Trigonometry Supplement (Under Construction)

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Contents

1. Trigonometric formulas

Trig properties

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \cot^2\theta = \csc^2\theta$
- $\tan^2\theta + 1 = \sec^2\theta$

Double Angle formulas

- $\sin 2\theta = 2\sin\theta\cos\theta$
- $\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$
- $\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

Half Angle formulas

- $\sin\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{2}}$
- $\cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}}$
- $\tan\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$

Sum & difference formulas

- $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$
- $\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$
- $\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$
- $\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

Laws of Sin Cos

- $\frac{\sin a}{A} = \frac{\sin b}{B} = \frac{\sin c}{C}$
- $C^2 = A^2 + B^2 - 2AB\cos c$
- $B^2 = A^2 + C^2 - 2AC\cos b$
- $A^2 = B^2 + C^2 - 2BC\cos a$

<back2top>

2. Graphing Trig functions

The general form of the sin function is given by

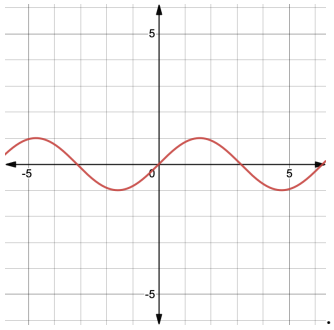
$$y = a\sin(b(x-c)) + d$$

where

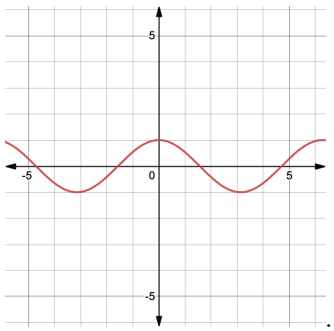
amplitude is given by;	$\lvert a\rvert$
frequency is between 0 and 2π given by;	b
period is given by;	$\frac{2\pi}{b}$
phase shift;	right c
vertical shift;	up d

- *amplitutde* is half of the total height from bottom to top.
- *period* is how long one full cycle is.

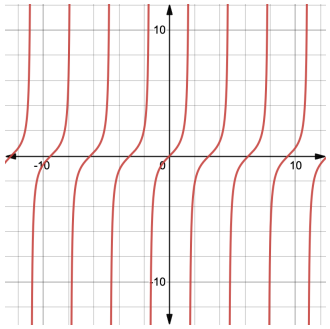
The standard sin graph:



The standard cos graph:



And lastly the standard tan graph:



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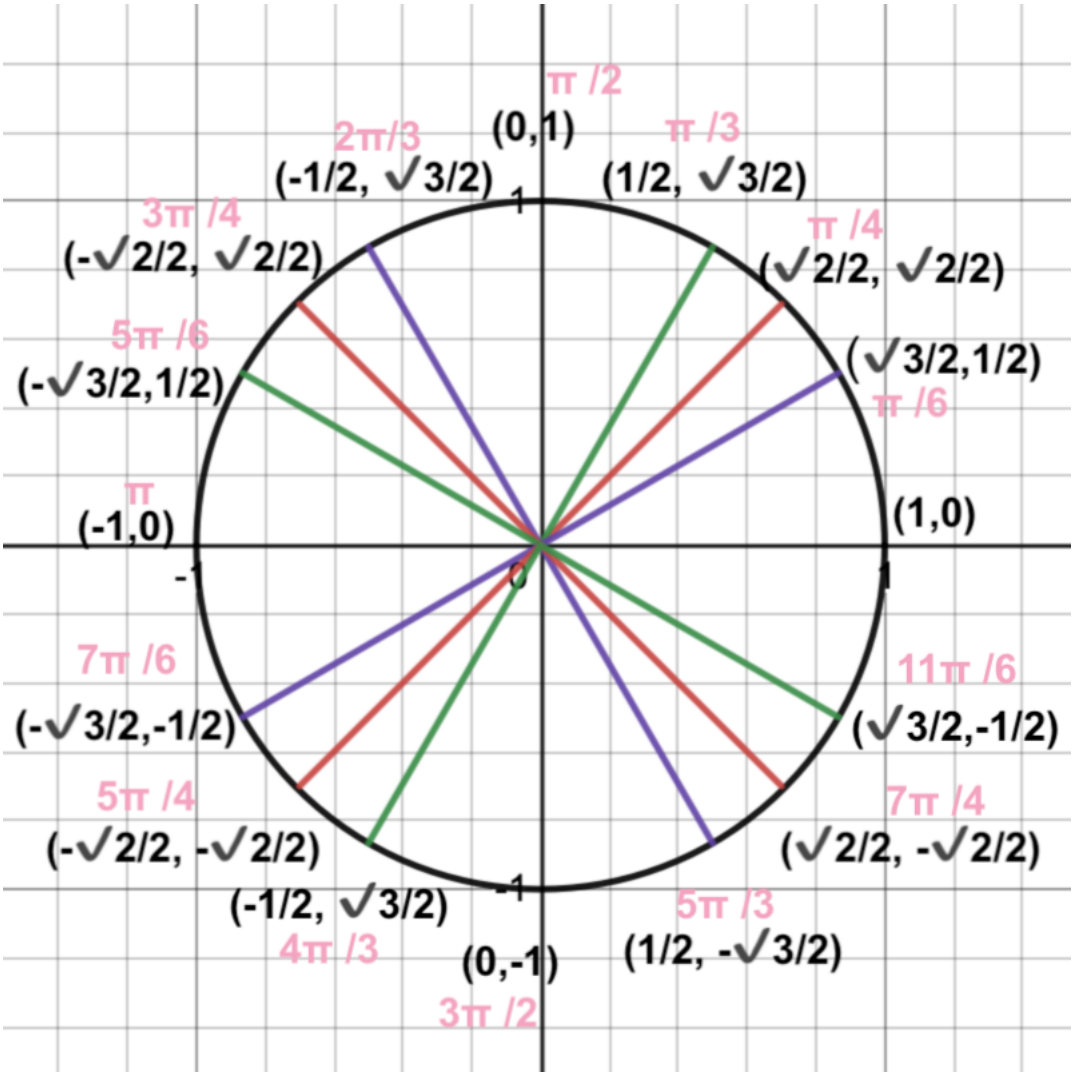
3. The Unit Circle



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