Agenda: 10/5/15

HW leader: Anna B.   Bryce M.
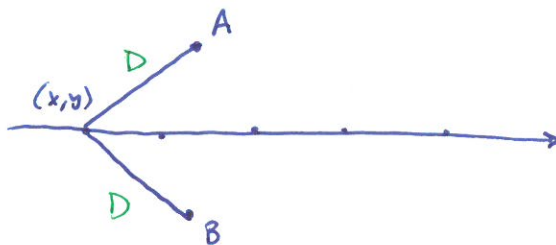
Lesson 36 + 37

   line as a locus

   Midpoint Formula

Definition of a line –

A line is the __locus__ of all points in a plane that are equidistant from two specified points.

         place

Ex. 37.3 Find the equation of the line equidistant from $(0, -4)$ and $(5, 2)$.

Distance from (x, y) to $(0, -4) = \sqrt{x^2 + (y+4)^2}$ $\Big\|$

Distance from (x, y) to $(5, 2) = \sqrt{(x-5)^2 + (y-2)^2}$

So $x^2 + (y+4)^2 = (x-5)^2 + (y-2)^2$

$\cancel{x^2} + \cancel{y^2} + 8y + 16 = \cancel{x^2} - 10x + 25 + \cancel{y^2} - 4y + 4$
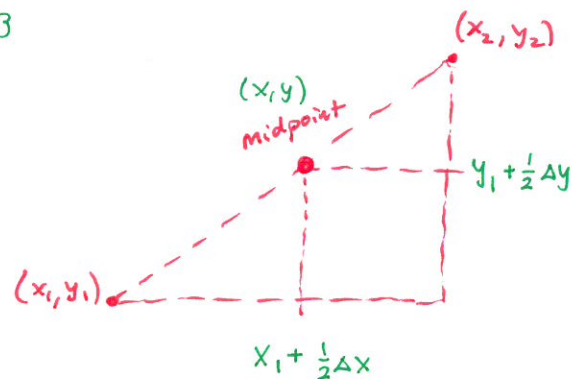
$$12y = -10x + 13$$

$$\boxed{y = -\frac{5}{6}x + \frac{13}{12}}$$

Midpoint formula

$$X = X_1 + \tfrac{1}{2}(X_2 - X_1) = \boxed{\frac{X_2 + X_1}{2}}$$

$$Y = Y_1 + \tfrac{1}{2}(Y_2 - Y_1) = \boxed{\frac{Y_2 + Y_1}{2}}$$

Fundamental Counting Principle: if one choice can be made A ways and after the first choice another choice can be made B ways then the number of possible choices is A · B, without repetition

• Arrangement of members of a set with a definite order is a _permutation_

Ex. 38.1   How many different ways can the numbers 3, 5, 7 and 8 be arranged in order if no repetitions are allowed?
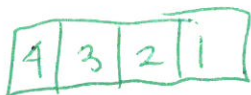
$$\boxed{4\,|\,3\,|\,2\,|\,1}\qquad\qquad 4\cdot3\cdot2\cdot1 = \boxed{24}$$

Ex 38.2   How many 4-letter signs can be made from the letters in the word EQUAL if repetitions are allowed?

$$\boxed{5\,|\,5\,|\,5\,|\,5}\qquad\qquad 5\cdot5\cdot5\cdot5 = \boxed{625}$$

Designated roots:

Ex. 38.6   Write the quadratic equation with lead coef. of 1 and roots $1+\sqrt{2}$ and $1-\sqrt{2}$.

$$(x-1-\sqrt{2})(x-1+\sqrt{2}) = 0$$

$$x^2 - x + \sqrt{2}x - x + 1 - \sqrt{2} - \sqrt{2}x + \sqrt{2} - 2 = 0$$

$$\boxed{x^2 - 2x - 1 = 0}$$

Overall average rate $= \dfrac{\text{Overall distance}}{\text{overall time}}$

Ex 38.7   Frank and Judy drove for 100 miles at 50 mph. Then drove 180 miles at 60 mph. What is their overall average rate over the whole trip?

$$\text{leg}_1 \text{ time} = \frac{100}{50} = 2\,hr$$
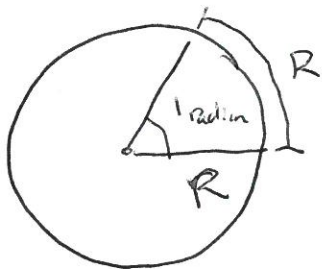$$\text{leg}_2 \text{ time} = \frac{180}{60} = 3\,hr$$

$$\text{Overall average} = \frac{100 + 180}{2 + 3} = \frac{280}{5}$$
$$= \boxed{56}$$

Lesson 39
radians
forms of Linear equations

Def:

Central angle
and measure of
the arc is 1 radian

Recal   Arc length $S = \theta \cdot R$

So if $S = 2\pi r = \theta r$

$$\boxed{\text{Then } \theta = 2\pi}$$ ← One full circle

So π as radians is   180 degrees

2π radians is   360 degrees

Conversion:

$$\boxed{\text{Unit Circle}}$$

$\theta° \cdot \dfrac{\pi \; rad}{180° \, deg}$

$\boxed{deg \to rad}$

$\theta_{rad} \cdot \dfrac{180°}{\pi \; rad}$

$\boxed{rad \to deg}$

forms of a line

Geeral:
$$ax + by + c = 0$$

★ Slope intercept
$$y = mx + b$$

double - intercept
$$\frac{x}{a} + \frac{y}{b} = 1$$

★ Point slope
$$y - y_1 = m(x_0 - x_1)$$

2 point
$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$
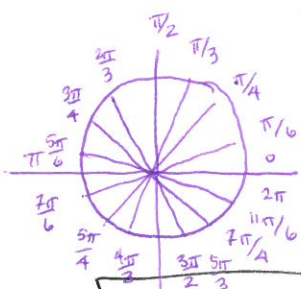
Ex : $4\sin\frac{\pi}{4} + \sin\left(-\frac{\pi}{3}\right) = 4\left(\frac{\sqrt{2}}{2}\right) - \frac{1}{2}$

Ex. $\cos\left(-\frac{25\pi}{6}\right) - 2\tan\left(\frac{4\pi}{3}\right) = \cos\left(-\frac{\pi}{6}\right) - 2\tan\left(\frac{\pi}{3}\right)$

$= \cos\left(\frac{\pi}{6}\right) - 2\tan\left(\frac{\pi}{3}\right) = \frac{1}{2} - 2(\sqrt{3})$

- <u>Argument</u> of a function is the input

- Laws of logarithms

$$\log_b MN = \log_b M + \log_b N$$

$$\log_b \frac{M}{N} = \log_b M - \log_b N$$

$$\log_b b = 1 \quad \text{because} \quad b^1 = b$$

$$L = \log_b a^x = x \cdot \log_b a \qquad \begin{array}{c} b^1 = a^x \end{array} \quad \begin{array}{c} \sqrt[1/x]{b} = a \end{array}$$

$$\log_b 1 = 0 \quad \text{because} \quad b^0 = 1$$

- <u>Properties of Inverse functions</u>

Two functions f and g are defined to be inverse functions if

$$f(g(x)) = x \quad \text{for all } x \text{ in domain of } g$$

$$g(f(x)) = x \quad \text{for all } x \text{ in domain of } f$$

Ex. 40.2

  Solve: $\log_4(x+6) - \log_4(x-1) = \log_4 5$

Solve $\quad 3\log_b x = \log_b 8$

Solve $\quad \ln(x-1) + \ln(x-2) = \ln(6)$