

Math 115

Spring 2018

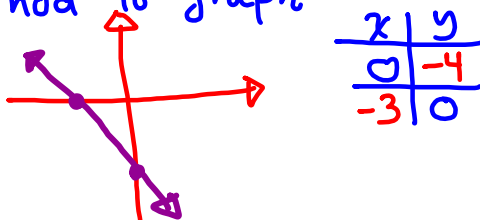
Lecture 11

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

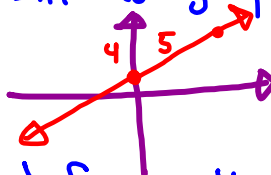
$$y = mx + b \quad ? \quad d = rt$$

Class Quiz

- ① Use intercept method to graph
 $4x + 3y = -12$



- ② use slope and y-Int to graph $y = \frac{4}{5}x + 2$



- ③ write in slope-Int form: $y + 3 = \frac{1}{2}(x + 2)$
- $$y = mx + b$$
- $$y + 3 = \frac{1}{2}x + \frac{1}{2} \cdot 2$$
- $$y = \frac{1}{2}x + 1 - 3$$
- $$y = \frac{1}{2}x - 2$$

$A(-6, 4)$, $B(0, -2)$

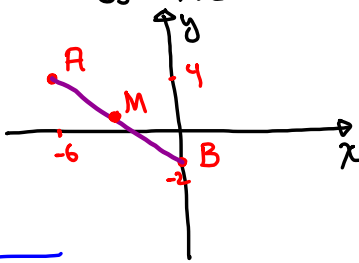
① Draw \overline{AB}

② Find its midpoint
 $M\left(\frac{-6+0}{2}, \frac{4+(-2)}{2}\right) \Rightarrow M(-3, 1)$

③ Find its slope
 $m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{4 - (-2)}{-6 - 0}$
 $= \frac{6}{-6} = -1$

④ Find the distance from A to B
 $d = \sqrt{(-6-0)^2 + (4-(-2))^2}$
 $= \sqrt{(-6)^2 + (6)^2} = \sqrt{72} \approx 8.5$

⑤ Find the equation of \overleftrightarrow{AB}



Equation of \overleftrightarrow{AB}
 $y - y_1 = m(x - x_1)$
 $y - 2 = -1(x - 0)$
 $y + 2 = -x$
 $y = -x - 2$

$A(2, 5)$, $B(-6, -5)$

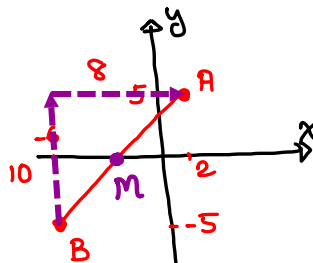
① Draw \overline{AB}

② Find its midpoint
 $M\left(\frac{2+(-6)}{2}, \frac{5+(-5)}{2}\right) \Rightarrow M(-2, 0)$

③ Find its slope
 $m = \frac{10}{8} = \frac{5}{4}$

④ Find the distance from A to B

⑤ Find the equation of \overleftrightarrow{AB} in slope-int form.



$y - y_1 = m(x - x_1)$
 $y - 5 = \frac{5}{4}(x - 2)$
 $y - 5 = \frac{5}{4}x - \frac{5}{4} \cdot 2$
 $4y - 20 = 5x - 10$
 $4y = 5x + 10$
 $y = \frac{5}{4}x + \frac{5}{2}$

$d = \sqrt{(2-(-6))^2 + (5-(-5))^2}$
 $= \sqrt{(2+6)^2 + (5+5)^2}$
 $= \sqrt{8^2 + 10^2} = \sqrt{164} \approx 12.8$

Find the equation of a line that contains $(-2, 1)$ with slope $-\frac{2}{3}$.

Point

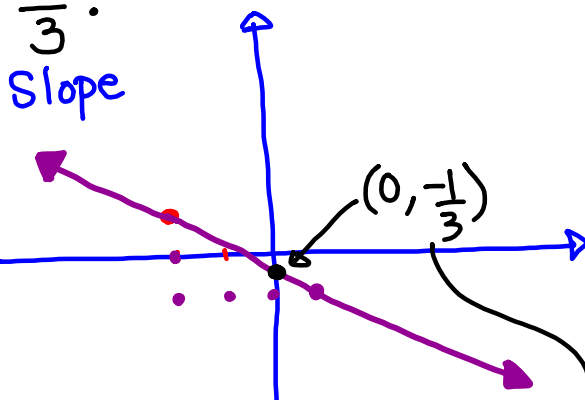
$$y - y_1 = m(x - x_1)$$

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

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

$$\text{LCD} = 3$$

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



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

$$3y = -2x - 1$$

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

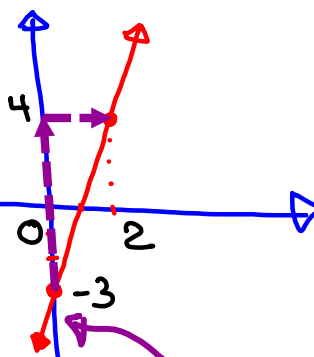
Find the eqn of a line that contains $(0, -3)$ and $(2, 4)$. Draw it. Final Answer in Slope-Int. Form.

$$m = \frac{-3 - 4}{0 - 2} = \frac{-7}{-2} = \boxed{\frac{7}{2}}$$

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

$$y - -3 = \frac{7}{2}(x - 0)$$

$$y + 3 = \frac{7}{2}x \Rightarrow \boxed{y = \frac{7}{2}x - 3}$$



find eqn of a line that contains
 $(-4, 3)$ and $(2, -5)$. Draw it. Final Ans
 in Slope-Int form.

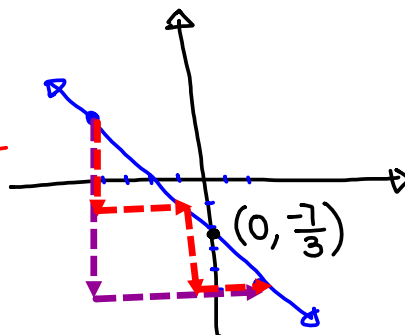
$$m = \frac{3 - (-5)}{-4 - 2} = \frac{3 + 5}{-4 - 2} = \frac{8}{-6}$$

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

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

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

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



→ LCD = 3

$$3y + 15 = -4(x - 2)$$

$$3y + 15 = -4x + 8$$

$$3y = -4x - 7$$

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

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

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

$$3y - 9 = -4(x + 4)$$

$$3y - 9 = -4x - 16$$

$$3y = -4x - 16 + 9$$

$$3y = -4x - 7$$

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

Find the equation of a line that contains $(4, -6)$ and

a) $(4, 8)$

$$(4, -6) \text{ and } (4, 8)$$

$$m = \frac{-6 - 8}{4 - 4}$$

$$= \frac{-14}{0} \text{ undefined}$$

No slope \Rightarrow V.L. $\Rightarrow \boxed{x = 4}$

b) $(-2, -6)$

$$(4, -6) \text{ and } (-2, -6)$$

$$m = \frac{-6 - (-6)}{4 - (-2)}$$

$$= \frac{-6 + 6}{4 + 2} = \frac{0}{6} = 0$$

Zero slope

\Rightarrow H.L. $\Rightarrow \boxed{y = -6}$

Parallel Lines

\Rightarrow Same Slope

Find equation of a line that contains $(4, -2)$ and is parallel to $y = \frac{3}{2}x + 5$.

Draw both lines.

Parallel lines \Rightarrow Same Slope

$$m = \frac{3}{2}$$

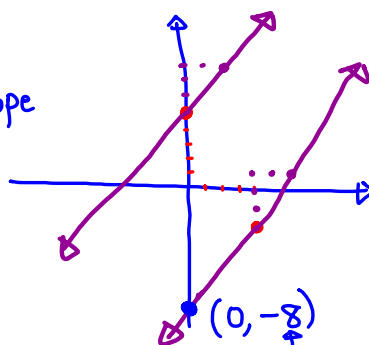
$$y - y_1 = m(x - x_1)$$

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

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

$$y = \frac{3}{2}x - 6 - 2$$

$$\boxed{y = \frac{3}{2}x - 8}$$



find the equation of a line in Slope-Int form that contains the origin and is

Parallel to $2x + 5y = 20$.

Convert to
 $y = mx + b$

$$5y = -2x + 20$$

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

$$m = -\frac{2}{5}, \text{Y-Int}(0, 4)$$

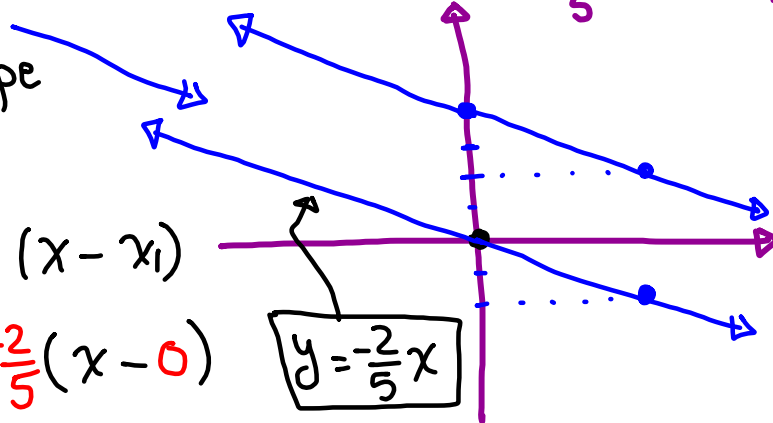
Parallel line
 \Rightarrow Same slope

$$\Rightarrow m = -\frac{2}{5}$$

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

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

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



Perpendicular lines

Product of Slopes is -1

opposite sign of the reciprocal

One line has slope $\frac{3}{4}$.

the perpendicular lines has slope

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

one line has a slope of -2 .

the perpendicular lines has slope

$$2 \cdot \frac{2}{1} \rightarrow$$

$$+\frac{1}{2}$$

Find the equation of a line in slope-Int form that contains $(0, -3)$ and is Perpendicular to $y = \frac{2}{5}x + 3$. Draw both lines.

Perpendicular lines
opposite reciprocal

$$-\frac{5}{2}$$

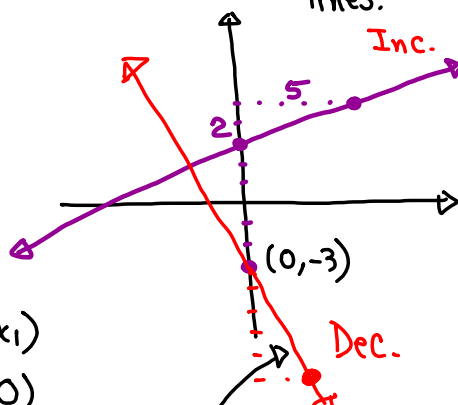
$$-\frac{5}{2} = \frac{5}{-2} = -\frac{5}{2}$$

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

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

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

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



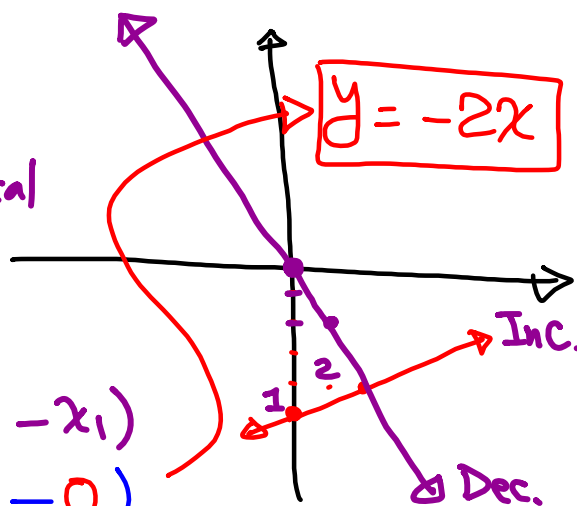
Find the eqn of a line in slope-Int. form that contain the origin and is perpendicular to $y = \frac{1}{2}x - 5$. Draw both lines.

Perpendicular lines
Slopes are
opposite reciprocal

$$-\frac{2}{1} = -2$$

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

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

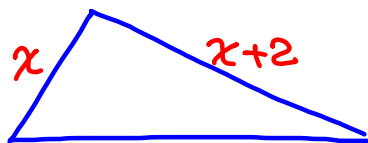


Perimeter of a triangle is 24 ft.

Three Sides are consecutive even integers.

Find all three sides.

$$x, x+2, x+4$$



$$P = 24$$

$$a + b + c = 24$$

$$x + x+4 + x+2 = 24$$

$$3x + 6 = 24$$

$$\rightarrow 3x = 24 - 6$$

$$3x = 18$$

$$x = \frac{18}{3}$$

$$x = 6$$

6 ft, 8 ft, and 10 ft

Jose has \$5. Dimes and Quarters only.

of dimes is 1 more than # of Quarters.

How many of each?

Quarters $\rightarrow x$

Dimes $\rightarrow x+1$

Total value = \$5

Value in Quarters + Value in Dimes = \$5

$$x = \frac{490}{35}$$

$$x = 14$$

$$25 \cdot x + 10 \cdot (x+1) = 500$$

$$25x + 10x + 10 = 500$$

$$35x = 500 - 10$$

$$35x = 490$$

14 Quarters

15 Dimes

Lisa ordered 30 pictures.

Small \neq large.

Cost for Small \rightarrow \$5

Cost for large \rightarrow \$8

She paid \$186 in total.

How many of each?

18 Small
 \neq
12 Large

Small $\rightarrow x$

Large $\rightarrow 30-x$

$$\boxed{5 \cdot x} + \boxed{8 \cdot (30-x)} = \boxed{186}$$

Cost for Small	Cost for large	Total Cost
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$$5x + 240 - 8x = 186$$

$$5x - 8x = 186 - 240$$

$$-3x = -54$$

$$\boxed{x = 18}$$

I have \$100 budget to rent a Car for one day. Daily rental is \$30 plus 20¢ per mile. Find the max. mile I can drive in one day.

Total Cost \leq Total Budget

$$30 + .20M \leq 100$$

$$.20M \leq 100 - 30$$

$$.20M \leq 70$$

$$M \leq \frac{70}{.2}$$

$$M \leq 350$$

at most 350 miles

Exam 1 \rightarrow 82

Exam 2 \rightarrow 76

Final exam counts as 2 exams.

To get a B for the class, you need average of at least 80.

What score on the final exam do you need to secure a B grade.

$$\text{Average} \geq 80$$

$$\frac{\text{Total}}{\text{\# of exams}} \geq 80$$

$$\frac{82 + 76 + 2F}{4} \geq 80$$

$$\rightarrow \frac{158 + 2F}{4} \geq 80$$

$$158 + 2F \geq 320$$

$$2F \geq 320 - 158$$

$$2F \geq 162$$

$$F \geq \frac{162}{2}$$

$$F \geq 81$$

at least 81 on
the final

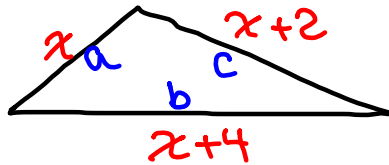
Due Thursday at 6:15 AM

WP 5 & SG 7

Make Sure You have SG 9 with You
So we can finish it in class and
Collect it.

Perimeter of a triangle is 45 cm.

Three sides are three consecutive odd integers find the longest side.



13, 15, 17

The longest side is 17 cm.

$$P = 45$$

$$a + b + c = 45$$

$$x + x + 4 + x + 2 = 45$$

$$3x + 6 = 45$$

$$3x = 45 - 6$$

$$3x = 39$$

$$x = \frac{39}{3} \quad x = 13$$

The perimeter of a rectangular shape is 104 ft. The width of the rectangle is half of the difference of length and 1 ft. Find its dimensions.

$$P = 104$$

$$2L + 2W = 104$$

$$\frac{1}{2}(x-1)$$



$$2(x) + 2\left(\frac{1}{2}(x-1)\right) = 104$$

$$2x + 1(x-1) = 104$$

$$2x + x - 1 = 104$$

$$3x - 1 = 104$$

$$3x = 105$$

$$x = \frac{105}{3}$$

$$x = 35$$

$$\frac{1}{2}(35-1) = \frac{1}{2} \cdot 34 = 17 \text{ ft}$$

Dimensions are 17 ft by 35 ft.

A rectangular billboard has a perimeter of 60m. The width is $\frac{2}{3}$ of its length.

Find its area.

$$P = 60$$

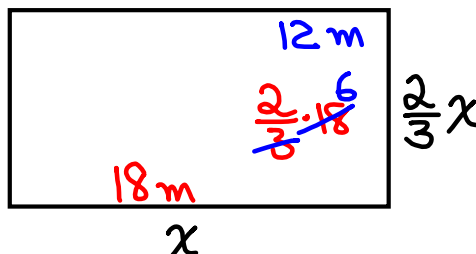
$$2L + 2W = 60$$

$$2x + 2\left(\frac{2}{3}x\right) = 60$$

$$2x + \frac{4}{3}x = 60$$

LCD=3

$$6x + 4x = 180$$



$$\rightarrow 10x = 180$$

$$x = 18$$

$$A = LW = 18(12)$$

$$A = 216 \text{ m}^2$$

The dimensions of a rectangular shape are two consecutive even integers.

The area is 24 ft².

Find its dimensions.

$$A = 24$$

$$LW = 24$$

$$(x+2) \cdot x = 24$$

By inspection

$$x = 4$$

