Math 115

Spring 2018

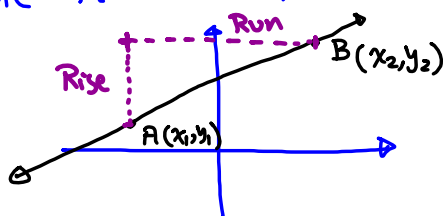**Lecture 9**

$? \; a^2 + b^2 = c^2 \; ?$

$y = mx + b$ $\quad ? \quad d = rt$

Suppose $A(x_1, y_1)$ & $B(x_2, y_2)$
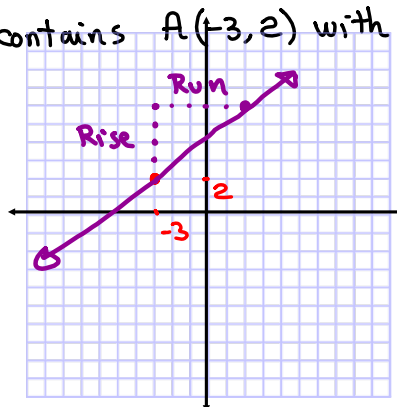
Slope of the line $\overleftrightarrow{AB}$ is m, where

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

Run

Rise $\quad B(x_2, y_2)$
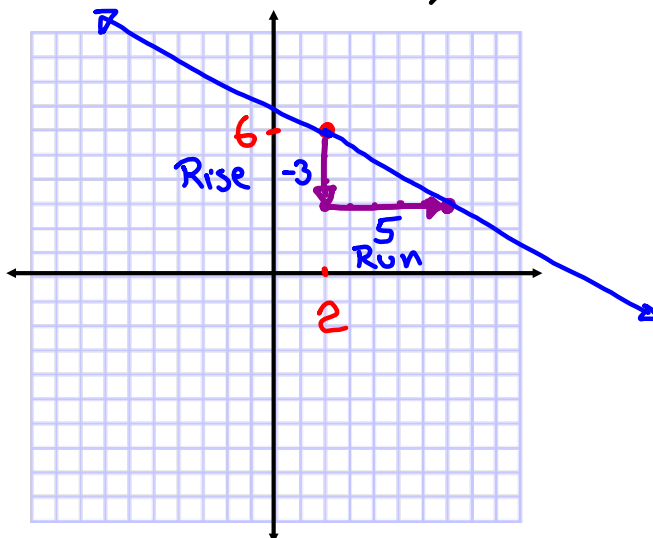
$A(x_1, y_1)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Draw a line that contains $A(-3, 2)$ with

Slope $\dfrac{4}{5} \cdot \dfrac{Rise}{Run}$

Run

Rise

2

-3

Draw the line that contains (2,6) with slope $-\frac{3}{5}$.

$\frac{-3}{5}$ $\frac{Rise}{Run}$

Rise -3

5 Run

6

2

Draw two lines with slope $\frac{2}{7}$, one contains (0,3), other one contains (0,-4).

Same slope

Increasing

Parallel lines

Increasing
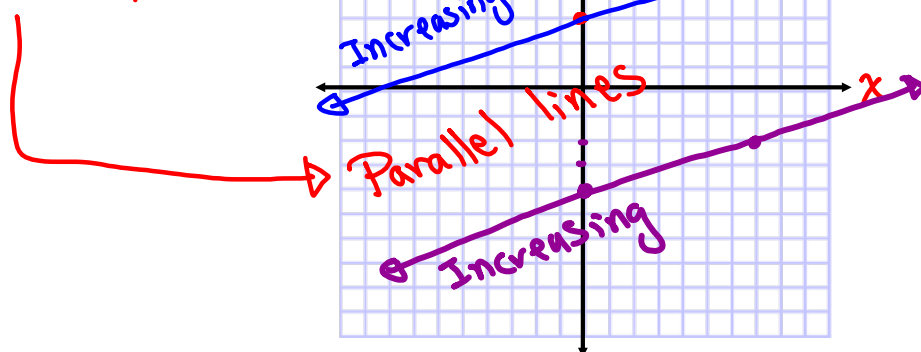
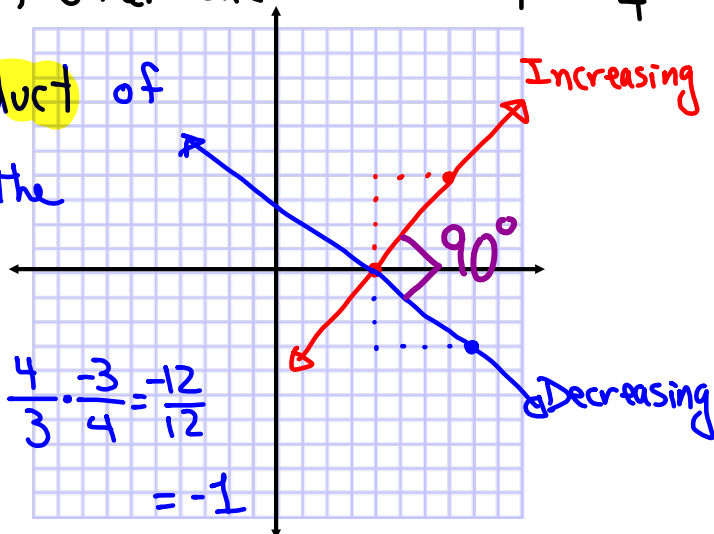Draw two lines that contain $(4,0)$, one with slope $\frac{4}{3}$, other one with slope $\frac{-3}{4}$.

whenever **Product** of slopes is **-1**, the slant **lines** are **Perpendicular**.

$$\frac{4}{3} \cdot \frac{-3}{4} = \frac{-12}{12}$$

$$= -1$$

Increasing

$90°$

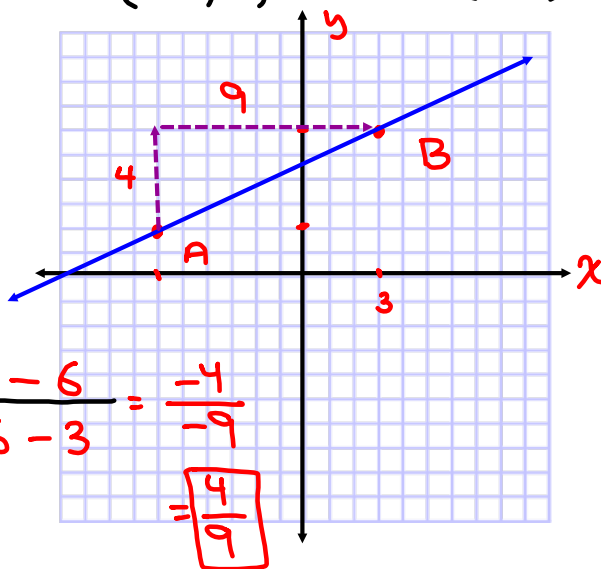Decreasing

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Draw $\overleftrightarrow{AB}$ where $A(-6,2)$ and $B(3,6)$.

$m = \frac{4}{9}$

$(-6,2)$ & $(3,6)$

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{2-6}{-6-3} = \frac{-4}{-9} = \boxed{\frac{4}{9}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-2}{3-(-6)} = \boxed{\frac{4}{9}}$$

9

4

B

A
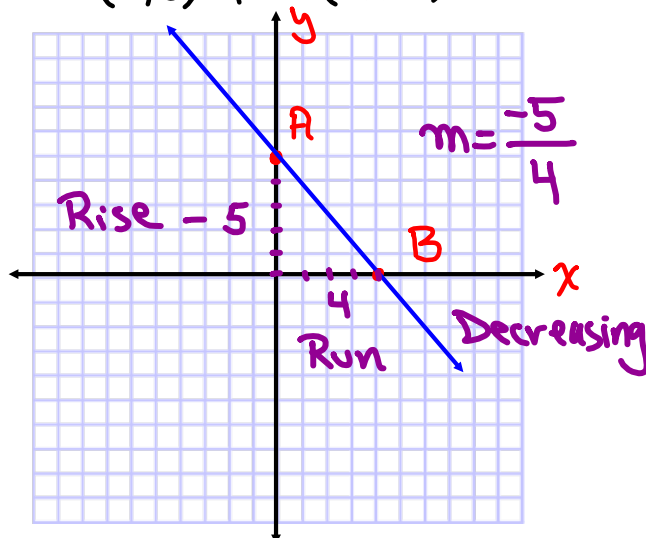
y

x

3

Draw $\overleftrightarrow{AB}$ with $A(0,5)$ & $B(4,0)$.

$(0,5)$ & $(4,0)$

$m = \dfrac{5-0}{0-4}$

$= \dfrac{5}{-4} = \boxed{\dfrac{-5}{4}}$

$m = \dfrac{-5}{4}$

Rise -5

Run

4

Decreasing
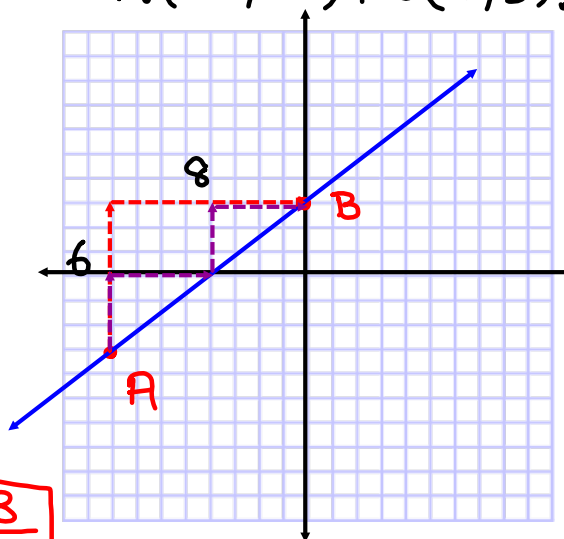
Draw $\overleftrightarrow{AB}$ with $A(-8,-3)$ & $B(0,3)$.

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

$(-8,-3)$ & $(0,3)$

$m = \dfrac{-3-3}{-8-0}$

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

8

6

$m = 0 \iff$ Horizontal line $\iff y = b$

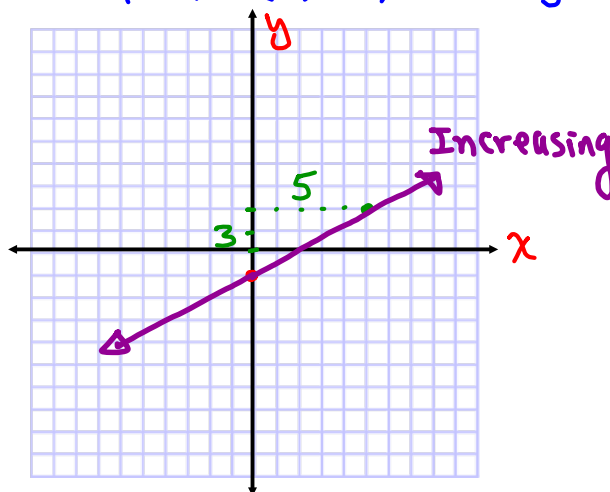undefined slope $\iff$ Vertical line $\iff x = a$

Slope -Int form

$$y = mx + b$$

Y-Int $(0, b)$

Slope m

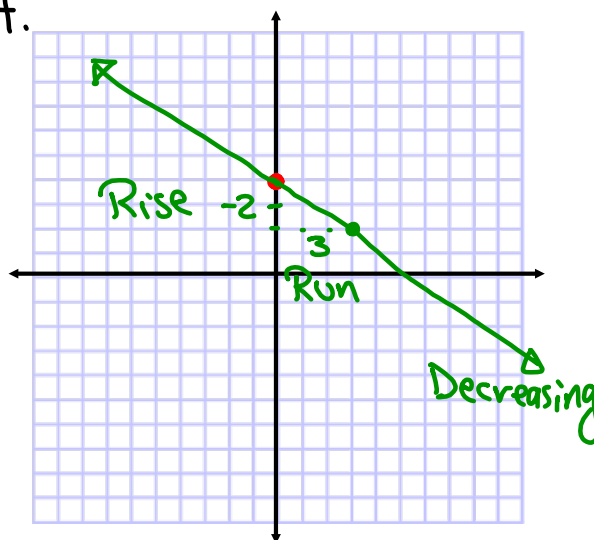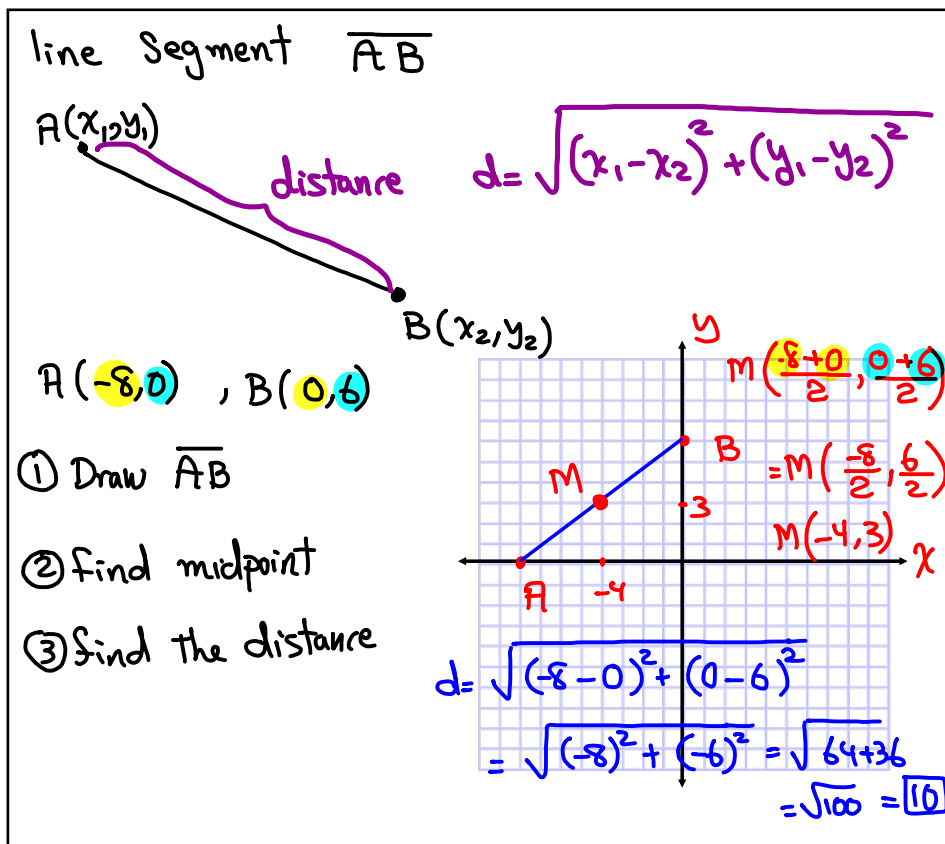$$y = \frac{3}{5}x - 1$$

Y-Int $(0, -1)$, $m = \frac{3}{5}$

Increasing

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

Y-Int $(0, 4)$

Slope $\frac{-2}{3}$ Rise / Run

Draw

Rise -2

Run 3

Decreasing

Line Segment $\overline{AB}$

$B(x_2, y_2)$

M

$A(x_1, y_1)$

$\longrightarrow$ Midpoint

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

$A(-4,2)$, $B(4,8)$

① Draw $\overline{AB}$

② find & plot its midpoint M.

$M\left(\dfrac{-4+4}{2}, \dfrac{2+8}{2}\right) = M\left(\dfrac{0}{2}, \dfrac{10}{2}\right)$

$= M(0,5)$

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line Segment $\overline{AB}$

$A(x_1, y_1)$

distance

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

$B(x_2, y_2)$

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

① Draw $\overline{AB}$

② find midpoint

③ find the distance

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

$= M\left(\dfrac{-8}{2}, \dfrac{6}{2}\right)$

$M(-4, 3)$

$d = \sqrt{(-8-0)^2 + (0-6)^2}$

$= \sqrt{(-8)^2 + (-6)^2} = \sqrt{64+36}$

$= \sqrt{100} = \boxed{10}$
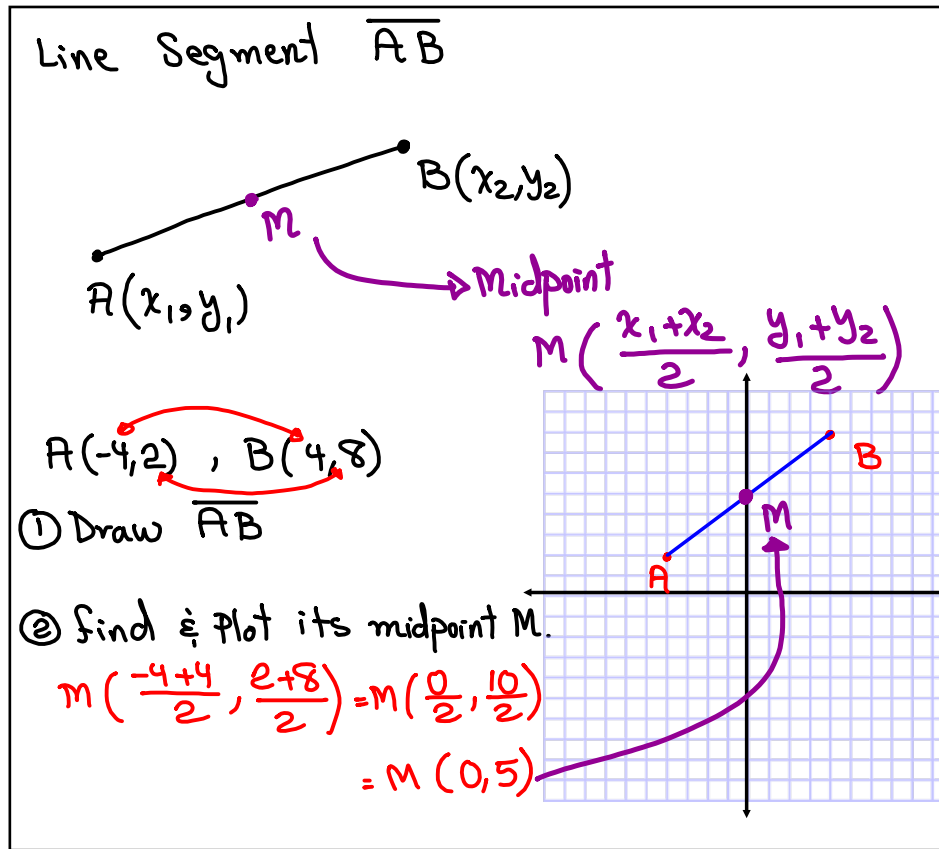
$A(-6,4)$, $B(6,-4)$

① Draw $\overline{AB}$

② Find its midpoint M

③ find its distance

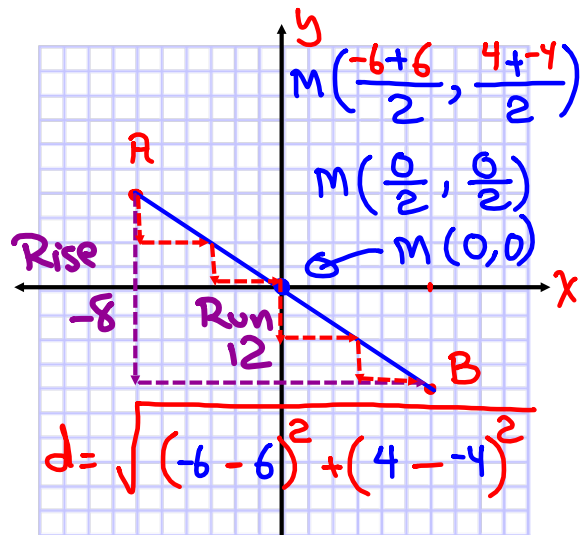④ find its slope

$m = \dfrac{-8}{12} = \boxed{\dfrac{-2}{3}}$

$M\left(\dfrac{-6+6}{2}, \dfrac{4+-4}{2}\right)$

$M\left(\dfrac{0}{2}, \dfrac{0}{2}\right)$

$M(0,0)$

Rise -8

Run 12

$d = \sqrt{\left(-6-6\right)^2 + \left(4 - -4\right)^2}$

$= \sqrt{(-12)^2 + 8^2}$

$= \sqrt{144+64} = \sqrt{208}$

$\approx \boxed{14.42}$

The sum of ages of Jose and Maria is 77 Yrs.

Jose's age is $\boxed{4 \text{ Years less than}}$ $\boxed{\text{twice}}$ $\boxed{\text{Maria's age}}$.

Find Jose's age.

Parts & whole

Total → 77 Yrs

Jose → $2x - 4$

Maria → x

Jose's age + Maria's age = 77

$2x-4$ + x = 77

$3x - 4 = 77$

$3x = 77+4$

$3x = 81$

$\boxed{x = 27}$

$2(27) - 4$

$= 54-4$

$= 50$

Jose is 50 Yrs old.

7

John has a total of 77 Coins.
Nickels, Dimes, and Quarters.
The # of dimes is twice # of nickels.
The # of Quarters is 5 more than 3 times # of nickels. How many quarters does he have?

Total → 77 Coins

$$3(12)+5$$
$$=36+5$$
$$=\boxed{41}$$

Parts $\begin{cases} \text{Nickels} \rightarrow x \\ \text{Dimes} \rightarrow 2x \\ \text{Quarters} \rightarrow 3x+5 \end{cases}$

41 Quarters

Nickels + Dimes + Quarters = 77

$$x + 2x + 3x+5 = 77$$

$$6x+5=77 \qquad 6x=72 \qquad x=12$$

PTA purchased 45 tickets for a trip to a local zoo. Students & Adults only.
# of Student's ticket was 5 fewer than 4 times the number of adult's tkt. How many of each?

Total → 45

Parts $\begin{cases} \text{Students} \rightarrow 4x-5 \\ \text{Adults} \rightarrow x \end{cases}$

Students + Adults = 45

$$\boxed{4x-5} + \boxed{x} = 45$$

$$5x-5=45$$

$$5x=50$$

$$x=10$$

10 adults
&
35 Students

45 Total tickets

Moe purchased ⟦30⟧ wedding pictures.
Small size and Large size.

The number of Small size pictures was $\frac{2}{3}$ of the number of Large size pictures.

How many of each?

Small + Large = 30

$\frac{2}{3}x + x = 30$

find total cost if Small picture is \$5 each and Large picture is \$8 each.

18 Large
&
12 Small

LCD = 3

$2x + 3x = 90$

$5x = 90$

$\boxed{x = 18}$

$8 \cdot 18 + 5 \cdot 12 = \boxed{\$204}$

WP 4
due Tomorrow.