3.1 Conversion of Angular Measure

Degree/Radian Relationship: $180° = \pi$ radians

Conversion Formulas:

From	To	Multiply by
Degrees	Radians	$\dfrac{\pi}{180}$
Radians	Degrees	$\dfrac{180°}{\pi}$

3.2 Applications of Radian Measure

Arc Length: $s = r\theta$, θ in radians

Area of Sector: $\mathscr{A} = \dfrac{1}{2}r^2\theta$, θ in radians

3.4

Angular Speed ω	Linear Speed v
$\omega = \dfrac{\theta}{t}$ (ω in radians per unit time, θ in radians)	$v = \dfrac{s}{t}$, $v = \dfrac{r\theta}{t}$, $v = r\omega$

5.1 Fundamental Identities

$\cot\theta = \dfrac{1}{\tan\theta}$ $\quad\sec\theta = \dfrac{1}{\cos\theta}$ $\quad\csc\theta = \dfrac{1}{\sin\theta}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ $\quad\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

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

$\sin(-\theta) = -\sin\theta$ $\quad\cos(-\theta) = \cos\theta$ $\quad\tan(-\theta) = -\tan\theta$

$\csc(-\theta) = -\csc\theta$ $\quad\sec(-\theta) = \sec\theta$ $\quad\cot(-\theta) = -\cot\theta$

5.3, 5.4 Sum and Difference Identities

$\cos(A + B) = \cos A\cos B - \sin A\sin B$

$\cos(A - B) = \cos A\cos B + \sin A\sin B$

$\sin(A + B) = \sin A\cos B + \cos A\sin B$

$\sin(A - B) = \sin A\cos B - \cos A\sin B$

$\tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}$

$\tan(A - B) = \dfrac{\tan A - \tan B}{1 + \tan A\tan B}$

5.5 Product-to-Sum and Sum-to-Product Identities

$$\cos A\cos B = \frac{1}{2}[\cos(A + B) + \cos(A - B)]$$

$$\sin A\sin B = \frac{1}{2}[\cos(A - B) - \cos(A + B)]$$

$$\sin A\cos B = \frac{1}{2}[\sin(A + B) + \sin(A - B)]$$

$$\cos A\sin B = \frac{1}{2}[\sin(A + B) - \sin(A - B)]$$

$$\sin A + \sin B = 2\sin\left(\frac{A + B}{2}\right)\cos\left(\frac{A - B}{2}\right)$$

$$\sin A - \sin B = 2\cos\left(\frac{A + B}{2}\right)\sin\left(\frac{A - B}{2}\right)$$

$$\cos A + \cos B = 2\cos\left(\frac{A + B}{2}\right)\cos\left(\frac{A - B}{2}\right)$$

$$\cos A - \cos B = -2\sin\left(\frac{A + B}{2}\right)\sin\left(\frac{A - B}{2}\right)$$

5.3 Cofunction Identities

$\cos(90° - \theta) = \sin\theta$

$\sin(90° - \theta) = \cos\theta$

$\tan(90° - \theta) = \cot\theta$

$\cot(90° - \theta) = \tan\theta$

$\sec(90° - \theta) = \csc\theta$

$\csc(90° - \theta) = \sec\theta$

5.5, 5.6 Double-Angle and Half-Angle Identities

$\cos 2A = \cos^2 A - \sin^2 A$ $\qquad\cos 2A = 1 - 2\sin^2 A$

$\cos 2A = 2\cos^2 A - 1$ $\qquad\sin 2A = 2\sin A\cos A$

$\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$ $\qquad\cos\dfrac{A}{2} = \pm\sqrt{\dfrac{1 + \cos A}{2}}$

$\sin\dfrac{A}{2} = \pm\sqrt{\dfrac{1 - \cos A}{2}}$ $\qquad\tan\dfrac{A}{2} = \pm\sqrt{\dfrac{1 - \cos A}{1 + \cos A}}$

$\tan\dfrac{A}{2} = \dfrac{\sin A}{1 + \cos A}$ $\qquad\tan\dfrac{A}{2} = \dfrac{1 - \cos A}{\sin A}$

7.1 Law of Sines

In any triangle ABC, with sides a, b, and c,

$$\frac{a}{\sin A} = \frac{b}{\sin B}, \quad \frac{a}{\sin A} = \frac{c}{\sin C}, \quad \text{and} \quad \frac{b}{\sin B} = \frac{c}{\sin C}.$$

Area of a Triangle

The area $\mathscr{A}$ of a triangle is given by half the product of the lengths of two sides and the sine of the angle between the two sides.

$$\mathscr{A} = \frac{1}{2}bc\sin A, \qquad \mathscr{A} = \frac{1}{2}ab\sin C, \qquad \mathscr{A} = \frac{1}{2}ac\sin B$$

7.3 Law of Cosines

In any triangle ABC, with sides a, b, and c,

$$a^2 = b^2 + c^2 - 2bc\cos A, \qquad b^2 = a^2 + c^2 - 2ac\cos B,$$

and

$$c^2 = a^2 + b^2 - 2ab\cos C.$$

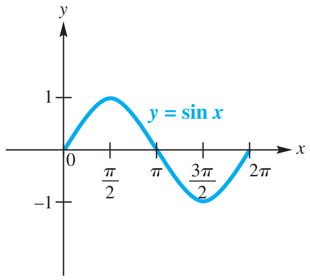
Heron's Area Formula

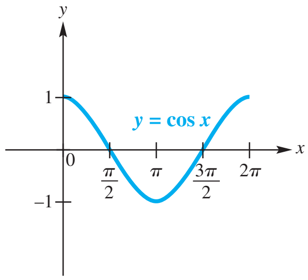
If a triangle has sides of lengths a, b, and c, with semiperimeter $s = \frac{1}{2}(a + b + c)$, then the area $\mathscr{A}$ of the triangle is

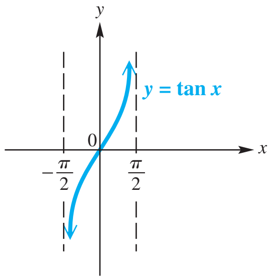
$$\mathscr{A} = \sqrt{s(s - a)(s - b)(s - c)}.$$

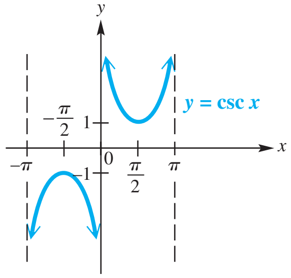
4.1–4.4 Trigonometric (Circular) Functions

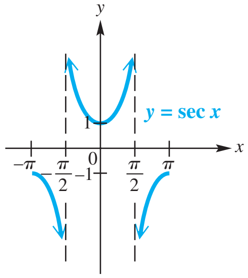
The graph of $y = c + a \sin[b(x - d)]$ or $y = c + a \cos[b(x - d)]$, where $b > 0$, has amplitude $|a|$, period $\frac{2\pi}{b}$, a vertical translation c units up if $c > 0$ or $|c|$ units down if $c < 0$, and a phase shift d units to the right if $d > 0$ or $|d|$ units to the left if $d < 0$. The graph of $y = a \tan bx$ or $y = a \cot bx$ has period $\frac{\pi}{b}$, where $b > 0$.

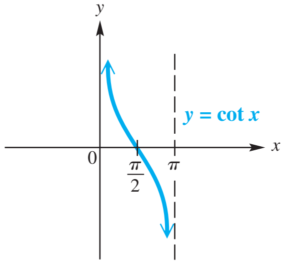












6.1 Inverse Trigonometric (Circular) Functions