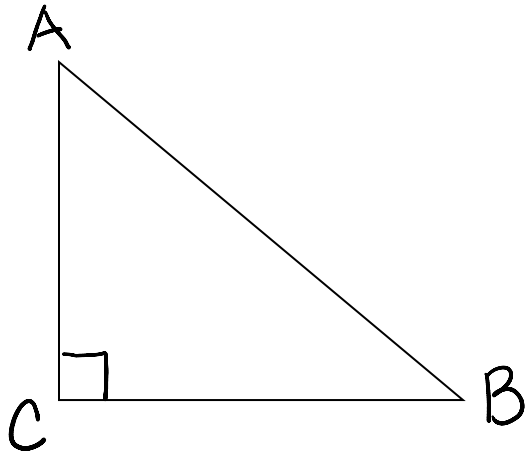
Section 13.1 Day 1

Trigonometry!

Trigonometry is the study of the relationships of sides & angles in a right triangle.

For Right Triangle ABC, which side is:



across → Opposite ∠ A $\overline{CB}$

next to → Adjacent ∠ A $\overline{AC}$

Hypotenuse $\overline{AB}$

(the Hypotenuse is ALWAYS opposite of the right angle)

Opposite ∠ B $\overline{AC}$

Adjacent ∠ B $\overline{CB}$

Hypotenuse $\overline{AB}$

Trig. Definitions

Three basic Trig. Functions: **Sine** (abbreviated "Sin"), **Cosine** (abbreviated "Cos"), and **Tangent** (abbreviated "Tan"). Each function is expressed as a ratio (it's just a fraction).

Sine = $\frac{Opposite}{Hypotenuse}$

Cosine = $\frac{Adjacent}{Hypotenuse}$

Tangent = $\frac{Opposite}{Adjacent}$

REMEMBER…

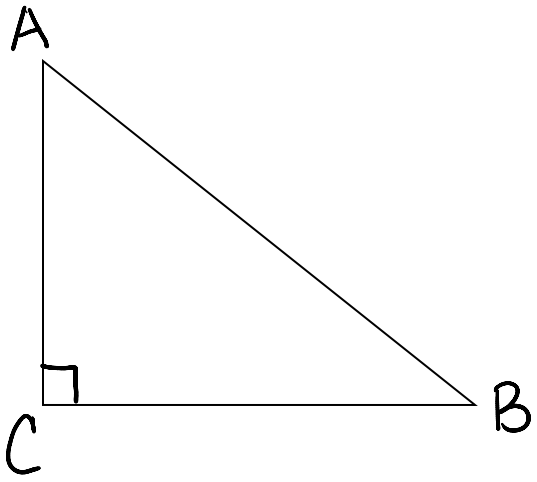
"SOH CAH TOA"

SOH: sin = $\frac{opp}{hyp}$

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

TOA: tan = $\frac{opp}{adj}$

Here's how it works…



SOH: sine ∠ A = $\frac{opp}{hyp}$ = $\frac{CB}{AB}$

CAH: cosine ∠ A = $\frac{adj}{hyp}$ = $\frac{AC}{AB}$

TOA: tangent ∠ A = $\frac{opp}{adj}$ = $\frac{CB}{AC}$

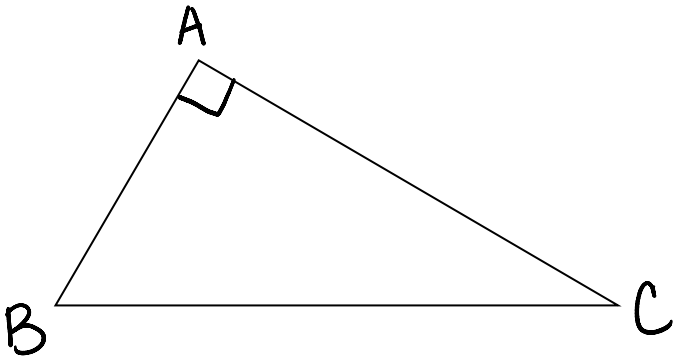
Find the ratios for angle B using the triangle above:

SOH: sine ∠ B = $\frac{opp}{hyp}$ = $\frac{AC}{AB}$

CAH: coine ∠ B = $\frac{adj}{hyp}$ = $\frac{CB}{AB}$

TOA: tangent ∠ B = $\frac{opp}{adj}$ = $\frac{AC}{CB}$

Find the ratios for angle C in this triangle:



sin ∠ C = $\frac{AB}{BC}$

cos ∠ C = $\frac{AC}{BC}$

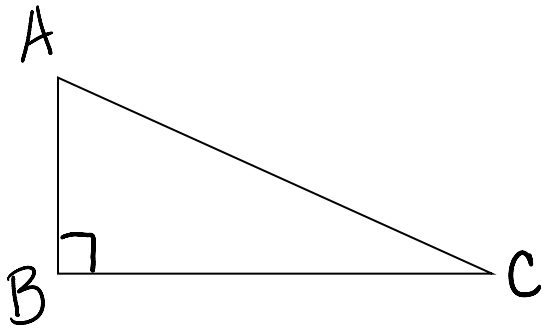
tan ∠ C = $\frac{AB}{AC}$

Just when you think you get it…

There are actually 6 trig functions that you will need to know. The remaining 3 are ***RECIPROCALS*** of the first 3. (Reciprocal means flip the fraction over!)

Basic Trig Functions	**Reciprocal Trig Functions**
Sine →	Cosecant (abbreviated "csc")
Cosine →	Secant (abbreviated "sec")
Tangent →	Cotangent (abbreviated "cot")

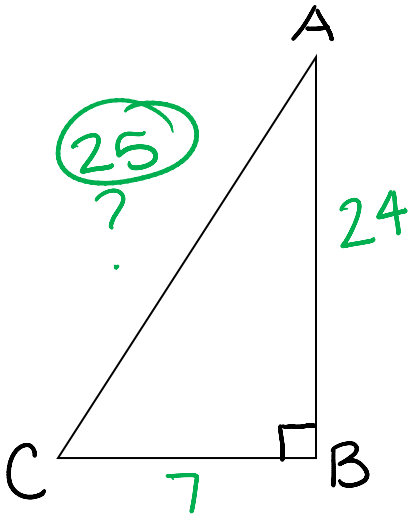
Find the 6 trig functions of ∠ A.



sin ∠ A = $\frac{BC}{AC}$	csc ∠ A= $\frac{AC}{BC}$
cos ∠ A = $\frac{AB}{AC}$	sec ∠ A= $\frac{AC}{AB}$
tan ∠ A = $\frac{BC}{AB}$	cot ∠A= $\frac{AB}{BC}$

For the triangle below, find the 6 trig functions of angle A.

Notice that you are missing one side of the triangle… You must find that side FIRST!
You can use the Pythagorean Theorem ($a^2 + b^2 = c^2$).



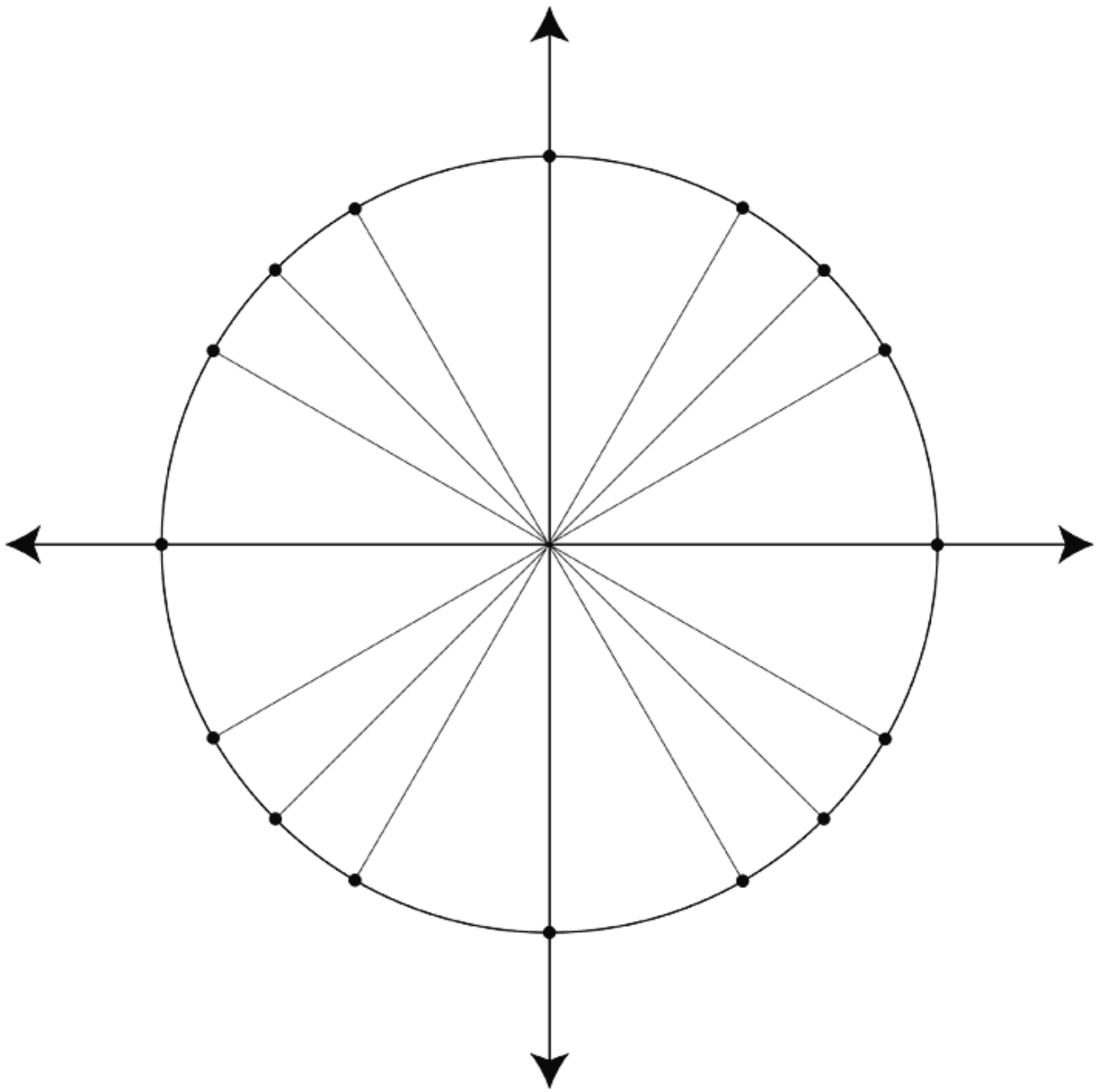
$7^2 + 24^2 = c^2$

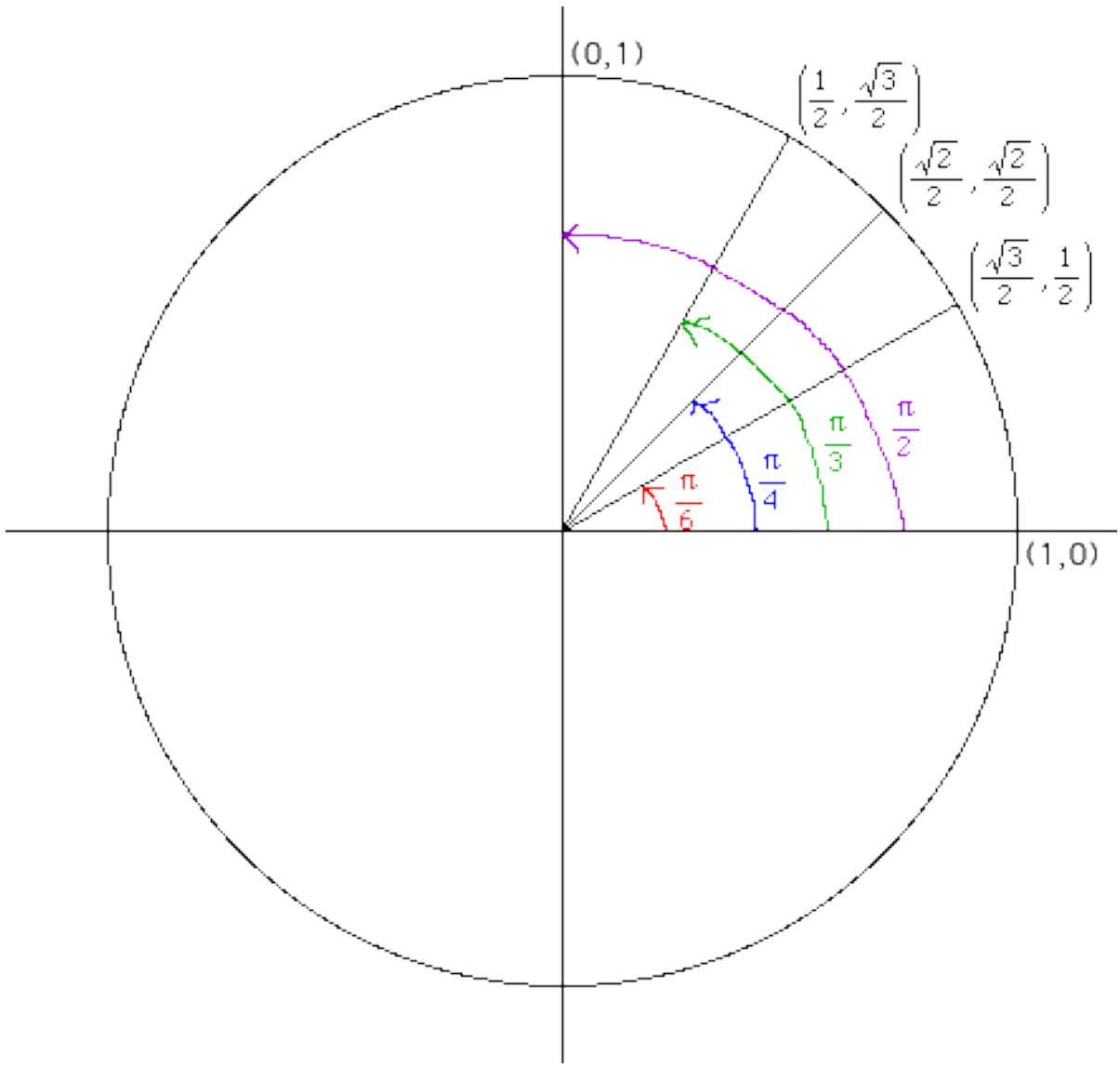
$49 + 576 = c^2$

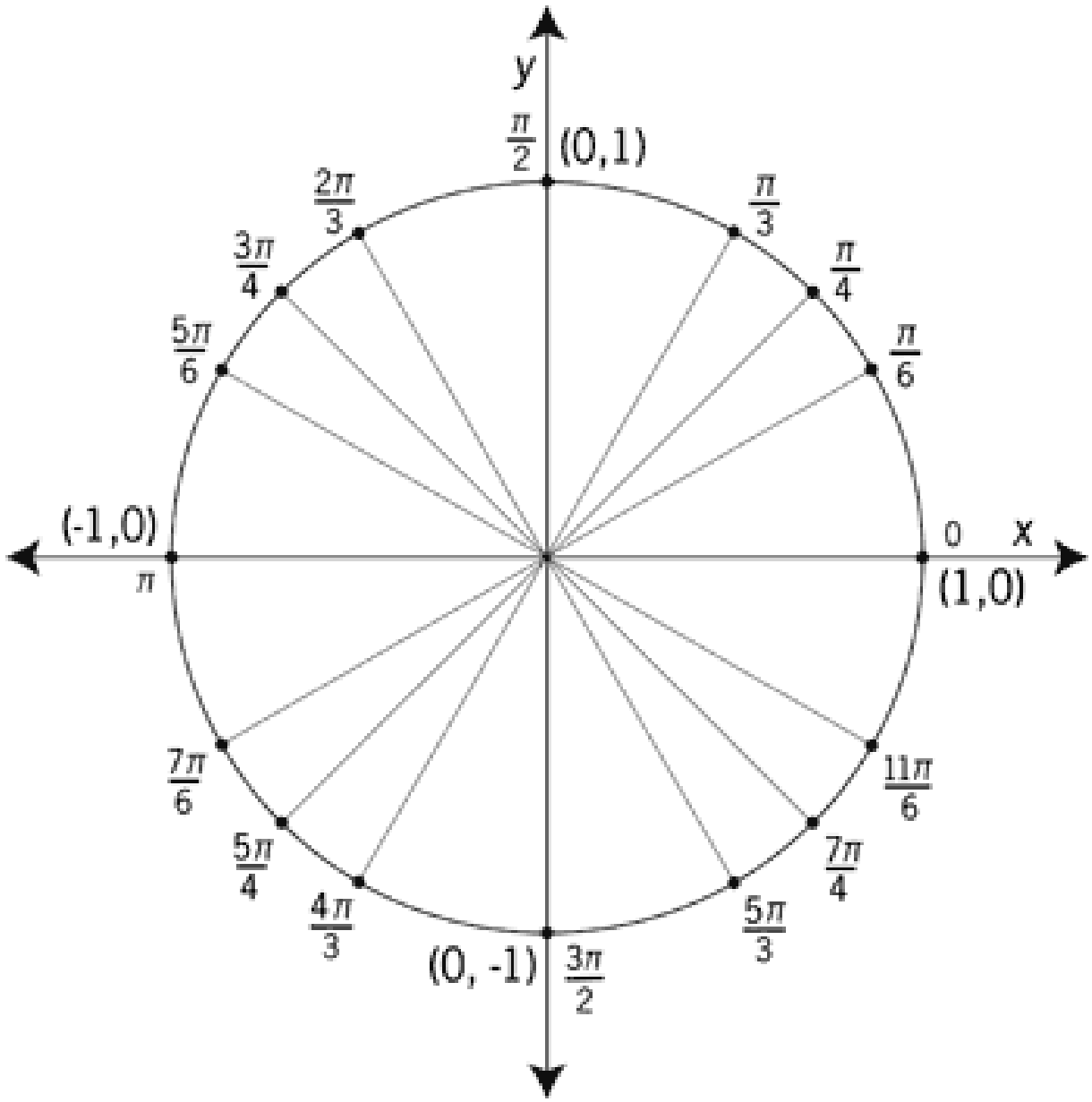
$625 = c^2$

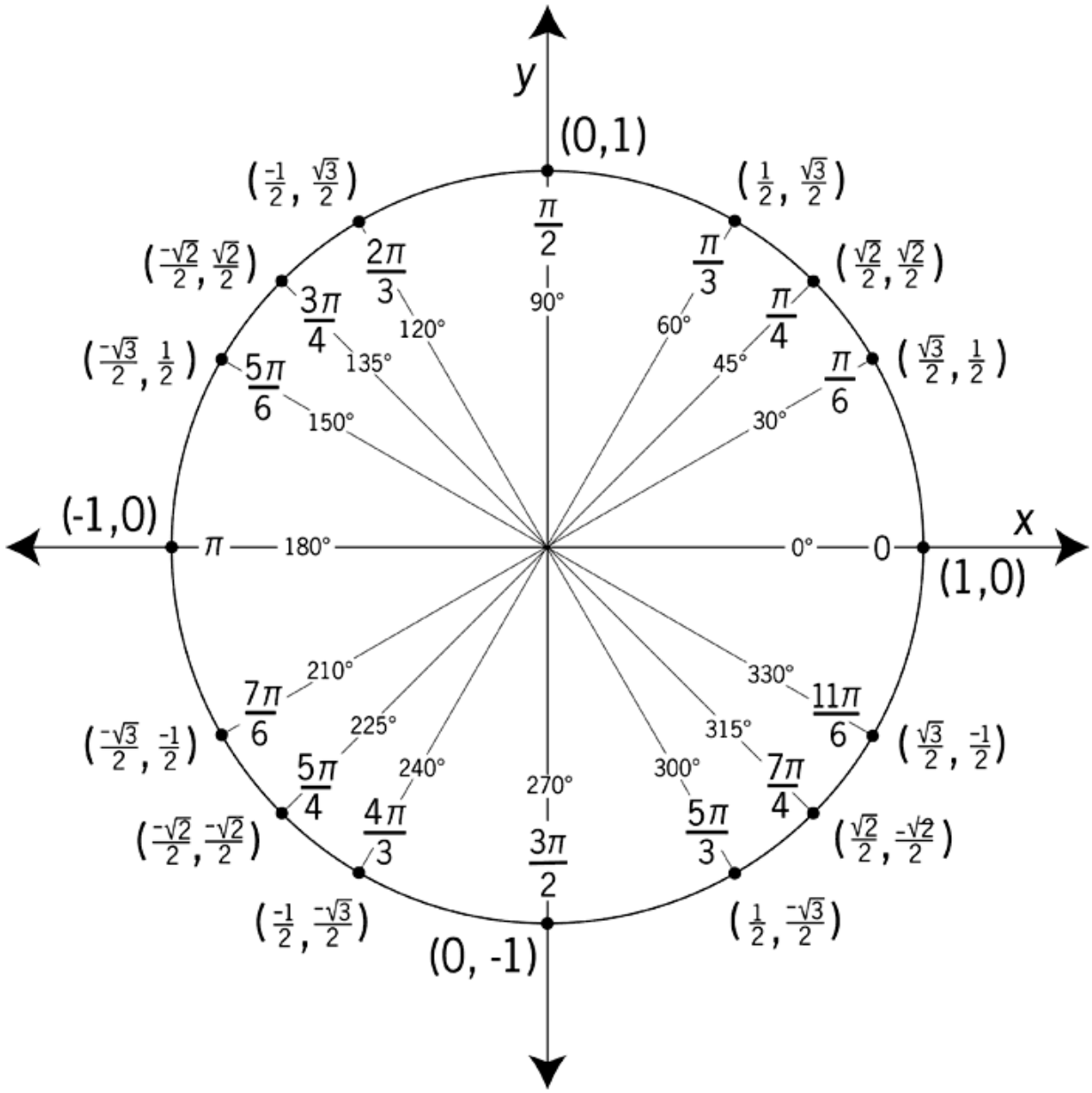
$25 = c$

sin ∠ A = $\frac{7}{25}$	csc ∠ A= $\frac{25}{7}$
cos ∠ A = $\frac{24}{25}$	sec ∠ A= $\frac{25}{24}$
tan ∠ A = $\frac{7}{24}$	cot ∠A= $\frac{24}{7}$




(0,1)
$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
$\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
$\frac{\pi}{2}$
$\frac{\pi}{3}$
$\frac{\pi}{4}$
$\frac{\pi}{6}$
(1,0)


y
x
$\frac{\pi}{2}$
(0,1)
$\frac{2\pi}{3}$
$\frac{\pi}{3}$
$\frac{3\pi}{4}$
$\frac{\pi}{4}$
$\frac{5\pi}{6}$
$\frac{\pi}{6}$
(-1,0)
π
0
(1,0)
$\frac{7\pi}{6}$
$\frac{11\pi}{6}$
$\frac{5\pi}{4}$
$\frac{7\pi}{4}$
$\frac{4\pi}{3}$
$\frac{5\pi}{3}$
(0, -1)
$\frac{3\pi}{2}$


y
x
(0,1)
(1,0)
(-1,0)
(0, -1)
$\frac{\pi}{2}$
90°
$\frac{\pi}{3}$
60°
$\frac{\pi}{4}$
45°
$\frac{\pi}{6}$
30°
0
0°
π
180°
$\frac{2\pi}{3}$
120°
$\frac{3\pi}{4}$
135°
$\frac{5\pi}{6}$
150°
$\frac{7\pi}{6}$
210°
$\frac{5\pi}{4}$
225°
$\frac{4\pi}{3}$
240°
$\frac{3\pi}{2}$
270°
$\frac{5\pi}{3}$
300°
$\frac{7\pi}{4}$
315°
$\frac{11\pi}{6}$
330°
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{-1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{-\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{-\sqrt{3}}{2}, \frac{-1}{2})$
$(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2})$
$(\frac{-1}{2}, \frac{-\sqrt{3}}{2})$
$(\frac{1}{2}, \frac{-\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{-1}{2})$