Trigonometric Ratios

Triangles in Quadrant I

a *Trig Ratio* is …

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

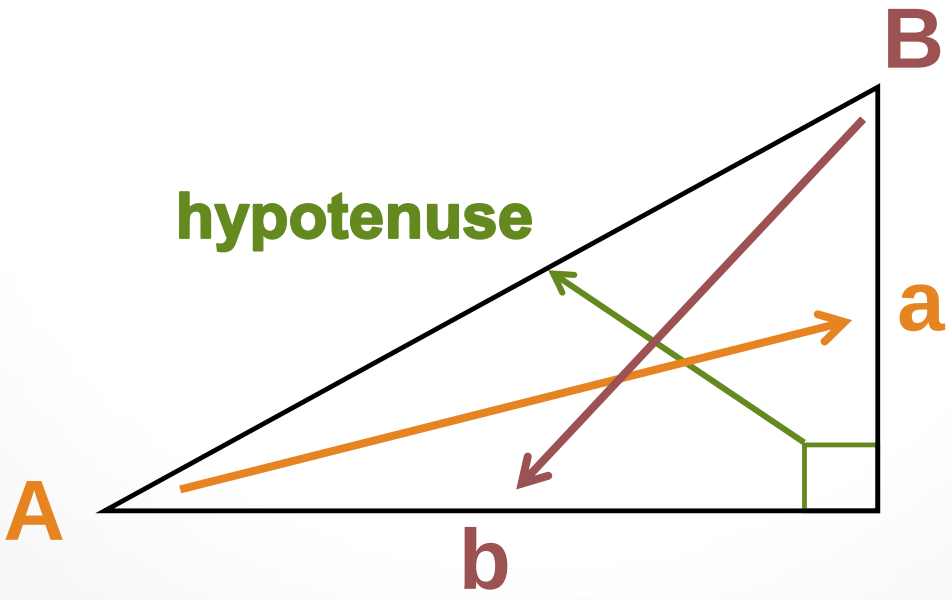
3 Basic Trig Ratios

- **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.



- $\text{Sin}\theta = \dfrac{opposite}{hypotenuse}$
- $\text{Cos}\theta = \dfrac{adjacent}{hypotenuse}$
- $\text{Tan}\theta = \dfrac{opposite}{adjacent}$

Just remember Chief…

SOHCAHTOA

i	p	y	o	d	y	a	p	d
n	p	p	s	j	p	n	p	j
e	o	o	i	a	o	g	o	a
	s	t	n	c	t	e	s	c
	i	e	e	e	e	n	i	e
	t	n		n	n	t	t	n
	e	u		t	u		e	t
		s			s			
		e			e			

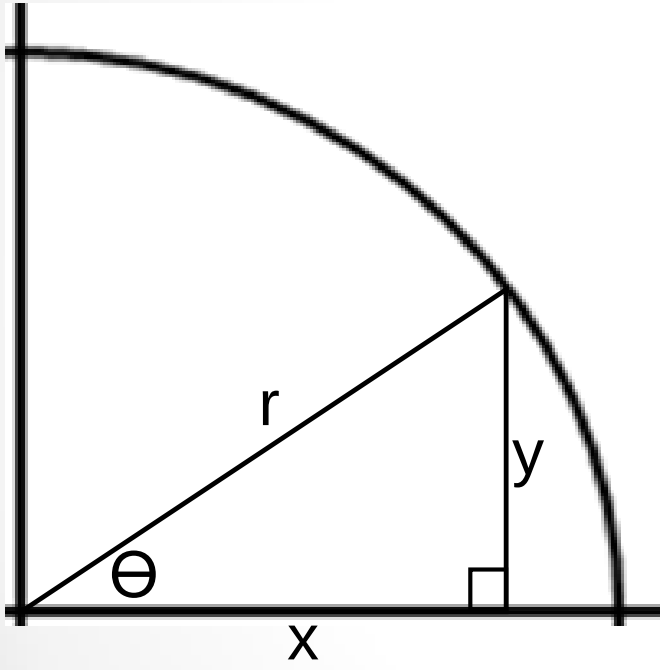
Each trig function has a *RECIPROCAL* function.

- **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 $\angle \Theta$

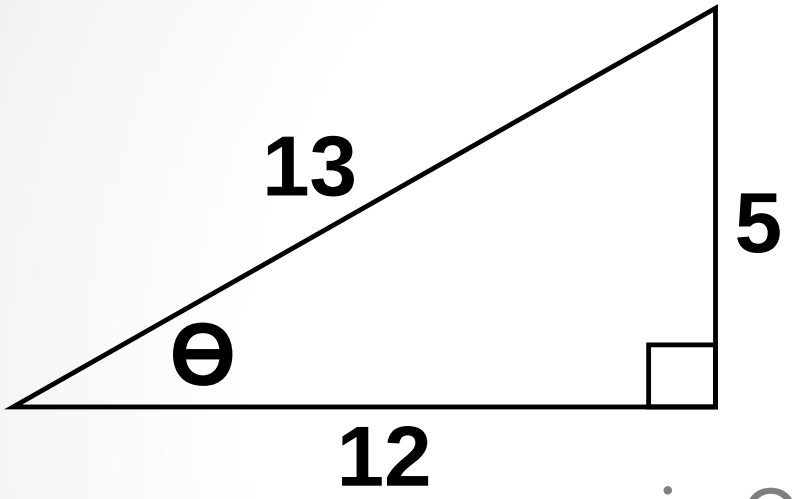


$$\sin\theta = \frac{y}{r} \qquad \csc\theta = \frac{r}{y}$$

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

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

Find the ratios for the 6 trig functions.

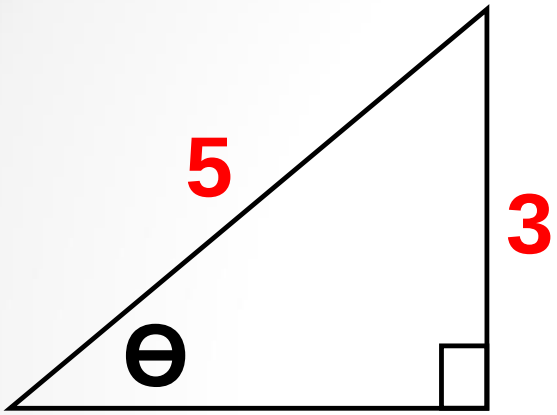


$\sin \Theta = 5/13$ $\csc \Theta = 13/5$

$\cos \Theta = 12/13$ $\sec \Theta = 13/12$

$\tan \Theta = 5/12$ $\cot \Theta = 12/5$

Find the ratios for the 6 trig functions.



Use Pythagorean Theorem to find the missing side length!

sinθ=opp/hyp

Given: csc Θ = 5/3

hypotenuse

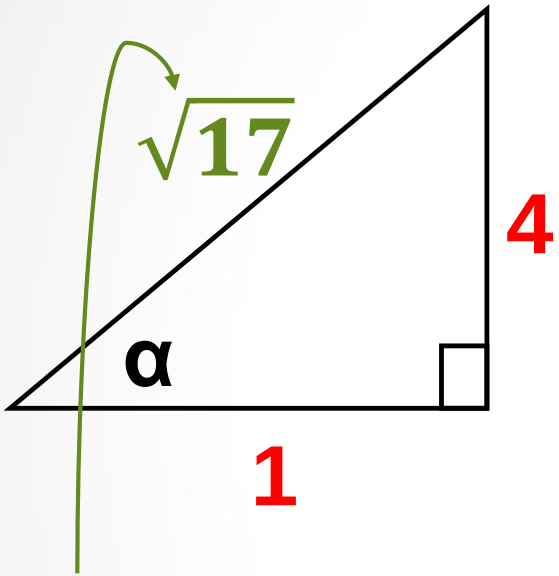
opposite

sin Θ = 3/5 csc Θ = 5/3

cos Θ = 4/5 sec Θ = 5/4

tan Θ = 3/4 cot Θ = 4/3

Find the ratios for the 6 trig functions.



Use Pythagorean Theorem to find the missing side length!

tanθ=opp/adj

Given: $\tan\alpha = \frac{4}{1}$

$\sin\alpha = \frac{4}{\sqrt{17}} = \frac{4\sqrt{17}}{17}$ $\quad \csc\alpha = \frac{\sqrt{17}}{4}$

$\cos\alpha = \frac{1}{\sqrt{17}} = \frac{\sqrt{17}}{17}$ $\quad \sec\alpha = \frac{\sqrt{17}}{1} = \sqrt{17}$

$\tan\alpha = 4$ $\quad \cot\alpha = \frac{1}{4}$