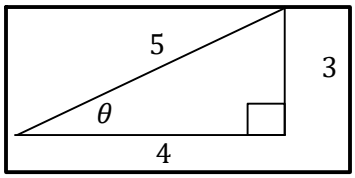
C12 - 4.3 - Find Ratio/Type in Calc Notes



Degrees are for children, unless you are taking physics.

$sin\theta = \frac{O}{H}$ $csc\theta = \frac{H}{O}$

$sin\theta = \frac{3}{5}$ $csc\theta = \frac{5}{3}$

The first letters switch s<->c

$cos\theta = \frac{A}{H}$ $sec\theta = \frac{H}{A}$ $sec\theta = \frac{1}{cos\theta}$

$cos\theta = \frac{4}{5}$ $sec\theta = \frac{5}{4}$ $sec\theta = \frac{1}{\left(\frac{4}{5}\right)}$

The first letters switch c<->s

$sec\theta = 1 \times \frac{5}{4}$

No one would do this! $sec\theta = \frac{5}{4}$

$tan\theta = \frac{O}{A}$ $cot\theta = \frac{A}{O}$

$tan\theta = \frac{3}{4}$ $cot\theta = \frac{4}{3}$

The ones with the t's

Type in Calculator (Degrees or Radians)

$sin25^0 = 0.42$

$cos180^0 = -1$

$sin30^0 = \frac{1}{2}$

$\tan(-980^0) = -5.67$

$csc140^0 =$

$csc\theta = \frac{1}{sin\theta}$

$csc140^0 = \frac{1}{sin140^0}$

$csc140^0 = -1.56$

$csc140 \neq \frac{1}{\sin\left(\frac{1}{140}\right)}$

$sec65^0 =$

$sec\theta = \frac{1}{cos\theta}$

$sec65^0 = \frac{1}{cos65^0}$

$sec\theta = 2.37$

$cot25^0 =$

$cot\theta = \frac{1}{tan\theta}$

$cot25^0 = \frac{1}{tan25^0}$

$cot25^0 = 2.14$

$sin2.5 = 0.60$

$\cos\frac{\pi}{3} = \frac{1}{2}$

$\tan(5\pi) = 0$

$cos\pi = -1$

$csc3.4 =$

$csc\theta = \frac{1}{sin\theta}$

$csc3.4 = \frac{1}{sin3.4}$

$csc3.4 = -3.91$

$\sec\left(\frac{3}{5}\right) =$

$sec\theta = \frac{1}{cos\theta}$

$\sec\left(\frac{3}{5}\right) = \frac{1}{\cos\left(\frac{3}{5}\right)}$

$\sec\left(\frac{3}{5}\right) = 1.21$

$\sec\left(\frac{3}{5}\right) \neq \cos\left(\frac{5}{3}\right)$

$\sec\left(\frac{3}{5}\right) \neq \frac{1}{\cos\left(\frac{5}{3}\right)}$

$cot250 =$

$cot\theta = \frac{1}{tan\theta}$

$cot250 = \frac{1}{tan250}$

$cot250 = -0.25$

Find θ in Degrees

$sin\theta = \frac{3}{5}$

$\theta = \sin^{-1}\left(\frac{3}{5}\right)$

$\theta = 36.9^0$

$sec\theta = \frac{2}{1}$

$cos\theta = \frac{1}{2}$

$\theta = \cos^{-1}\left(\frac{1}{2}\right)$

$\theta = 60^0$

$sec\theta = \frac{H}{A}$

$cos\theta = \frac{A}{H}$

Find θ in Radians

$cos\theta = \frac{3}{5}$

$\theta = \cos^{-1}\left(\frac{3}{5}\right)$

$\theta = 0.93$

$cot\theta = 3$

$cot\theta = \frac{3}{1}$

$tan\theta = \frac{1}{3}$

$\theta = \tan^{-1}(\frac{1}{3})$

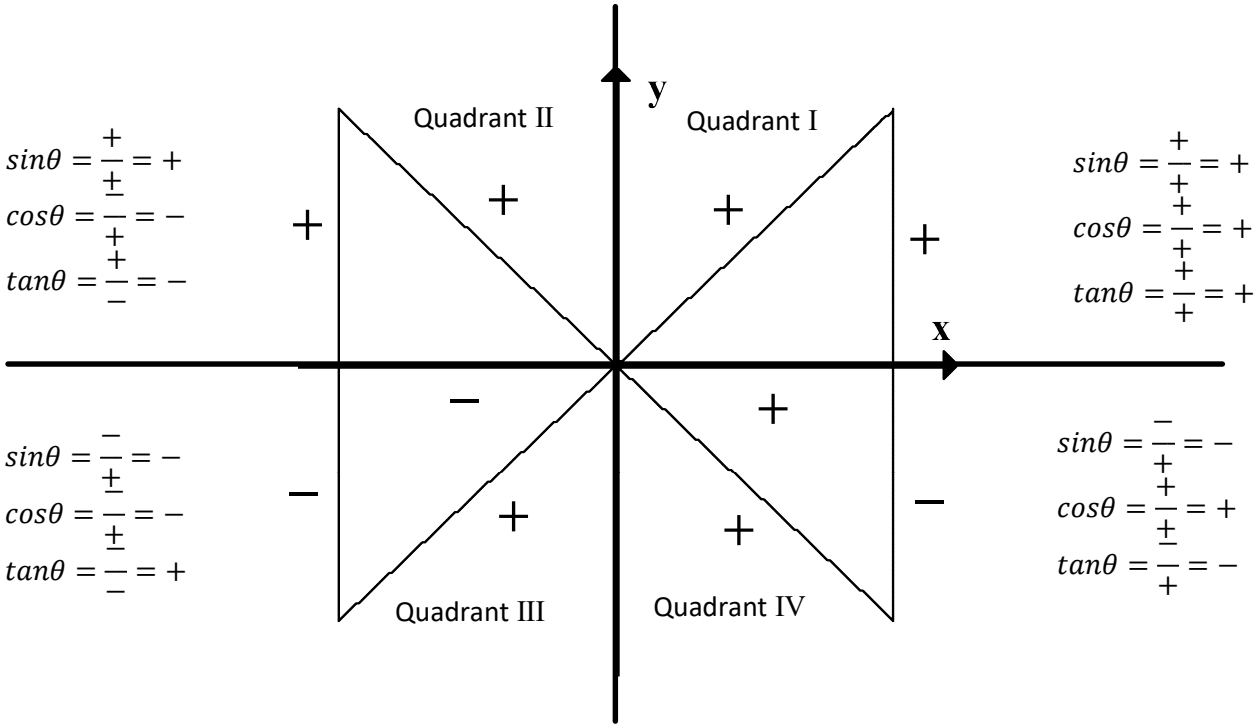
$\theta = 0.32$

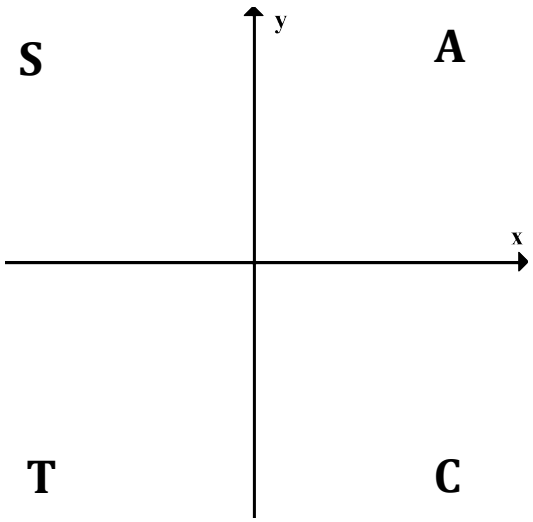
$cot\theta = \frac{A}{O}$

$tan\theta = \frac{O}{A}$

C12 - 4.3 - ASTC Notes

$(+)^2+(-)^2=+$	Remember: the hypotenuse is always positive.	$(+)^2+(+)^2=+$
$\sqrt{+}=+$		$\sqrt{+}=+$





Students

Only **S**in positive.

All

All (sin, cos, tan) positive

Only **T**an positive.

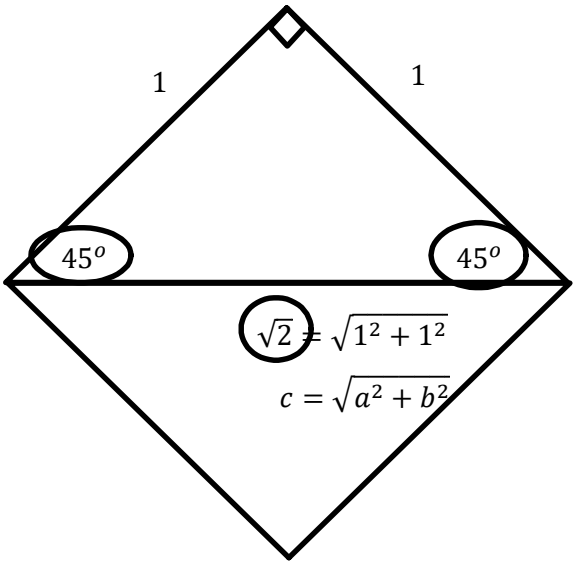
Take

Calculus

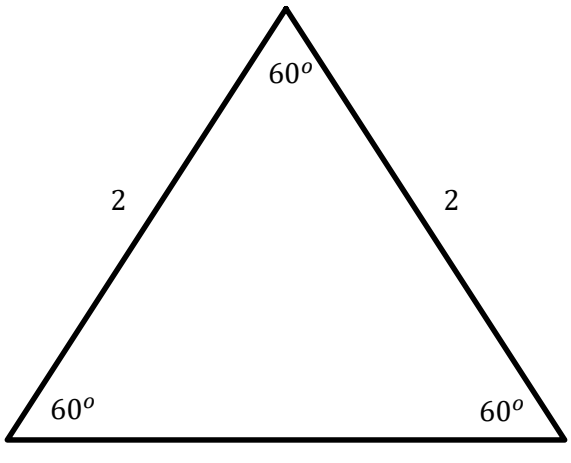
Only **C**os positive.

C12 - 4.3 - Special Triangles 30,45,60 sin/cos/tan Notes

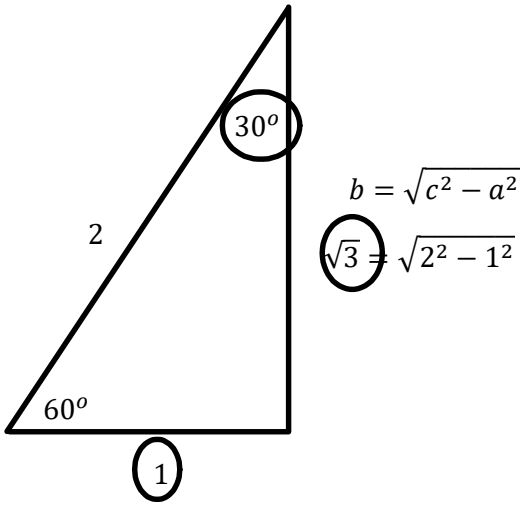
Right Isosceles, with sides =1

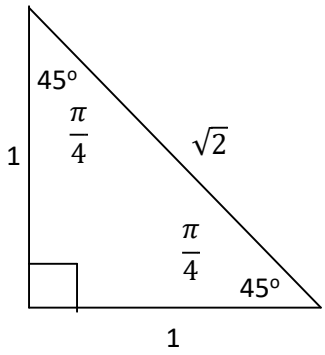


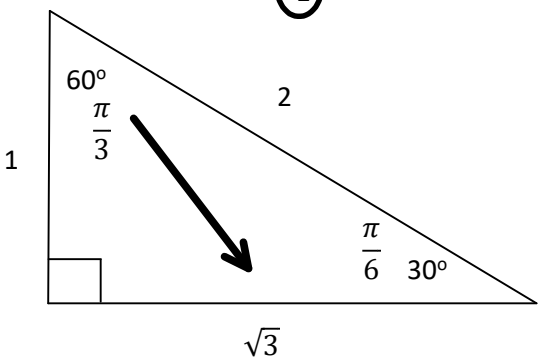
Half an equilateral with sides 2



Diagonal of a square with sides lengths of 1







$60 > 30$

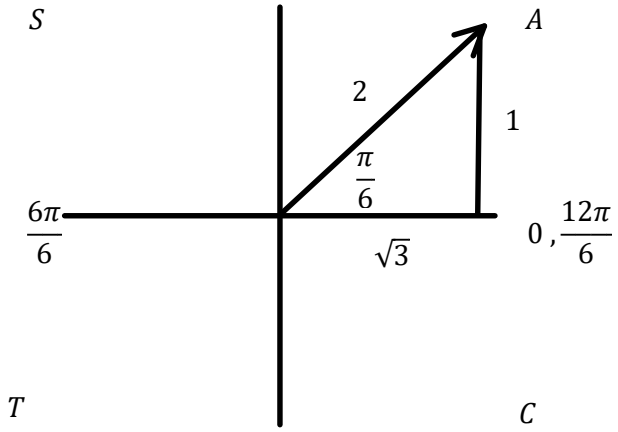
$\sqrt{3} > 1$

60 must open up to the root 3. And Vice Versa

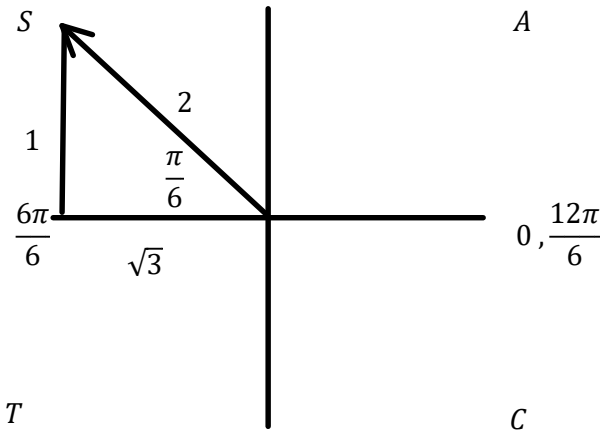
$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$	$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$	$\sin\frac{\pi}{6} = \frac{1}{2}$
$\cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$	$\cos\frac{\pi}{3} = \frac{1}{2}$	$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$
$\tan\frac{\pi}{4} = \frac{1}{1}$	$\tan\frac{\pi}{3} = \frac{\sqrt{3}}{1}$	$\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}$

C12 - 4.3 - $sin\theta = ?$ *Notes*

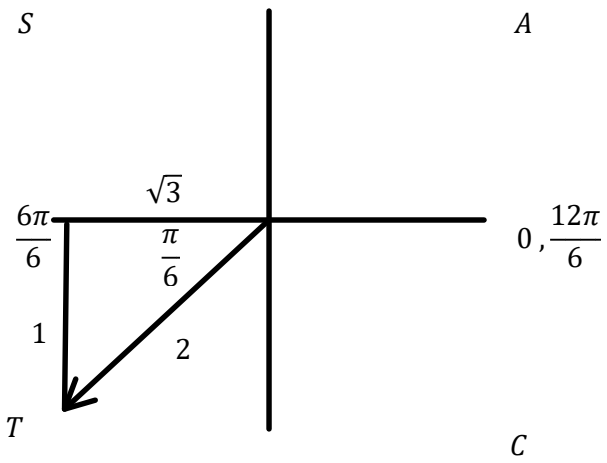
$\sin\frac{\pi}{6} = ?$ $\sin\frac{\pi}{6} = \frac{1}{2}$



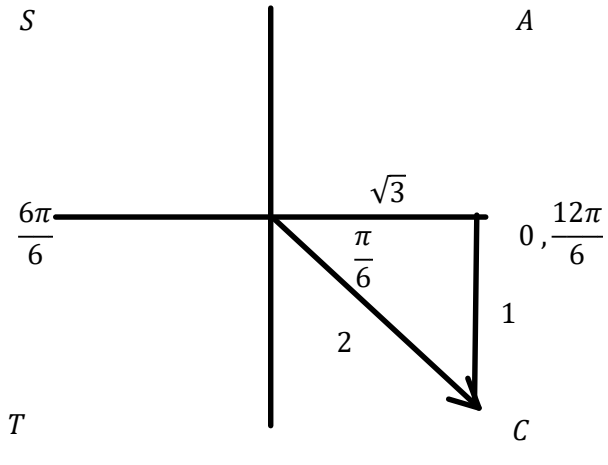
$\sin\frac{5\pi}{6} = ?$ $\sin\frac{5\pi}{6} = \frac{1}{2}$



$\sin\frac{7\pi}{6} = ?$ $\sin\frac{7\pi}{6} = -\frac{1}{2}$



$\sin\frac{11\pi}{6} = ?$ $\sin\frac{11\pi}{6} = -\frac{1}{2}$



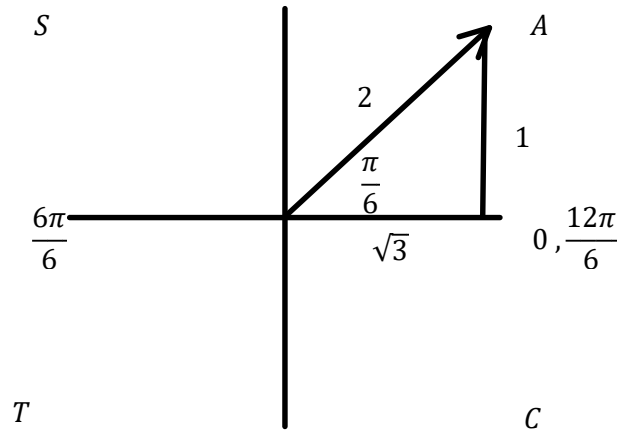
SOH - CAH - TOA

$$sin\theta = \frac{O}{H} \qquad cos\theta = \frac{A}{H} \qquad tan\theta = \frac{O}{A}$$

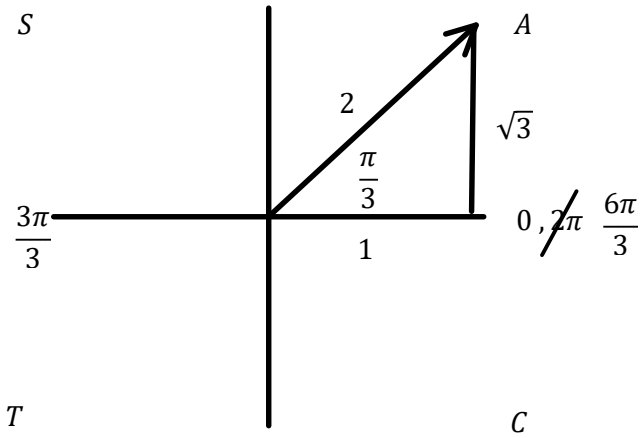
$$csc\theta = \frac{1}{sin\theta} = \frac{H}{O} \qquad sec\theta = \frac{1}{cos\theta} = \frac{H}{A} \qquad cot\theta = \frac{1}{tan\theta} = \frac{A}{O}$$

C12 - 4.3 - $sin\theta, cos\theta, tan\theta = ?$ Notes

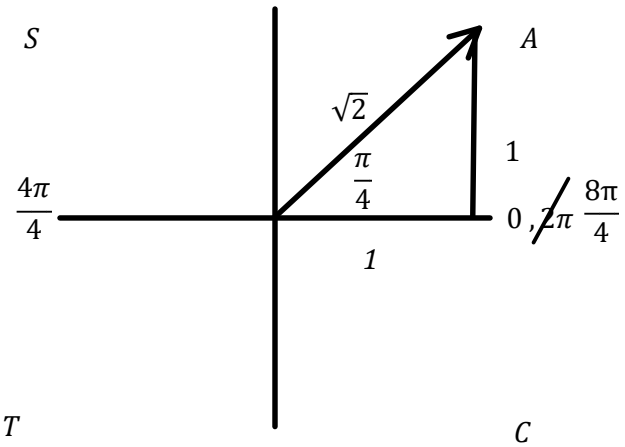
$\cos\frac{\pi}{6} = ?$ $\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$



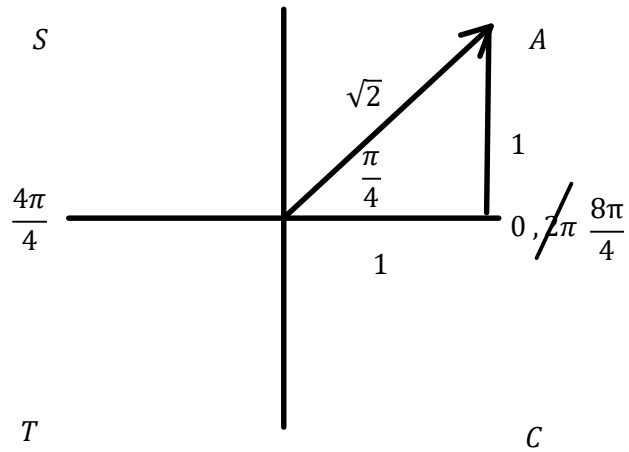
$\sin\frac{\pi}{3} = ?$ $\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$



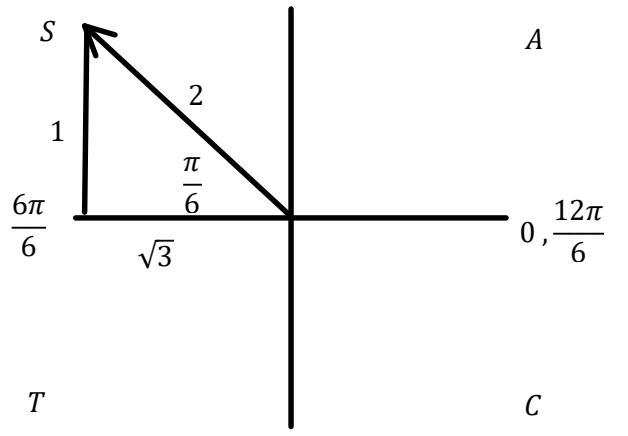
$\sin\frac{\pi}{4} = ?$ $\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$



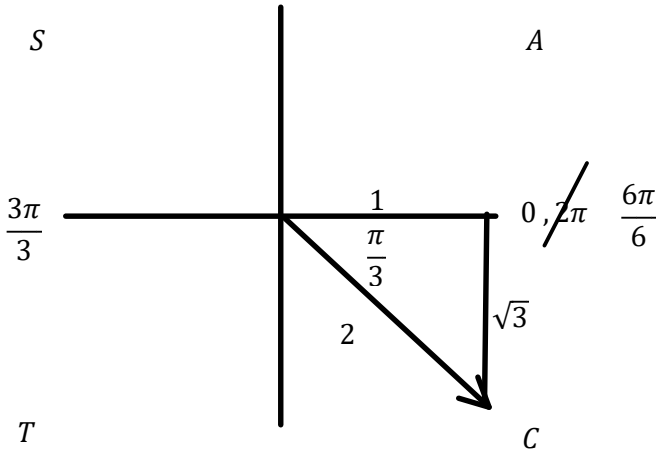
$\tan\frac{\pi}{4} = ?$ $\tan\frac{\pi}{4} = 1$



$\cos\frac{5\pi}{6} = ?$ $\cos\frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$



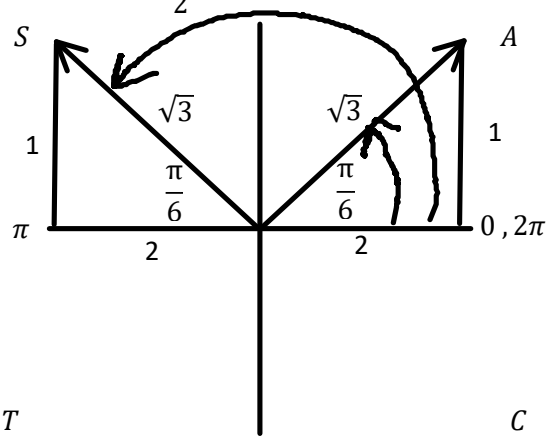
$\tan\frac{5\pi}{3} = ?$ $\tan\frac{5\pi}{3} = -\sqrt{3}$



C12 - 4.3 - $sin\theta = \frac{1}{2}$ Notes

Solve for $\theta, 0^o \leq \theta < 2\pi$.

$sin\theta = \frac{1}{2}$



$\theta_{stp} = \frac{\pi}{6}$

$\theta_{stp} = \pi - \frac{\pi}{6}$

$= \frac{6\pi}{6} - \frac{\pi}{6}$

$= \frac{5\pi}{6}$

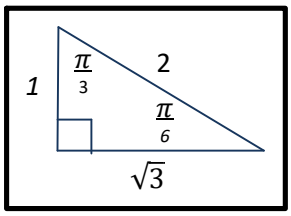
$\theta_{stp} = \frac{\pi}{6}, \frac{5\pi}{6}$

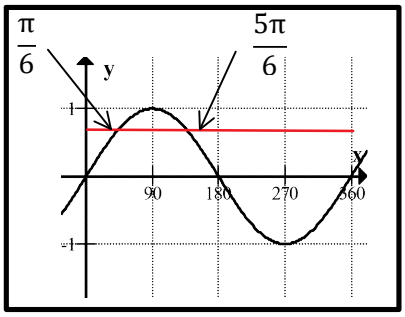
Solve for the arrows θ_{stp}

Draw two triangles where $\sin\theta$ is positive: ASTC Quadrant I, II

Label triangles based on special triangles/SOH CAH TOA
Label the reference angle according to special triangles.

Draw an arrow from the principal axis to:
The first and second terminal arm.

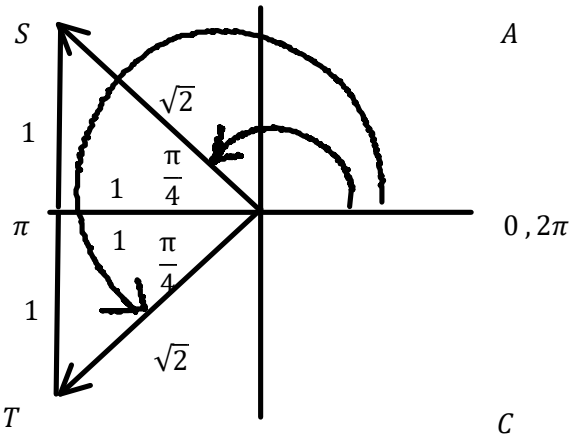




Check your answer: $\sin(\frac{\pi}{6}) = \frac{1}{2}$ $\sin(\frac{5\pi}{6}) = \frac{1}{2}$

Solve for $\theta, 0^o \leq \theta < 2\pi$ *and state the General Solution*.

$cosx = -\frac{1}{\sqrt{2}}$



$\theta_{stp} = \pi - \frac{\pi}{4}$

$\theta_{stp} = \frac{4\pi}{4} - \frac{\pi}{4}$

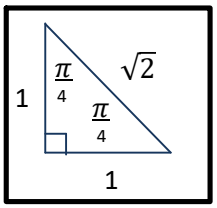
$\theta_{stp} = \frac{3\pi}{4}$

$\theta_{stp} = \pi + \frac{\pi}{4}$

$\theta_{stp} = \frac{4\pi}{4} + \frac{\pi}{4}$

$\theta_{stp} = \frac{5\pi}{4}$

$\theta_{stp} = \frac{3\pi}{4}, \frac{5\pi}{4}$



General Solution: $\theta = \theta_{stp} \pm pn, n \in I$

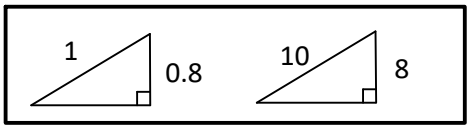
$\theta = \frac{3\pi}{4} \pm 2\pi n, n \in I$ $\theta = \frac{5\pi}{4} \pm 2\pi n, n \in I$

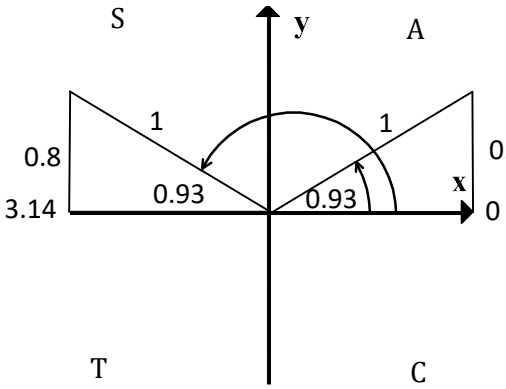
C12 - 4.3 - $sin\theta = .8$ & *Point* Notes

Solve for $\theta, 0^o \leq \theta < 2\pi$ and general solution

$\sin\theta = 0.8$

$sin\theta = \frac{0.8}{1} = \frac{8}{10}$





Draw two triangles where $\sin\theta$ is positive:
ASTC Quadrant I, II

Label the triangles according to SOH CAH TOA

$sin\theta = \frac{0.8}{1}$

$\theta_r = \sin^{-1}\left(+\frac{0.8}{1}\right)$

$\theta_r = 0.93$

Solve for θ_r: $\theta_r = \sin^{-1}(+\frac{O}{H})$

Draw an arrow from the principal axis to the first terminal arm,
draw an arrow from the principal axis to the second terminal arm.

Only inverse positives $= \theta_r$

Solve for the arrows θ_{stp}

$\theta_{stp} = 0.93 \quad \theta_{stp} = \pi - 0.93 = 2.21$

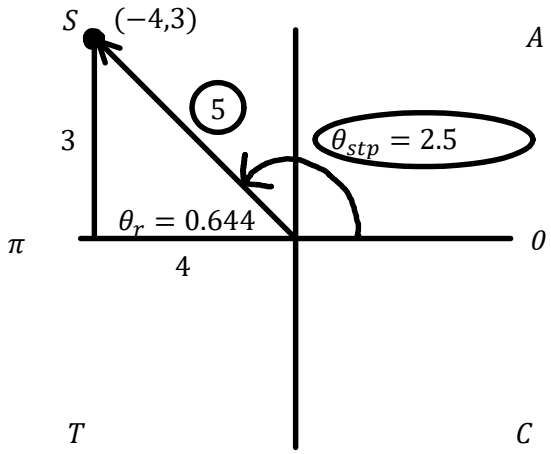
Check your answer: $sin0.93 = 0.8 \quad sin2.21 = 0.8$

$\theta_{stp} = 0.93, 2.21$

General Solution: $\theta = \theta_{stp} \pm pn, n \in I \quad \theta = 0.93 \pm 2\pi n, n \in I$

$\theta = \theta_{stp} \pm pn, n \in I \quad \theta = 2.21 \pm 2\pi n, n \in I$

Find sinx, cox, tanx, cscx, secx, and cotx for the following point. Find θ_{stp}



$sin\theta = +\frac{3}{5}$ $\quad cscx = +\frac{5}{3}$

$cos\theta = -\frac{4}{5}$ $\quad secx = -\frac{5}{4}$

$tan\theta = -\frac{3}{4}$ $\quad cotx = -\frac{4}{3}$

$a^2 + b^2 = c^2$
$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$25 = c^2$
$\sqrt{25} = \sqrt{c^2}$
$5 = c$

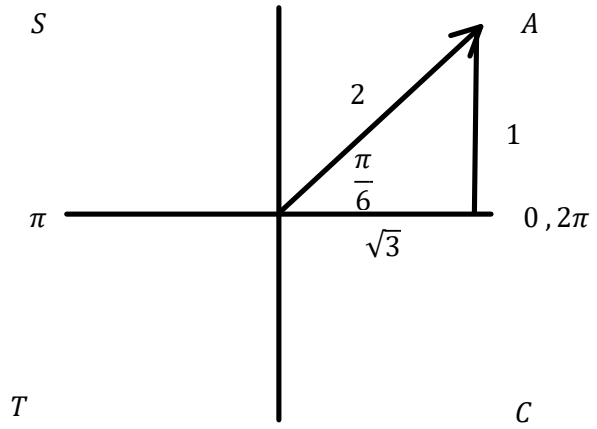
$tan\theta = \frac{O}{A}$
$tan\theta = \frac{3}{-4}$
$tan\theta = -0.75$
$\theta = \tan^{-1}(+0.75)$
$\theta = 0.644$
$\pi - 0.644 = 2.50$

Only inverse positives $= \theta_r$

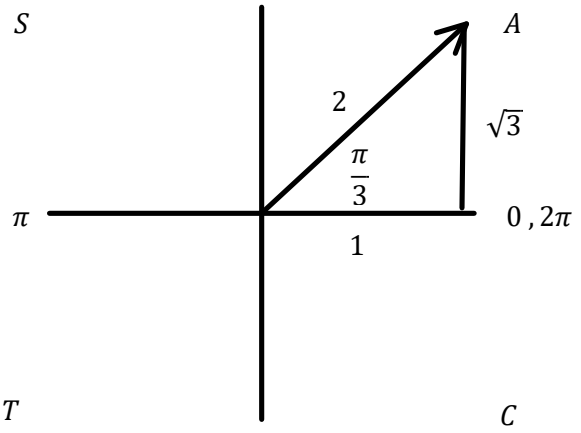
$\theta_{stp} = 2.50$

C12 - 4.3 - $csc\theta, sec\theta, cot\theta = ?$ *Notes*

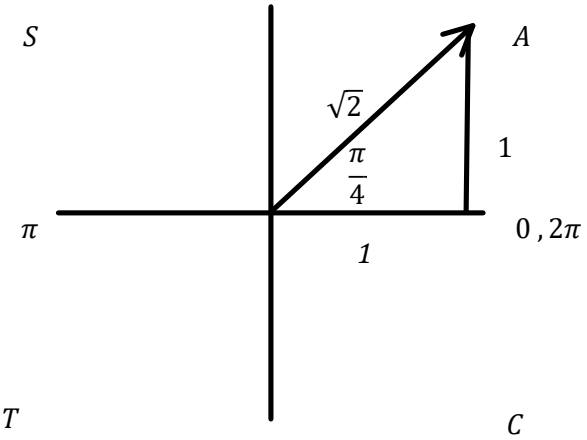
$\sec\frac{\pi}{6} = ?$ $\quad \sec\frac{\pi}{6} = \frac{2}{\sqrt{3}}$ $\quad \sec\frac{\pi}{6} \neq \cos\left(\frac{6}{\pi}\right)$



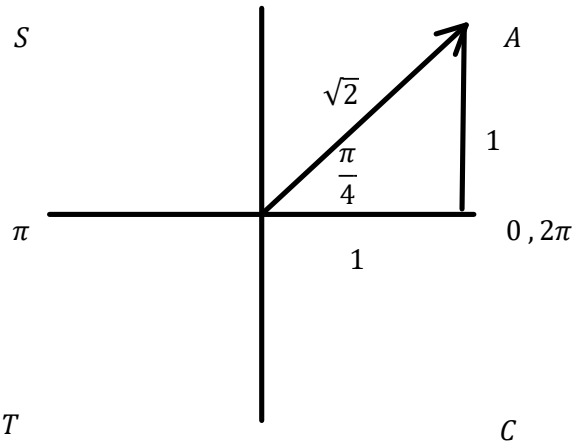
$\csc\frac{\pi}{3} = ?$ $\quad \csc\frac{\pi}{3} = \frac{2}{\sqrt{3}}$



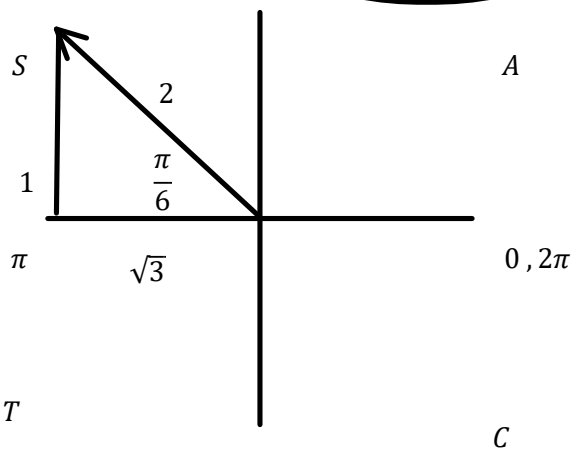
$\csc\frac{\pi}{4} = ?$ $\quad \csc\frac{\pi}{4} = \sqrt{2}$



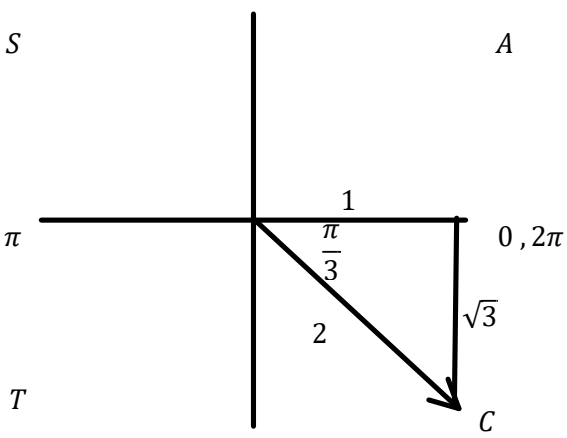
$\cot\frac{\pi}{4} = ?$ $\quad \cot\frac{\pi}{4} = 1$



$\sec\frac{5\pi}{6} = ?$ $\quad \sec\frac{5\pi}{6} = -\frac{2}{\sqrt{3}}$



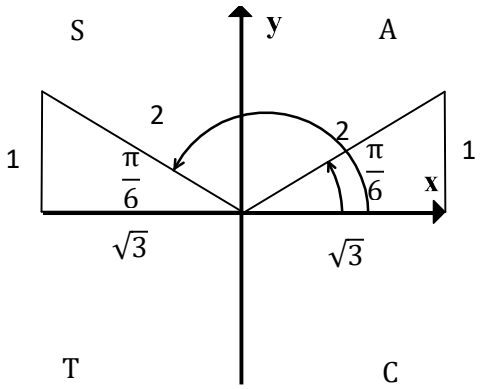
$\cot\frac{5\pi}{3} = ?$ $\quad \cot\frac{5\pi}{3} = -\frac{1}{\sqrt{3}}$



C12 - 4.3 - $csc\theta = 2$ Notes

Solve for $\theta, 0^o \leq \theta < 2\pi$.

$$csc\theta = \frac{2}{1}$$

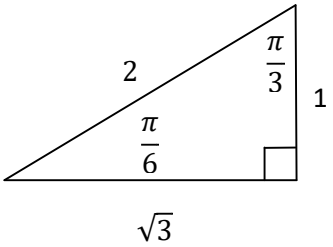


Draw two triangles where csc θ is positive:
ASTC Quadrant I, II

Label the triangles according to special triangles/SOH CAH TOA

Label the reference angle according to special triangles.

Draw an arrow from the principal axis to the first terminal arm
Draw an arrow from the principal axis to the second terminal arm.



Solve for the arrows θ_{stp}

$\theta_{stp} = \frac{\pi}{6}$ $\quad \theta_{stp} = \pi - \frac{\pi}{6}$

$= \frac{6\pi}{6} - \frac{\pi}{6}$

$= \frac{5\pi}{6}$

$\theta_{stp} = \frac{\pi}{6}, \frac{5\pi}{6}$

Check your answer:

$cot\theta = 0.1$

$cot\theta = \frac{0.1}{1} = \frac{1}{10}$

$tan\theta = \frac{1}{0.1} = \frac{10}{1}$

$\theta = \tan^{-1}(10)$

$\theta = 84.24^0$

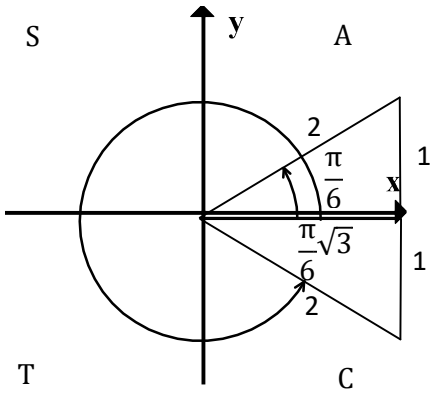
...

$\theta = 84.24, 264.29^0$

$OR \qquad sin\theta = \frac{1}{2}$

Solve for $\theta, 0^o \leq \theta < 2\pi$ *and state the General Solution*.

$$sec x = \frac{2}{\sqrt{3}} \qquad cos\theta = \frac{\sqrt{3}}{2}$$



$\theta_{stp} = \frac{\pi}{6}$ $\quad \theta_{stp} = 2\pi - \frac{\pi}{6}$

$= \frac{11\pi}{6}$

$\theta_{stp} = \frac{\pi}{6}, \frac{11\pi}{6}$

General Solution: $\theta = \theta_{stp} \pm pn, n \in I$

$\theta = \frac{\pi}{6} \pm 2\pi n, n \in I$ $\qquad \theta = \frac{11\pi}{6} \pm 2\pi n, n \in I$