Trigonometric Ratios

Triangles in Quadrant I

a *Trig Ratio* is …

… a ratio of the lengths of two sides of a right Δ

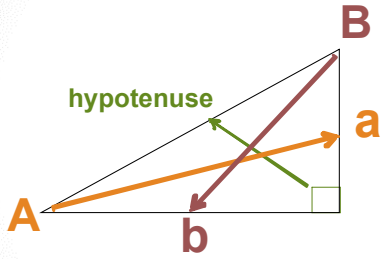
3 Basic Trig Ratios

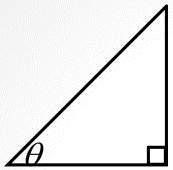
- Sine (sin)
- Cosine (cos)
- Tangent (tan)

These trig ratios (or trig functions) can be used to SOLVE a right triangle … that means to find all the side lengths and angle measures of the right triangle.

Right Triangles

- **The hypotenuse is opposite the right angle.**
- **The shortest leg is opposite the smallest angle.**
- **The longest leg is opposite the largest angle.**





- $\sin\theta = \frac{opposite}{hypotenuse}$
- $\cos\theta = \frac{adjacent}{hypotenuse}$
- $\tan\theta = \frac{opposite}{adjacent}$

Just remember Chief…

SOHCAHTOA

ine pposite ypotenuse osine djacent ypotenuse angent pposite djacent

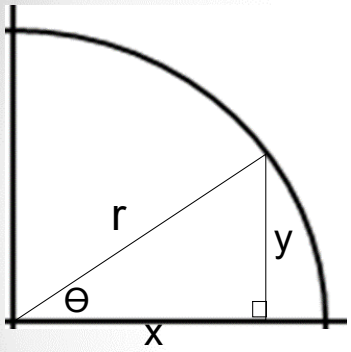
Each trig function has a *RECIPROCAL* function.

- **sine → cosecant (csc)**
- **cosine → secant (sec)**
- **tangent → cotangent (cot)**

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

$$\csc\theta = \frac{hyp}{opp} \qquad \sec\theta = \frac{hyp}{adj} \qquad \cot\theta = \frac{adj}{opp}$$

Six Trig Ratios of ∠ Θ

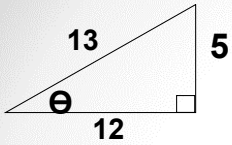


$$\sin\theta = \frac{y}{r} \qquad \csc\theta = \frac{r}{y}$$

$$\cos\theta = \frac{x}{r} \qquad \sec\theta = \frac{r}{x}$$

$$\tan\theta = \frac{y}{x} \qquad \cot\theta = \frac{x}{y}$$

Ex. 1Find the ratios for the 6 trig functions.



sin Θ = csc Θ =

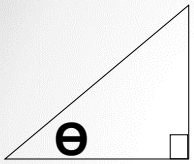
cos Θ = sec Θ =

tan Θ = cot Θ =

Ex. 2 Find the ratios for the 6 trig functions.

Use Pythagorean Theorem to find the missing side length!

Given: csc Θ = 5/3



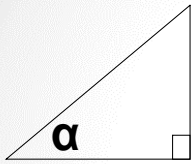
sin Θ = csc Θ =

cos Θ = sec Θ =

tan Θ = cot Θ =

Ex. 3 Find the ratios for the 6 trig functions.

Given: tanα = 4



sin α = csc α =

cos α = sec α =

tan α = cot α =