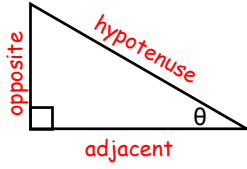


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Right Triangle Trig


SOH-CAH-TOA



Example 1: Evaluate trig ratios given a point.

Let $(-12, 5)$ be a point on the terminal side of an angle θ in standard position. Evaluate the 6 trig ratios of θ .

$x = -12$ (adjacent) $\sin \theta = \frac{5}{13} \frac{\text{opp}}{\text{hyp}}$ $\csc \theta = \frac{13}{5} \frac{\text{hyp}}{\text{opp}}$
 $y = 5$ (opposite)
 $r = 13$ (hypotenuse) $\cos \theta = \frac{-12}{13} \frac{\text{adj}}{\text{hyp}}$ $\sec \theta = \frac{-13}{12} \frac{\text{hyp}}{\text{adj}}$
 $\tan \theta = \frac{5}{-12} \frac{\text{opp}}{\text{adj}}$ $\cot \theta = \frac{-12}{5} \frac{\text{adj}}{\text{opp}}$




$a^2 + b^2 = c^2$
 $(5)^2 + (-12)^2 = c^2$
 $25 + 144 = c^2$
 $169 = c^2$
 $13 = c$

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Example 2: Find a trig ratio given a trig ratio.

Find $\sin \theta$ when $\cos \theta = \frac{-5}{13}$ and the terminal side of θ lies in Quadrant II.

$\cos \theta = \frac{-5}{13}$ ← adj
 ← hyp

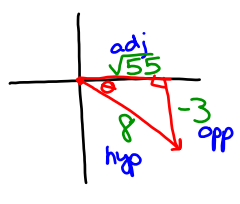


$a^2 + b^2 = c^2$
 $a^2 + (-5)^2 = (13)^2$
 $a^2 + 25 = 169$
 $a^2 = 144$
 $a = 12$

$\sin \theta = \frac{\text{opp}}{\text{hyp}}$
 $\sin \theta = \frac{12}{13}$

Example 3: Find a trig ratio given a trig ratio.

$\sin \theta = \frac{-3}{8}$ and θ is in Quadrant IV. Find $\tan \theta$.



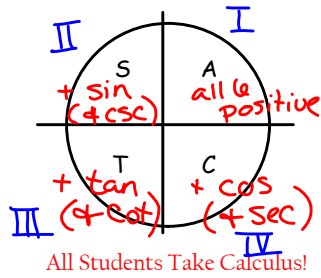
$\sin \theta = \frac{-3}{8} \frac{\text{opp}}{\text{hyp}}$
 $a^2 + b^2 = c^2$
 $a^2 + (-3)^2 = (8)^2$
 $a^2 + 9 = 64$
 $\sqrt{a^2} = \sqrt{55}$
 $a = \sqrt{55}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$
 $\tan \theta = \frac{-3}{\sqrt{55}} \cdot \frac{\sqrt{55}}{\sqrt{55}}$
 $\tan \theta = \frac{-3\sqrt{55}}{55}$

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Example 4: Find the quadrant of an angle.

State the quadrant in which θ lies.



- $\sin \theta > 0$ and $\sec \theta > 0$ I
- $\csc \theta < 0$ and $\cos \theta < 0$ III
- $-\csc$ $-\cos$
- $\sin \theta > 0$ and $\tan \theta < 0$ II
- $+\sin$ $-\tan$
- $\sec \theta < 0$ and $\tan \theta > 0$ IV
- $-\cos$ $+\tan$

Trig Ratios for ANY Angle & Radius Length

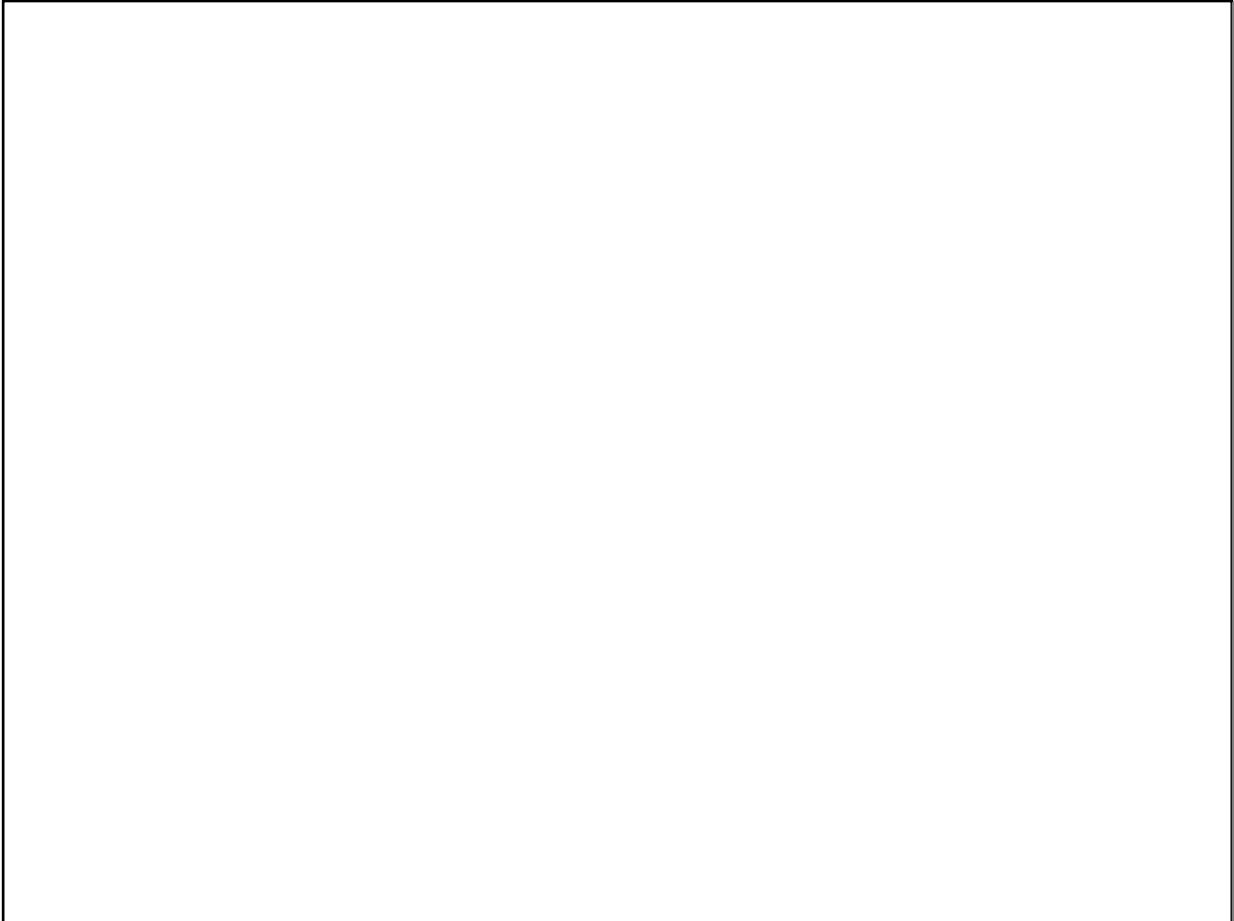
$r =$ hypotenuse

$\sin \theta = \frac{y}{r}$ $\csc \theta = \frac{r}{y} \quad y \neq 0$

$\cos \theta = \frac{x}{r}$ $\sec \theta = \frac{r}{x} \quad x \neq 0$

$\tan \theta = \frac{y}{x} \quad x \neq 0$ $\cot \theta = \frac{x}{y} \quad y \neq 0$

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