

Warm up

Find the trig ratio for the following:

1. $\sin \frac{\pi}{3}$

2. $\cos \frac{\pi}{4}$

3. $\csc \frac{\pi}{6}$

4. $\tan 30^\circ$

5. $\sec 45^\circ$

6. $\cot 45^\circ$

Find θ in degrees.

7. $\sin \theta = \frac{1}{\sqrt{2}}$

8. $\csc \theta = \frac{2}{\sqrt{3}}$

9. $\cot \theta = \sqrt{3}$

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

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4.4 Trig Functions of any angle Day 1

trig ratios for angles > 90 or $\frac{\pi}{2}$

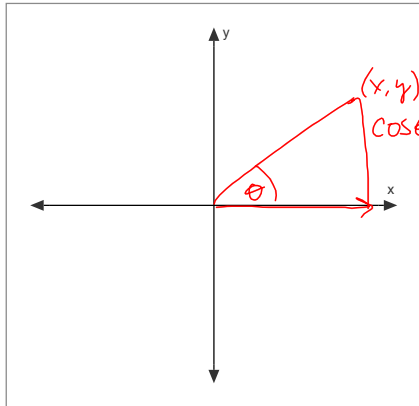
ASTC

Quadrant angle values

What quadrant am I in?

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So far we have talked only about trig ratios of acute angles. What if the angle I want to evaluate is obtuse?



Remember that on the unit circle

$$(x, y) = (\cos \theta, \sin \theta)$$

$$= (\text{adj side}, \text{opp side})$$

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Example: Let (5, -12) be a point on the terminal side of angle θ , find $\sin \theta$, $\cos \theta$, $\tan \theta$

Step 1: Draw a triangle with the x-axis

Step 2: Find the third side

using pythagorean theorem

Step 3: Find the ratios

$\sin \theta$	$\cos \theta$	$\tan \theta$
$-\frac{12}{13}$	$\frac{5}{13}$	$-\frac{5}{12}$

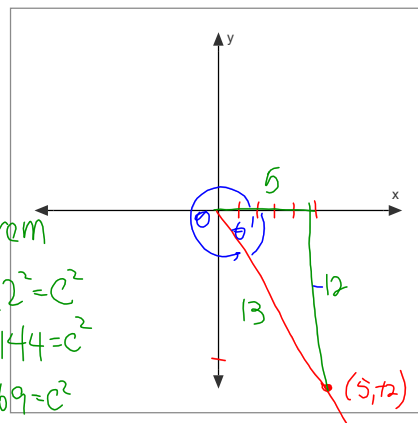
$$5^2 + 12^2 = c^2$$

$$25 + 144 = c^2$$

$$169 = c^2$$

$$\sqrt{169} = c$$

$13 = c \Rightarrow$ always positive



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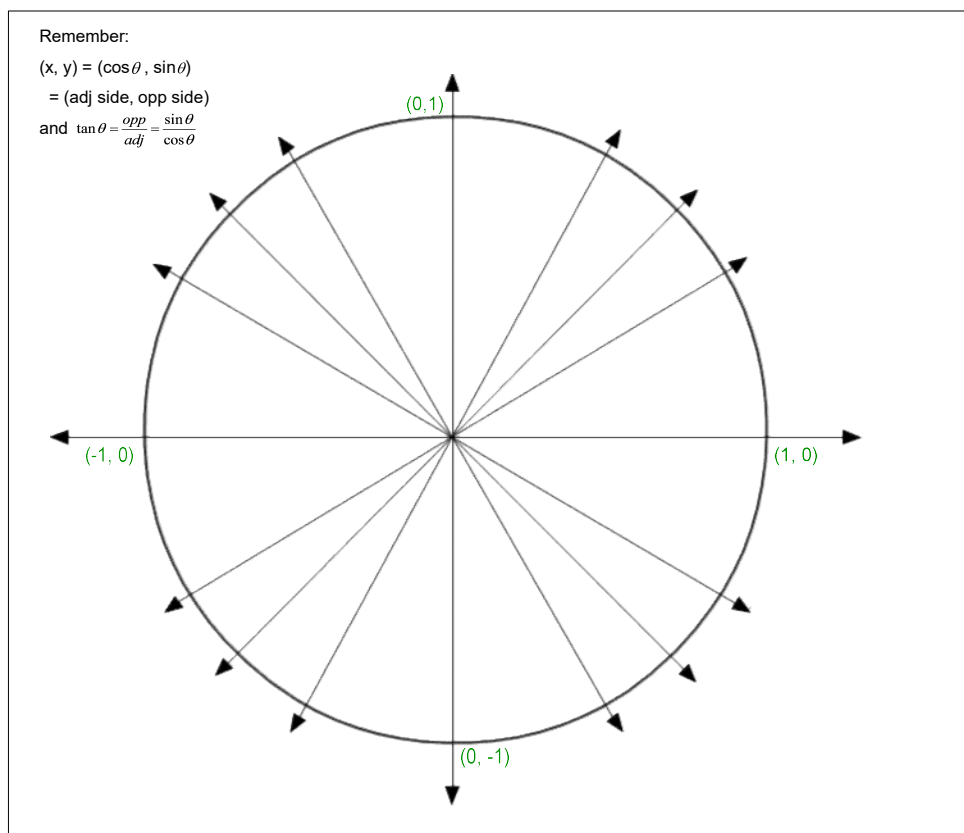
ASTC = what is positive in each quadrant

$(x, y) = (\cos \theta, \sin \theta)$
 = (adj side, opp side)

$\frac{\sin \theta}{\cos \theta} = \tan \theta$

<u>STUDENTS</u>	<u>ALL</u>
$\sin \theta +$	$\sin \theta +$
$\cos \theta -$	$\cos \theta +$
$\tan \theta -$	$\tan \theta +$
$\sin \theta -$	$\cos \theta +$
$\cos \theta -$	$\sin \theta -$
$\tan \theta +$	$\tan \theta -$
<u>TAKE</u>	<u>CALCULUS</u>

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Jan 11-2:00 PM

$\frac{0}{1} \rightarrow \frac{1}{0}$

	0, 360 or 0, 2π	90 or $\pi/2$	180 or π	270 or $3\pi/2$
sin θ	0	1	0	-1
cos θ	1	0	-1	0
tan θ	0	und	0	und
csc θ	und	1	und	-1
sec θ	1	und	-1	und
cot θ	und	0	und	0

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What quadrant am I in??

$\sin \theta > 0$ $\tan \theta > 0$ I
~~I~~ II ~~I~~ III

$\cos \theta < 0$ $\sin \theta < 0$ III
 II ~~III~~ ~~IV~~ IV

$\sec \theta < 0$ $\cot \theta < 0$ II

$\cos \theta < 0$ $\tan \theta < 0$
~~II~~ III ~~IV~~ IV

$\sin 270^\circ = -1$

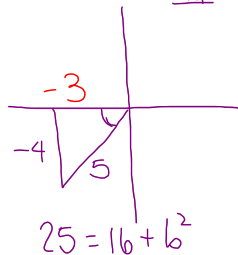
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find the remaining 5 trig ratios (values) given:

$$\sin \theta = -\frac{4}{5}, \quad \cos \theta < 0$$

III IV II III

III



draw a Δ in Q3

Load information

Find 3rd side

$$\begin{aligned} \text{(given)} \sin \theta &= -\frac{4}{5} & \csc \theta &= -\frac{5}{4} \\ \cos \theta &= -\frac{3}{5} & \sec \theta &= -\frac{5}{3} \\ \text{Q3} \rightarrow \tan \theta &= \frac{4}{3} & \cot \theta &= \frac{3}{4} \end{aligned}$$

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HOMWORK



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1-21 odd, 29-36 all

Feb 2-9:51 PM

