

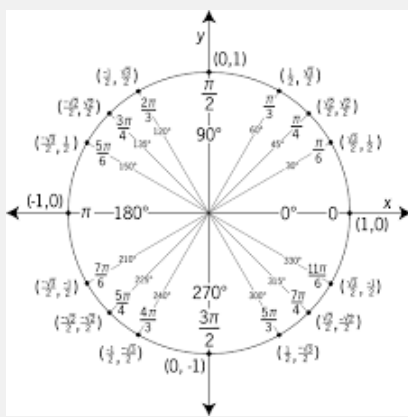
### 6 Trigonometric Functions

$\sin \angle = o/h$	$\csc \angle = h/o$
$\tan \angle = o/a$	$\cot \angle = a/o$
$\cos \angle = a/h$	$\sec \angle = h/a$

### General Definitions of the 6 Trig Functions

$\sin \angle = y/r$	$\csc \angle = r/y$
$\cos \angle = x/r$	$\sec \angle = r/x$
$\tan \angle = y/x$	$\cot \angle = x/y$

### Unit Circle



### Vocabulary

**Initial Side** The fixed ray of an angle

**Terminal Side** The rotated ray of an angle

**Standard Position** Angle whose vertex is on the origin and initial side lies on the x-axis

**Coterminal** Two angles that have the same terminal side. Coterminal = angle + / - [multiple of 360]

**Radian** The measure of an angle in standard position whose terminal side intercepts an arc of length  $r$

**Sector** A section of a circle bound by two radii

**Central Angle** The internal angle of a sector

**Reference Angle** the angle formed by the terminal side of another angle and the x-axis

### Arc Length and Area of a Sector

Arc Length

$$s = r\theta$$

Area

$$0.5 \times r^2 \times \theta$$

### Degrees to Radians

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$$\text{Degree} \times [(\pi \text{ radians})/180]$$

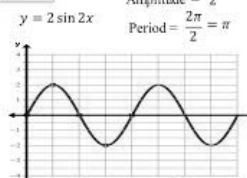
Radians to Degrees

$$\text{Radian} \times [180/(\pi \text{ radians})]$$

### Sine Functions

Sketching a Sine Curve Graph

1. Find amplitude and period.
2. Plot 5 points:
  - Midline points
  - Beginning
  - End
  - Middle
  - Amplitude points
  - Max
  - Min
3. Sketch curve.

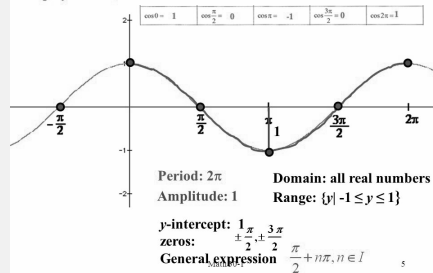


Amplitude =  $|a|$

Period =  $(2\pi) \div |b|$

### Graphing Cosine Functions

Graphing a Periodic Function  
Graph  $y = \cos x$ , radians



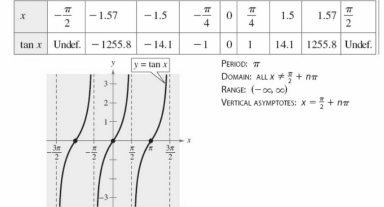
Amplitude =  $|a|$

Period =  $(2\pi) |b|$

### Graphing a Tangent Function

Graph of the Tangent Function  
 $y = \tan x$

Recall that the tangent function is odd, thus  $\tan(-x) = -\tan x$ . Therefore, the graph of  $y = \tan x$  is symmetric with respect to the origin.



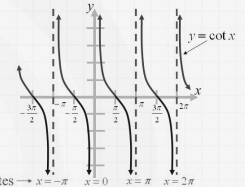
### Graphing a Cotangent Function

Graph of the Cotangent Function

To graph  $y = \cot x$ , use the identity  $\cot x = \frac{\cos x}{\sin x}$ . At values of  $x$  for which  $\sin x = 0$ , the cotangent function is undefined and its graph has vertical asymptotes.

Properties of  $y = \cot x$

1. domain: all real  $x$   
 $x = n\pi$  ( $n \in \mathbb{Z}$ )
2. range:  $(-\infty, +\infty)$
3. period:  $\pi$
4. vertical asymptotes:  
 $x = n\pi$  ( $n \in \mathbb{Z}$ )



vertical asymptotes  $\rightarrow x = -\pi, x = 0, x = \pi, x = 2\pi$