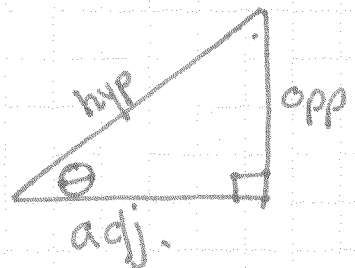


4.1 Triangle Trigonometry

Trigonometry - Triangle Measures

Trigonometric Ratios / Functions

- * Right triangles only
 - * 1 acute angle / one side
 - * 2 sides
- "SOH CAH TOA"

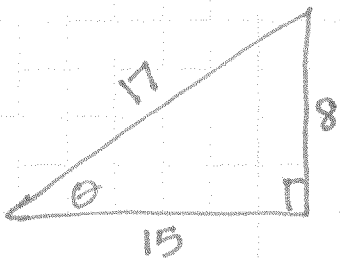


Basic Ratios

$$\begin{aligned} \sin \theta &= \frac{O}{H} & \frac{H}{O} &= \frac{1}{\sin \theta} = \csc \theta = \text{cosecant} \\ \cos \theta &= \frac{A}{H} & \frac{H}{A} &= \frac{1}{\cos \theta} = \sec \theta = \text{secant} \\ \tan \theta &= \frac{O}{A} & \frac{A}{O} &= \frac{1}{\tan \theta} = \cot \theta = \text{cotangent} \end{aligned}$$

Reciprocal Ratios

Example 1. given sides, find 6 ratios



$$\sin \theta = \frac{8}{17}$$

$$\csc \theta = \frac{17}{8}$$

$$\cos \theta = \frac{15}{17}$$

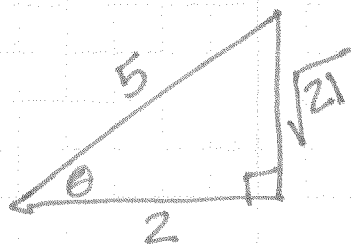
$$\sec \theta = \frac{17}{15}$$

$$\tan \theta = \frac{8}{15}$$

$$\cot \theta = \frac{15}{8}$$

Example 2. given 1 ratio, find other 5.

given $\cos \theta = \frac{2}{5}$ ← adj
5 ← hyp $\sec \theta = \frac{5}{2}$



$$\sin \theta = \frac{\sqrt{21}}{5}$$

$$\csc \theta = \frac{5}{\sqrt{21}} \cdot \frac{\sqrt{21}}{\sqrt{21}} = \frac{5\sqrt{21}}{21}$$

$$\tan \theta = \frac{\sqrt{21}}{2}$$

$$\cot \theta = \frac{2}{\sqrt{21}} \cdot \frac{\sqrt{21}}{\sqrt{21}} = \frac{2\sqrt{21}}{21}$$

$$\begin{aligned} 2^2 + x^2 &= 5^2 \\ 4 + x^2 &= 25 \\ x^2 &= 21 \end{aligned}$$

$$x = \sqrt{21}$$

Rationalize denominator