4-3 Right Triangle Trigonometry

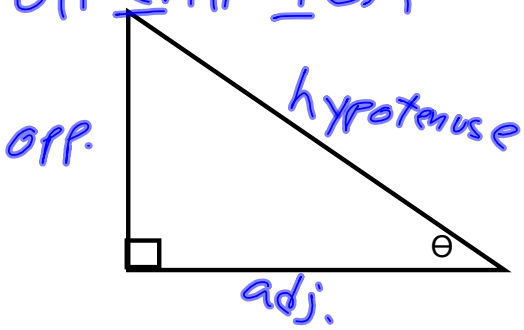
SOH-CAH-TOA

I. Six Trig Functions:

$\sin\Theta = \frac{opp}{hyp}$ $\quad \csc\Theta = \frac{hyp}{opp}$

$\cos\Theta = \frac{adj}{hyp}$ $\quad \sec\Theta = \frac{hyp}{adj}$

$\tan\Theta = \frac{opp}{adj}$ $\quad \cot\Theta = \frac{adj}{opp}$



Ex 1) Find the exact values of the six trig functions of Θ given the triangle.

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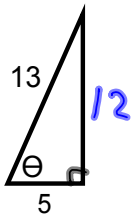


$5^2 + b^2 = 13^2$

$25 + b^2 = 169$

$\sqrt{b^2} = \sqrt{144}$

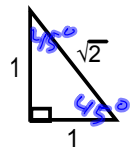
$b = 12$

$\sin\theta = \frac{12}{13}$ $\quad \csc\theta = \frac{13}{12}$

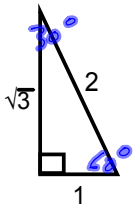
$\cos\theta = \frac{5}{13}$ $\quad \sec\theta = \frac{13}{5}$

$\tan\theta = \frac{12}{5}$ $\quad \cot\theta = \frac{5}{12}$

II. Special Right Triangles: 45°- 45°- 90°



30°- 60°- 90°



Ex 2) Find the exact values of:

sin 30° = $\frac{opp}{hyp} = \frac{1}{2}$

cos 60° = $\frac{adj}{hyp} = \frac{1}{2}$

tan 30° = $\frac{opp}{adj} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

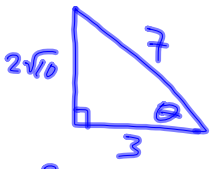
sin 45° = $\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

tan 45° = $\frac{1}{1} = 1$

cos 30° = $\frac{\sqrt{3}}{2}$

III. Find the other 5 trig functions given the information.

Ex 3) $\cos\theta = \frac{3}{7} = \frac{adj}{hyp}$



$3^2 + b^2 = 7^2$

$9 + b^2 = 49$

$b = \sqrt{40}$

$b = \sqrt{4} \cdot \sqrt{10}$

$b = 2\sqrt{10}$

$\sin\theta = \frac{2\sqrt{10}}{7}$

$\tan\theta = \frac{2\sqrt{10}}{3}$

$\csc\theta = \frac{7}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{7\sqrt{10}}{20}$

$\sec\theta = \frac{7}{3}$

$\cot\theta = \frac{3}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$

$\cot\theta = \frac{3\sqrt{10}}{20}$