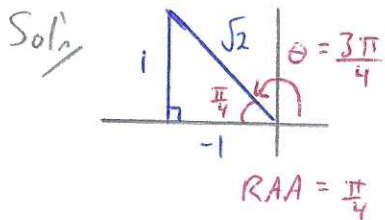


A 8.4 * Trig Equations *

Warmup 1. Evaluate exactly.

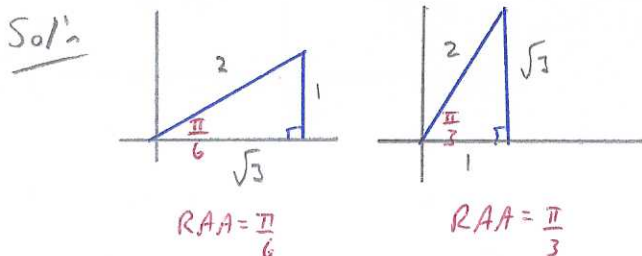
a) $\sin \frac{3\pi}{4}$



So, $\sin \frac{3\pi}{4} = \frac{y}{r}$
 $= \frac{1}{\sqrt{2}}$
 $= \frac{\sqrt{2}}{2}$, rationalized.

"RAA is the angle between the terminal arm of the rotation and the x-axis."

b) $\csc \frac{\pi}{6} + \sin^2 \frac{\pi}{3}$



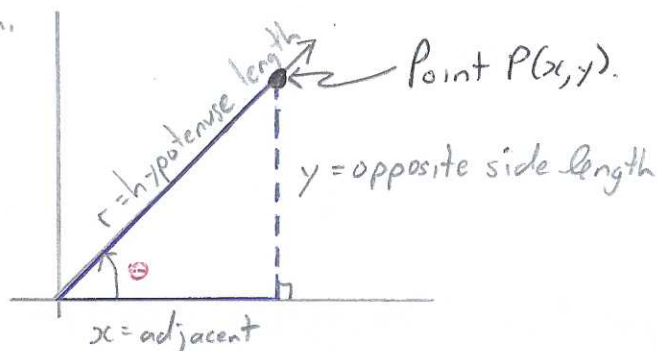
So $\csc \frac{\pi}{6} = \frac{1}{\sin \frac{\pi}{6}}$; So $\sin^2 \frac{\pi}{3} = \left(\sin \frac{\pi}{3}\right)^2$
 $= \frac{1}{\left(\frac{1}{2}\right)} = 2$; $= \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}$

∴ Our sum total is $2 + \frac{3}{4} = 2.75$ ✓

Remark: *syrckrt yx*, "sir-kicks-or-ticks" is sohcahtoa on the xy plane.

∴ $\sin \theta = \frac{y}{r}$; $\cos \theta = \frac{x}{r}$; $\tan \theta = \frac{y}{x}$

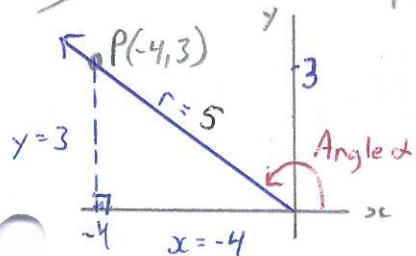
And, $r = \sqrt{x^2 + y^2}$



"crawl first, climb second to $P(x, y)$."

Ex₁ Find the 3 exact primary trig ratios for $(-4, 3)$ on the terminal arm of angle α .

Sol'n "Sketch a helpful diagram with the givens. Include the reference triangle."



$\sin \alpha = \frac{y}{r}$
 $= \frac{3}{5}$ ✓

$\cos \alpha = \frac{x}{r}$
 $= \frac{-4}{5}$ ✓

$\tan \alpha = \frac{y}{x}$
 $= \frac{3}{-4}$
 $= -\frac{3}{4}$ ✓

Recall: The **CAST** rule shows in which quadrant the trig ratios aka trig fractions are **Positive**. This pattern is based on the terminal arm of θ , which is in Standard Position aka θ 's rotation begins on the positive x-axis.

II Sin θ	I All θ
III Tan θ	IV Cos θ

"4 windows"


C Quad
A Quad
S Quad
T Quad"

Ex₂ Find **all possible** values of θ , $0^\circ \leq \theta \leq 360^\circ$, given

"3U Question"

a) $\sin \theta = 0.5736$

Sol'n $\theta_1 = \sin^{-1}(0.5736)$

$\hat{=} 35^\circ$,  QI, used calculator in degree mode.
 or
 RAA $\hat{=} 35^\circ$ \rightarrow

$\theta_2 = 180^\circ - 35^\circ$, used $\theta_2 = 180^\circ - \text{RAA}$

$\hat{=} 145^\circ$,  QII

So $\theta_1 \hat{=} 35^\circ$, $\theta_2 \hat{=} 145^\circ$

b) $\cot \theta = -\frac{1}{2}$

Sol'n $\therefore \tan \theta = -2$, reciprocal trig function definition

Tangent ratio is negative in the "S Quadrant" and "C Quadrant".



$\theta = \tan^{-1}(-2)$

$= -63.4349$, calculator.

So RAA $\hat{=} 63.4349^\circ$

So $\theta_1 = 180^\circ - \text{RAA}$

$= 180 - 63.4349$

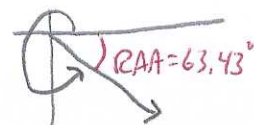
$\hat{=} 116.57^\circ$ ✓

or

$\theta_2 = 360^\circ - \text{RAA}$

$= 360^\circ - 63.4349$

$= 296.57^\circ$ ✓



Ex₃ Solve $\sec \theta = 11.4679$, $0 \leq \theta \leq 2\pi$ aka θ in between 0° and $2\pi^\circ$.

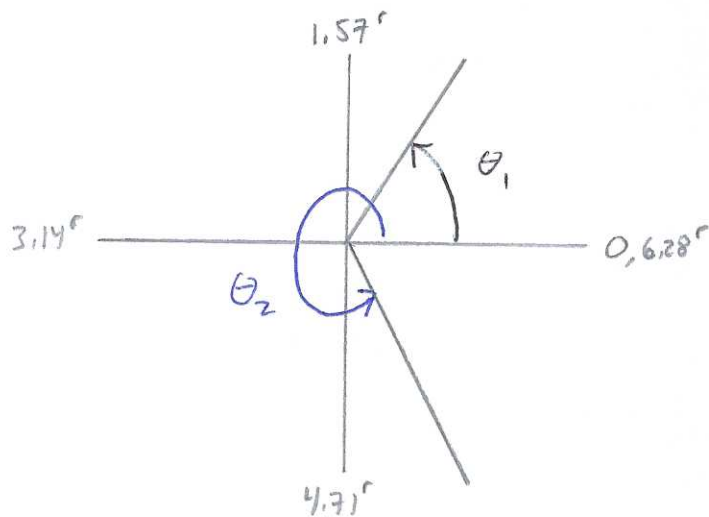
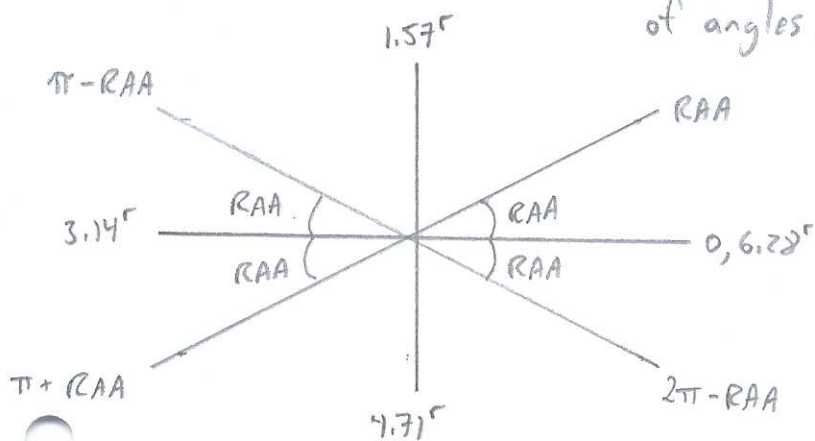
Sol_n Change angle mode on your calculator to RADIAN mode.

So $\frac{1}{\cos \theta} = 11.4679$, reciprocal definition

$\cos \theta = 0.0872$, reciprocated aka "flipped" both sides.

∴ Positive cosine ratio

∴ We are looking for a "C Quad" and "A Quad" pair of angles.



So $\cos \theta = 0.0872$

$\theta_1 = \cos^{-1}(0.0872)$

$\approx 1.483^\circ$

So $\text{RAA} \approx 1.48^\circ$ ✓

OR

$\theta_2 = 2\pi - 1.48$

$\approx 4.80^\circ$

∴ Roots are about 1.48° and 4.80° .

A P319 # 3-6, 9.