

II. Y. Trig: Reciprocal Function vs. Inverse Function

Reciprocal Function vs. Inverse Function for Trigonometry

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Reciprocal vs. inverse function confusion is easily acquired in trigonometry. In algebra, we think of reciprocal and multiplicative inverse in the same breath, or should.

A. **Basic function** distinction

I. **Inverse functions** for $y = f(x)$ are what you get when

- Switching x and y in functions and solving for y
- Switching the x and y in ordered pairs like $(-5, 20)$ or in charts
- Reflecting a graph across the $y = x$ line (at 45°)
- Writing $f^{-1}(x)$

II. **Reciprocal functions** for $y = f(x)$ are what you get when

- Writing a fraction with numerator = 1 and denominator = $f(x)$.
- On graphs, switching asymptotes with zeroes and switch $0 < y < 1$ with $\infty > y > 1$, and similarly below the x -axis
- Writing $(f(x))^{-1}$

B. **Trigonometric function** distinction

I. **Inverses of trig functions** are written like

$\sin^{-1}(x) = \arcsin(x)$. A principal value is $\text{Arcsin}(x)$.

II. **Reciprocal functions** are *renamed*.

$(\sin x)^{-1}$ is called cosecant = $\frac{\text{hypotenuse}}{\text{opposite}}$

$(\cos x)^{-1}$ is called secant = $\frac{\text{hypotenuse}}{\text{adjacent}}$

$(\tan x)^{-1}$ is called cotangent = $\frac{\text{adjacent}}{\text{opposite}}$

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