Pre-Calc AB

Lesson 51 + 52

11/3/15

Agenda: 11/3/15

Hw leader

lesson 51 + 52

Common log, Natural log

Arguments in Trig Equations

★ Test is tomorrow

$$\log_b N = L \iff b^L = N$$

- L the exponent is the logarithm of the number N
- N the number is the antilogarithm of the exponent L

$\log_{10}(x) = \log(x)$ is called the common logarithm

$\log_e(x) = \ln(x)$ is called the natural logarithm

Ex. 51.1 Write 2.4 as a power with a base of (round to two decimal places)

(a) 10 $\log 2.4 \approx 0.3802112$ so $2.4 \approx 10^{0.38}$

(b) e $\ln(2.4) \approx 0.8754687$ so $2.4 \approx e^{0.88}$

Ex. Solve: $2\sin 3\theta - \sqrt{3} = 0$ $0 \le \theta < 2\pi$

$\sin 3\theta = \frac{\sqrt{3}}{2}$

$3\theta = \frac{\pi}{3} + 2\pi K$ $\quad 3\theta = \frac{2\pi}{3} + 2\pi K$

$\theta = \frac{\pi}{9} + \frac{2\pi K}{3}$ $\quad \theta = \frac{2\pi}{6} + \frac{2\pi K}{3}$

$\theta = \frac{\pi}{9}, \frac{7\pi}{9}, \frac{13\pi}{9}$ $\quad \theta = \frac{2\pi}{9}, \frac{14\pi}{9}, \frac{8\pi}{9}$

No $\sin\theta = \frac{\sqrt{3}}{6}$

Ex. Solve $\tan\left(\frac{\theta}{2} - \pi\right) = 1$ $\quad 0 \le \theta < 2\pi$

$\frac{\theta}{2} - \pi = \frac{\pi}{4} + \pi K$ $\quad \frac{\theta}{2} = \frac{\pi}{4} + \pi K$ $\quad \theta = \frac{\pi}{2} + 2\pi K$ $\quad \theta = \frac{\pi}{2}$

$\theta =$

Pre-Calc AB

Lesson 53

11/5/15

Agenda: 11/5/15

HW Leader

Lesson 53

Unit Multipliers

Angular Velocity

★ Test 6 back after lesson

Ex. Convert 50 Km per hour to feet per second

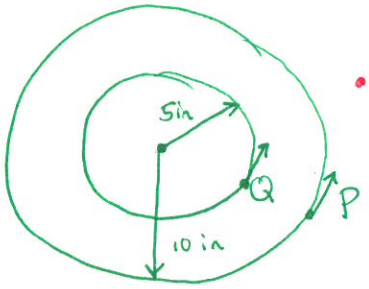
$$\frac{50\ \text{Km}}{1\ \text{hr}} \times \frac{1\ \text{hr}}{60\ \text{min}} \times \frac{1\ \text{min}}{60\ \text{sec}} \times \frac{1000\ \text{m}}{1\ \text{Km}} \times \frac{100\ \text{cm}}{1\ \text{m}} \times \frac{1\ \text{in}}{2.54\ \text{cm}} \times \frac{1\ \text{ft}}{12\ \text{in}}$$

$$= \frac{5 \times 100 \times 100}{6 \times 6 \times 2.54 \times 12} = \frac{5 \times 25 \times 25}{3 \times 3 \times 2.54 \times 3}\ \frac{\text{ft}}{\text{sec}}$$

Linear velocity is a vector quantity - has a direction and magnitude

Angular Velocity is a vector quantity that measures the rate of rotation of an object.

$$\text{Angular Velocity} = \frac{\text{Units of Circular measure}}{\text{Units of time}}$$



- 1 revolution (rev) per second for P and Q

For P 1 rotation $= 2\pi(10) \approx 62.8$ in

For Q 1 rotation $= 2\pi(5) \approx 31.4$ in

Velocity of P $= 62.8\ \frac{\text{in}}{\text{s}}$ Velocity of Q $= 31.4\ \frac{\text{in}}{\text{s}}$

Linear Velocity (V) $= r \cdot (\omega)$ Angular Velocity

Ex 53.3 An automobile whose wheels are 30 in in diameter is traveling at 40 mph. What is the angular velocity of the wheels in revolutions per second?

$V = r\omega$ $\quad \omega = \frac{V}{r}$ $\quad \omega = \frac{40\ \text{mph}}{15\ \text{in}} \times$

$$\frac{\cancel{8}\,4}{\frac{40\ \text{mi}}{\cancel{15}\,\cancel{3}\ \text{hr}}} \times \frac{\overset{528}{5280\ \text{ft}}}{1\ \text{mi}} \times \frac{\overset{4}{12\ \text{in}}}{1\ \text{ft}} \times \frac{1\ \text{hr}}{\cancel{60}\,\cancel{6}\,3\ \text{min}} \times \frac{1\ \text{min}}{60\ \text{sec}} = \frac{4(528)}{45}\ \frac{\text{rad}}{\text{sec}}$$

$$\omega = \frac{4(528)}{2\pi(45)}\ \frac{\text{rev}}{\text{sec}} = \boxed{\frac{2(528)}{45\pi}\ \frac{\text{rev}}{\text{sec}}}$$

Pre-Calc AB

Lesson 54

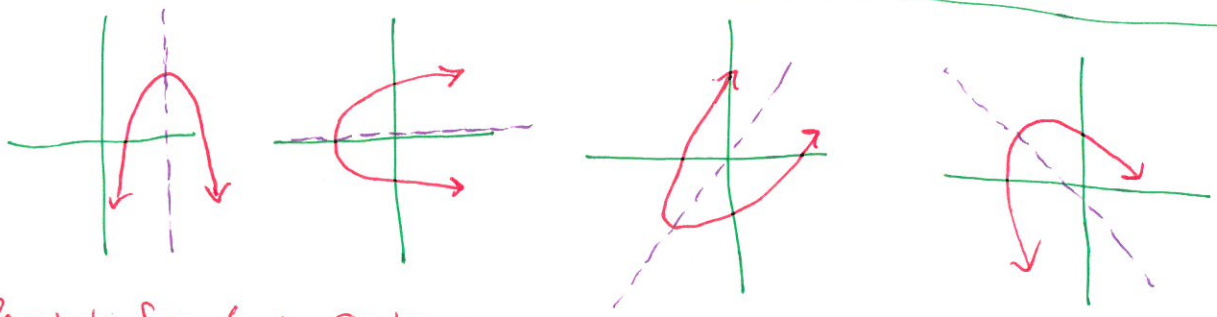
11/6/15

Agenda: 11/6/15

HW leader

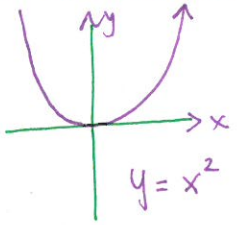
Lesson 54 ★ Handout WS 18

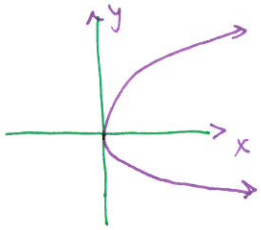
Parabolas



Parabola from Conic Sections

- focus on ones with vertical or horizontal axes of Symetry





$x = y^2$

Intercept form:

$y = a(x - r_1)(x - r_2)$

Standard form:

$y = a(x - h)^2 + K$

vertex: (h, k)

Axis of Symmetry: $x = h$

x-intercepts ($y = 0$)

$(r_1, 0)$ and $(r_2, 0)$

y-intercept ($x = 0$)

$(0, ah^2 + k)$

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

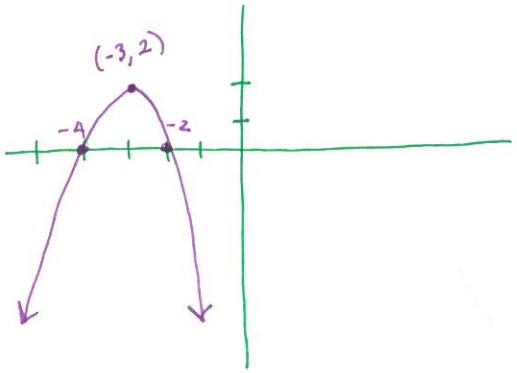
- opens down
- Axis of Symmetry $x = -2$
- vertex at $y = -3$

Ex. Complete the square to graph

$$y = -2x^2 - 12x - 16$$

$$y = -2(x^2 + 6x + 8)$$

$y = -2(x+3)^2 + 2$ [Standard form] $y = -2(x+4)(x+2)$ [intercept form]



Pre-Calc AB

Lesson 55

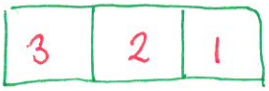
11/9/15

Agenda: 11/9/15
- Lesson 55
  - Circular Permutations
  - Distinguishable Permutations

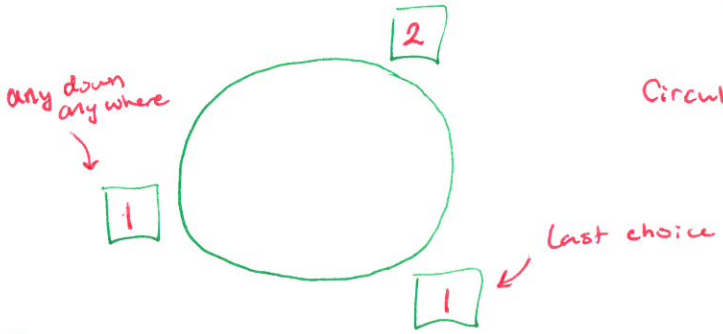
Quiz 7 tomorrow lessons 46-53
- 10 problems
- No Calculator Allowed

- **Circular Permutations** - arranged in a circle instead of a line [No first place]

Linear:



$3! = 6$



Circular: $2!$

General: $N!$ Linear Permutations

$(N-1)!$ Circular Permutations

- **Distinguishable Permutations** - permutations that are different.

Ex. How many distinguishable permutations are there of the letters in Mississippi?

11 - Letters i's - 4 s's - 4 p's - 2

Distinguishable Permutations $= \boxed{\frac{11!}{4!\,4!\,2!}} = 11 \cdot 10 \cdot 9 \cdot 7 \cdot 5$

If N items have a of one kind, b of another kind and c of another than

$$\text{Number of distinguishable Perms} = \frac{N!}{a!\,b!\,c!}$$