

1 Six Trigonometric Functions

$$\begin{aligned} \sin x &= \frac{\text{opp}}{\text{hyp}} = \frac{y}{r} & \csc x &= \frac{\text{hyp}}{\text{opp}} = \frac{r}{y} = \frac{1}{\sin x} \\ \cos x &= \frac{\text{adj}}{\text{hyp}} = \frac{x}{r} & \sec x &= \frac{\text{hyp}}{\text{app}} = \frac{r}{x} = \frac{1}{\cos x} \\ \tan x &= \frac{\text{opp}}{\text{adj}} = \frac{y}{x} & \cot x &= \frac{\text{adj}}{\text{opp}} = \frac{x}{y} = \frac{1}{\tan x} \end{aligned}$$

2 Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

3 Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cos A$$

4 Area of a Triangle

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{ab \sin C}{2} \end{aligned}$$

5 Radians

5.1 Conversion

Radians and Degrees: $180^\circ = \pi$

DegMinSec: $d^\circ m' s'' = d + \frac{m}{60} + \frac{s}{3600}$

5.2 Arc Length

$$s = r\theta$$

5.3 Area of a Sector

$$A = \frac{1}{2}r^2\theta$$

6 Identities

6.1 Pythagorean

$$o^2 + a^2 = h^2$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

6.2 Negative Angles

$$\sin(-\theta) = -\sin \theta \qquad \csc(-\theta) = -\csc(\theta)$$

$$\cos(-\theta) = \cos \theta \qquad \sec(-\theta) = \sec(\theta)$$

$$\tan(-\theta) = -\tan \theta \qquad \cot(-\theta) = -\cot(\theta)$$

6.3 Co-Function Identities

$$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta \qquad \csc\left(\frac{\pi}{2} - \theta\right) = \sec \theta$$

$$\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta \qquad \sec\left(\frac{\pi}{2} - \theta\right) = \csc \theta$$

$$\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta \qquad \cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$$

6.4 Note; Further Identities to be Added Later

7 Unit Circle

