Trigonometric Ratios – Right Triangles in Quadrant I

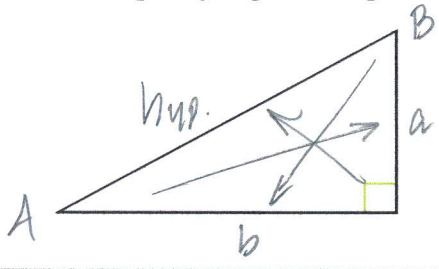
a Trig Ratio is … a ratio of the lengths of two sides of a right △

The 3 basic Trig Functions (ratios) are:

- sine (sin)
- cosine (cos)
- tangent (tan)

Trig functions are used to … SOLVE right triangles (find all side lengths and angle measures)

opposite sides and angles of Right Triangles:



$\sin\Theta = \frac{opp}{hyp}$ SoH

$\cos\Theta = \frac{adj}{hyp}$ CAH

$\tan\Theta = \frac{opp}{adj}$ ToA

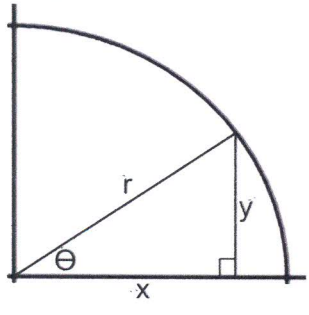
Reciprocal functions:

sine → cosecant (csc) $\quad \csc\Theta = \frac{hyp}{opp}$

cosine → secant (sec) $\quad \sec\Theta = \frac{hyp}{adj}$

tangent → cotangent (cot) $\quad \cot\Theta = \frac{adj}{opp}$

Six Trig Ratios of an angle in Quadrant I:



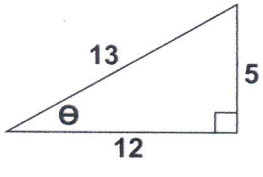
$\sin\Theta = \frac{y}{r}$ $\quad \csc\Theta = \frac{r}{y}$

$\cos\Theta = \frac{x}{r}$ $\quad \sec\Theta = \frac{r}{x}$

$\tan\Theta = \frac{y}{x}$ $\quad \cot\Theta = \frac{x}{y}$

Find the ratios for the 6 trig functions.

Example 1:

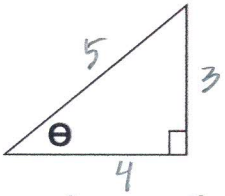


$\sin\theta = 5/13$ $\quad \csc\theta = 13/5$

$\cos\theta = 12/13$ $\quad \sec\theta = 13/12$

$\tan\theta = 5/12$ $\quad \cot\theta = 12/5$

Example 2:
given $\csc\Theta = 5/3$



$b^2 + 3^2 = 5^2$

$b^2 = 16$

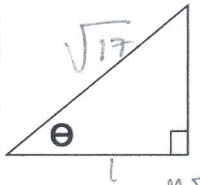
$b = 4$

$\sin\theta = 3/5$ $\quad \csc\theta = 5/3$

$\cos\theta = 4/5$ $\quad \sec\theta = 5/4$

$\tan\theta = 3/4$ $\quad \tan\theta = 4/3$

Example 3:
given $\tan\Theta = 4$ $= \frac{opp}{adj}$



$c^2 = 4^2 + 1^2$

$c^2 = 17$

$c = \sqrt{17}$

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

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

$\tan\theta = 4$ $\quad \cot\theta = 1/4$