64} = \sqrt{100} = \boxed{10}$$

formula for Slope $\quad m = \dfrac{y_1 - y_2}{x_1 - x_2}$, $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$A(-6,0)$, $B(0,8)$

$m = \dfrac{0-8}{-6-0} = \dfrac{-8}{-6} = \dfrac{8}{6} = \boxed{\dfrac{4}{3}}$

when $-$, keep it in the numerator.
Always reduce,
No mixed number,
No decimals.

$A(-7,2)$, $B(1,-2)$

$m = \dfrac{2-(-2)}{-7-1} = \dfrac{2+2}{-8} = \dfrac{4}{-8} = \boxed{\dfrac{-1}{2}}$

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find slope

① $(5,-3)$ & $(5,7)$

$m = \dfrac{-3-7}{5-5} = \dfrac{-10}{0}$ → undefined or No slope

② $(-4,2)$ & $(-4,6)$

$m = \dfrac{2-6}{-4-(-4)} = \dfrac{-4}{0}$ → undefined or No slope

③ $(3,8)$ & $(2,5)$

$m = \dfrac{8-5}{3-2} = \dfrac{3}{1} = \boxed{3}$

④ $(7,4)$, $(-2,4)$

$m = \dfrac{4-4}{7-(-2)} = \dfrac{0}{9} = \boxed{0}$

Zero slope

Midpoint of line segment AB with

$A(x_1, y_1)$ & $B(x_2, y_2)$

$M\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

$A(-6, 3)$ $B(0, 7)$

$M\left(\dfrac{-6+0}{2}, \dfrac{3+7}{2}\right) = M\left(\dfrac{-6}{2}, \dfrac{10}{2}\right) = M(-3, 5)$

$A(-8, 0)$ $B(2, 6)$ $M\left(\dfrac{-8+2}{2}, \dfrac{0+6}{2}\right)$

find its Midpoint.

$= M(-3, 3)$

$A(-5, 7)$, $B(3, 1)$

① Draw $\overline{AB}$

② find $m = \dfrac{7-1}{-5-3} = \dfrac{6}{-8}$

$= \dfrac{-3}{4}$

③ find $M\left(\dfrac{-5+3}{2}, \dfrac{7+1}{2}\right) = M\left(\dfrac{-2}{2}, \dfrac{8}{2}\right) = M(-1, 4)$

④ find d

$d = \sqrt{(-5-3)^2 + (7-1)^2} = \sqrt{(-8)^2 + (6)^2} = \sqrt{100}$

$= 10$

A
M
B
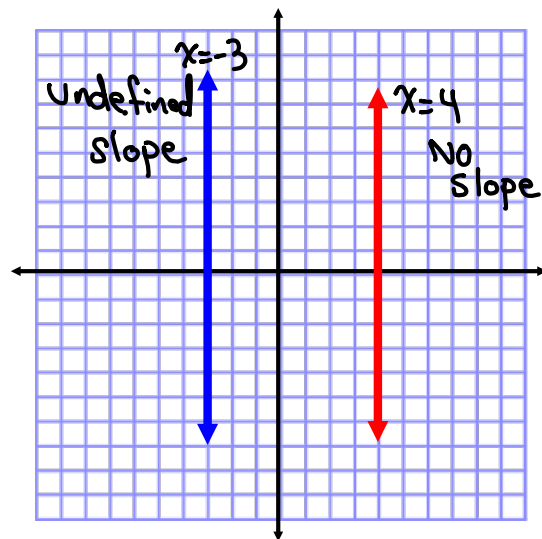$m = \dfrac{-6}{8} = \dfrac{-3}{4}$
Rise -6
8
Run
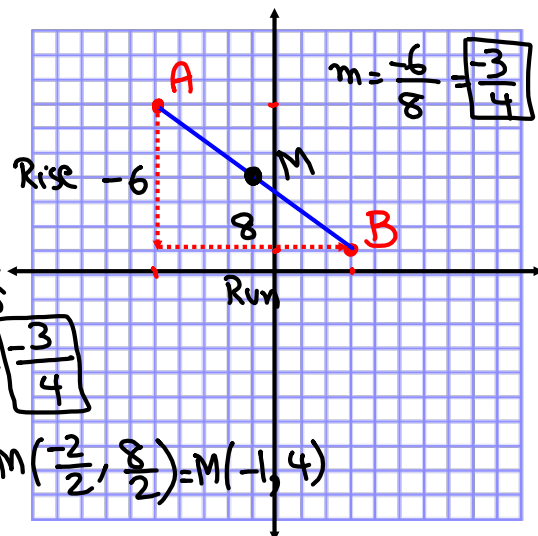
Vertical lines

$x = a$

x-only

Undefined Slope

or

No Slope

Graph $x = 4$, & $x = -3$.

x=-3

Undefined Slope

x=4

No Slope

Horizontal line

Y-only

$y = b$

Slope is Zero

or

Zero Slope

$m = 0$

Do not use ϕ for Zero

Graph

$y = 6$,

$y = -2$

$y = 6$, $m = 0$

$y = -2$, $m = 0$
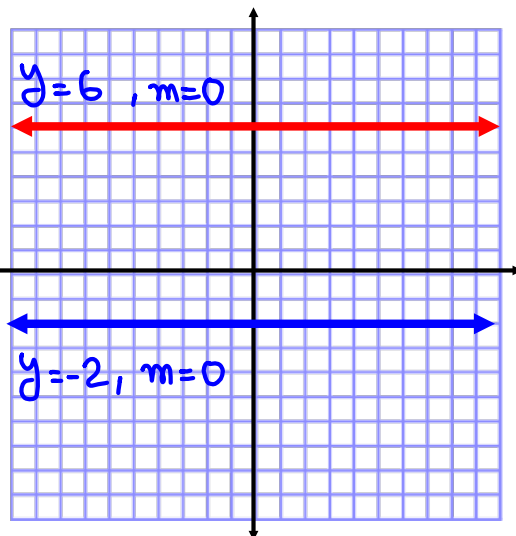
Slant line $Ax + By = C$, $y = mx + b$
           Stand. form   Slope-Int form

Graph $2x - 5y = -10$ using intercept method.

x	y
0	2
-5	0

Run
5

Rise   2 $2x - 5y = -10$
                Increasing

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

Solve for y

$2x - 5y = -10$

$-5y = -2x - 10$

$\dfrac{-5}{-5}y = \dfrac{-2}{-5}x - \dfrac{10}{-5}$

$y = \dfrac{2}{5}x + 2$
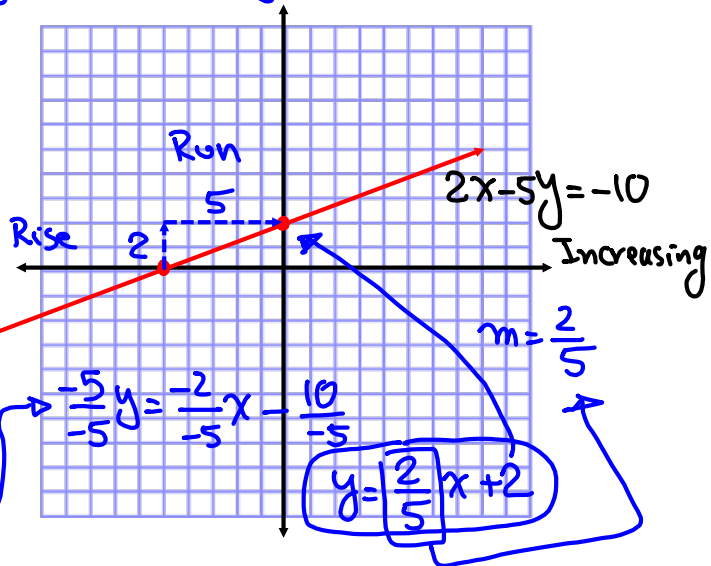
Repeat last example with $3x + 4y = 12.$

x	y
0	3
4	0

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

$3x + 4y = 12$

-3

4

Decreasing

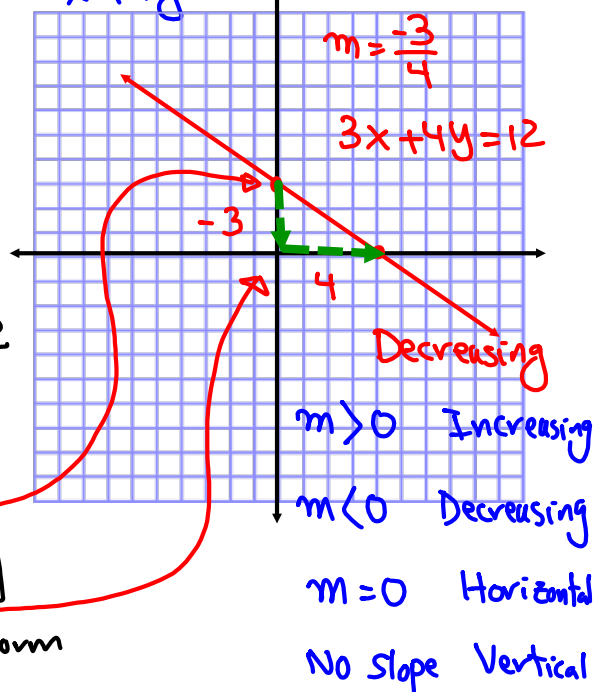$\boxed{3x} + 4y = 12$

$4y = -3x + 12$

$\dfrac{4}{4}y = \dfrac{-3}{4}x + \dfrac{12}{4}$

$y = \dfrac{-3}{4}x + 3$

Slope-Int form

$m > 0$ Increasing

$m < 0$ Decreasing

$m = 0$ Horizontal

No slope Vertical

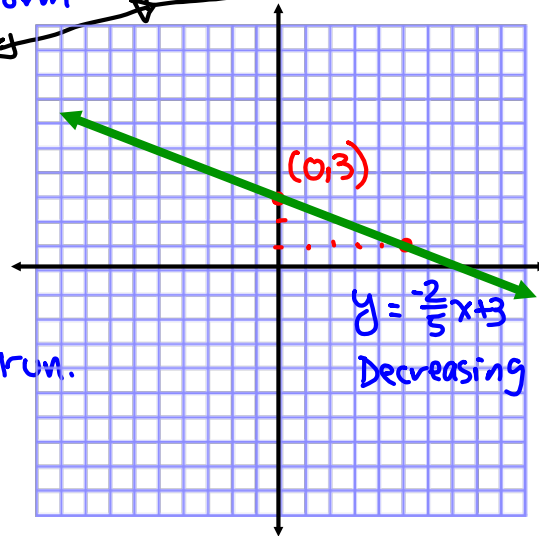$2x + 5y = 15$ $\qquad$ $5y = -2x + 15$

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

① Write in Slope-Int form
$\qquad$ $y = mx + b$

② Y-Int $(0, 3)$

③ Slope $m = \frac{-2}{5}$ $\dfrac{Rise}{Run}$

④ Graph, Show rise & run.

$(0, 3)$

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

Decreasing

Point-Slope form

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

① Plot the point

② use rise & run of Slope to get a second pt.

③ Draw the line

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

Point $(1, 2)$

$m = \frac{3}{5}$

5

3

$$y - 4 = \frac{-3}{7}(x + 5) \qquad y - y_1 = m(x - x_1)$$

$$y - 4 = \frac{-3}{7}(x - (-5))$$

Point
(-5,4)

$m = \frac{-3}{7}$

Draw

(-5,4)

-3

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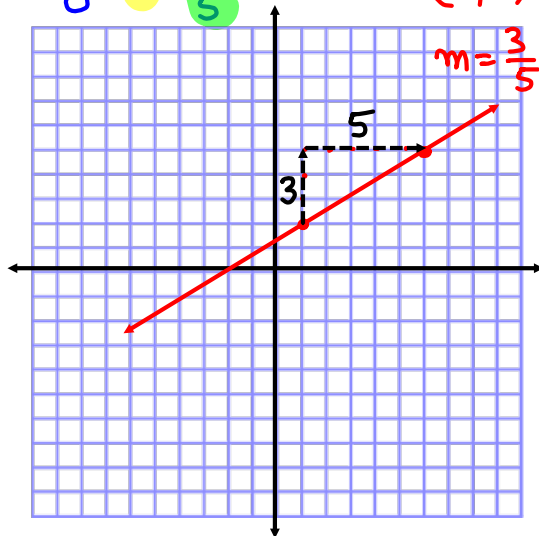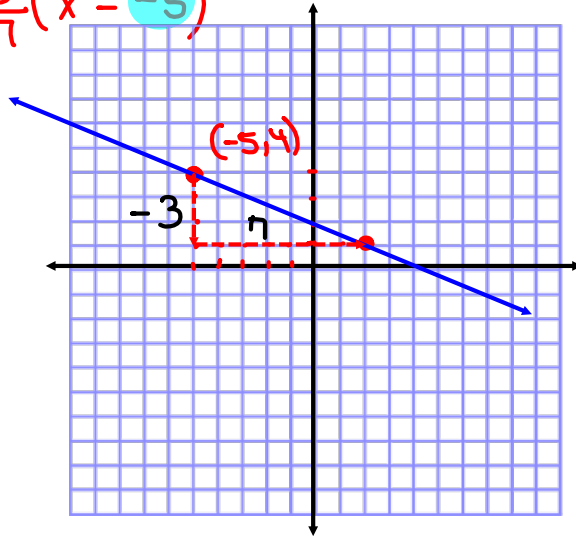
$$y + 3 = \frac{3}{5}(x + 5)$$

Point (-5,-3)

Slope $\frac{3}{5}$

Draw

Show Rise & Run

Run
5

Rise 3

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

$$m = \frac{3}{5}$$

Increasing
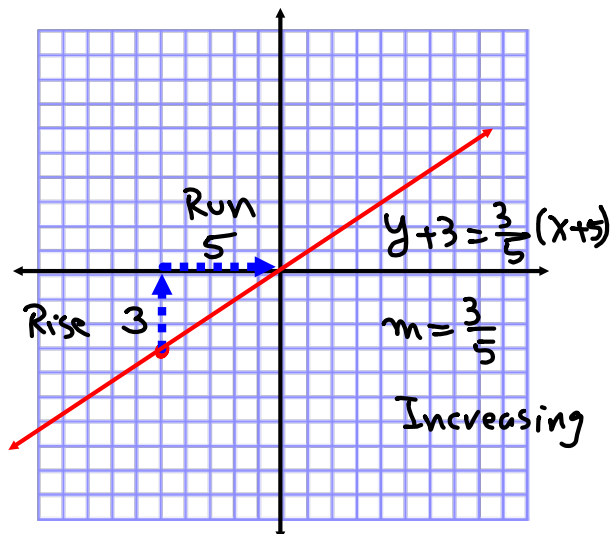
Work on SG 8

Money Problems:

Adult pay $12

Kids Pay $5

(Total Cost $118)

# of kids was
10 more than the # of
Adults. How many of each?

{ 4 adults
&
14 kids }

Types	Value	How many	Cost
Adults	12	x	$12x$
Kids	5	$x+10$	$5(x+10)$

$12x + 5(x+10) = 118$

$12x + 5x + 50 = 118$

$17x = 118 - 50$

$17x = 68$ $\boxed{x=4}$

Jose has $5.50 in Quarters & Dimes only.
The # of dimes is 1 more than twice # of
quarters. How many of each?

Categories	Value	Number	Amount
Quarters	25¢	x	$25x$
Dimes	10¢	$2x+1$	$10(2x+1)$

$25x + 10(2x+1) = 550$

Divisible by 5

$5x + 2(2x+1) = 110$

$5x + 4x + 2 = 110$

$9x = 108$

$\boxed{x=12}$

12 Quartes & 25 Dimes

9

Maria Paid $14.70 For 50 Stamps.

Stamps were two kinds: 24¢ each & 39¢ each.

Find how many of each?

24¢	39¢
10	50-10=40
22	50-22=28
35	50-35=15
x	50-x

Categories	Value	Number	Worth
24¢ type	24¢	x	$24x$
39¢ Type	39¢	50-x	$39(50-x)$

$$24x + 39(50-x) = 1470$$

Divisible by 3

$$8x + 13(50-x) = 490$$
$$8x + 650 - 13x = 490$$

$$-5x = 490 - 650$$

$$-5x = -160 \quad \boxed{x = 32}$$

32 of 24¢ Stamp

18 of 39¢ Stamp.

Cheap Tires.com produces two types of tire.

Type A : $37 Cost, Type B : $42

Total cost to produce 355 tires was $13860.

How many of each?

$$37x + 42(355-x) = 13860$$

$$\vdots$$

$$x = 210 \Rightarrow$$ 210 of type A, 145 of type B

Categories	Cost	Number	Amount
Type A	$37	x	$37x$
Type B	$42	355-x	$42(355-x)$

B of A $\rightarrow$ \$10/Month plus 5¢/check

Wells Fargo $\rightarrow$ \$20/Month plus 3¢/check.

find # of checks that makes B of A a

better account (lower cost)

$$10 + .05 X < 20 + .03 X$$

$$.05x - .03x < 20 - 10$$

$$.02x < 10 \qquad x < \frac{10}{.02} \qquad x < 500$$

Fewer than 500 checks/Month

Art got 75 and 84 on first two exams.
He will set B for the class if his average
falls within 80 and 89, inclusive.
Final exam counts as 2 exam. Find range of
Scores he needs to secure B for the class?

$$80 \leq Average \leq 89 \qquad \rightarrow Multiply\ by\ 4$$

$$80 \leq \frac{Total\ Scores}{4} \leq 89 \qquad 320 \leq 159 + 2F \leq 356$$

work on WP 8

$$80 \leq \frac{75 + 84 + 2F}{4} \leq 89 \qquad 161 \leq 2F \leq 197$$

$$\boxed{80.5 \leq F \leq 98.5}$$

Work on SG8 , WP8

Redo SG7

Expect Quiz in class