

Section 7.3: Trigonometric Substitutions

Expression	Substitution	Triangle
$\sqrt{a^2 - x^2}$	$x = a \sin \theta$ $dx = \underline{\hspace{2cm}}$ $\sqrt{a^2 - x^2} = \underline{\hspace{2cm}}$	
$\sqrt{a^2 + x^2}$	$x = a \tan \theta$ $dx = \underline{\hspace{2cm}}$ $\sqrt{a^2 + x^2} = \underline{\hspace{2cm}}$	
$\sqrt{x^2 - a^2}$	$x = a \sec \theta$ $dx = \underline{\hspace{2cm}}$ $\sqrt{x^2 - a^2} = \underline{\hspace{2cm}}$	

Evaluate the following integrals.

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

$x = \underline{\hspace{2cm}}$

$dx = \underline{\hspace{2cm}}$

$\sqrt{16 - x^2} = \underline{\hspace{4cm}}$

2. $\int \frac{x^3}{\sqrt{1 + x^2}} dx$

$x = \underline{\hspace{2cm}}$

$dx = \underline{\hspace{2cm}}$

$\sqrt{1 + x^2} = \underline{\hspace{4cm}}$

$$3. \int \frac{\sqrt{x^2 - 9}}{x} dx$$

$$x = \underline{\hspace{2cm}}$$

$$dx = \underline{\hspace{2cm}}$$

$$\sqrt{x^2 - 9} = \underline{\hspace{3cm}}$$

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

$$x = \underline{\hspace{2cm}}$$

$$dx = \underline{\hspace{2cm}}$$

$$\sqrt{x^2 - 4} = \underline{\hspace{3cm}}$$