

Table of Trigonometric Substitution

Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a \sin \theta, \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$	$1 - \sin^2 \theta = \cos^2 \theta$
$\sqrt{a^2 + x^2}$	$x = a \tan \theta, \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$	$1 + \tan^2 \theta = \sec^2 \theta$
$\sqrt{x^2 - a^2}$	$x = a \sec \theta, \quad 0 \leq \theta < \frac{\pi}{2}, \pi \leq \theta < \frac{3\pi}{2}$	$\sec^2 \theta - 1 = \tan^2 \theta$

1.  $\int \frac{\sqrt{16 - x^2}}{x^2} dx$

2.  $\int \frac{\sqrt{x^2 - a^2}}{x^4} dx$

3.  $\int_0^1 \sqrt{x^2 + 1} \, dx$

4.  $\int_0^1 x\sqrt{x^2 + 4} \, dx$

5.  $\int \frac{dt}{\sqrt{t^2 - 6t + 13}}$