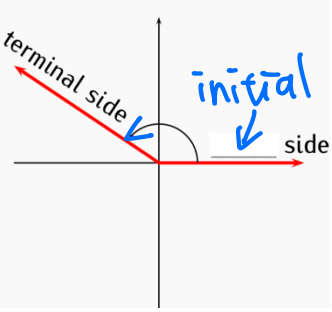
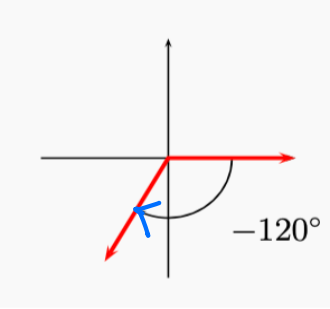
MAT 1375, Classwork15, Fall2024

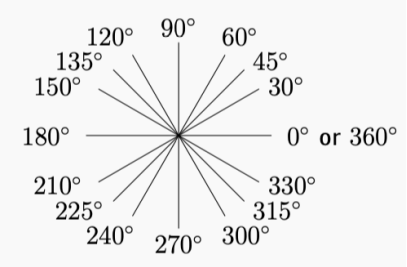
ID:_____ Name:_____

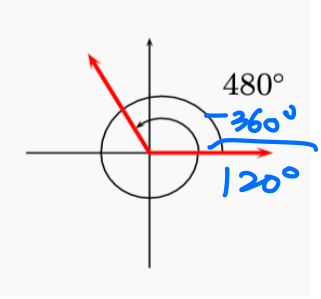
1. Angle in standard position:

An angle in the plane is in _standard position_ if its vertex is at the origin and the initial side is at the positive x-axis.









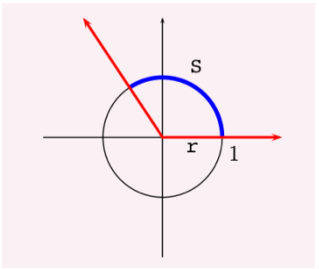
Counterclockwise direction: Angle $>$ 0.

Clockwise direction: Angle $<$ 0.

A full rotation measure as $360°$

An angle can be $\geq$ $360°$

2. The **Central angle** is an angle whose vertex is at the _center_ of the circle.

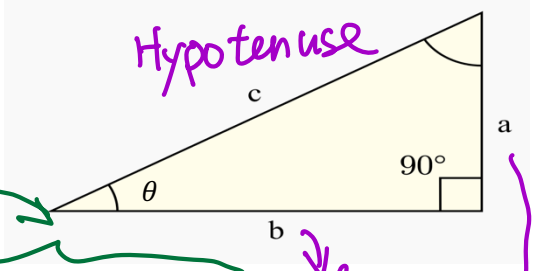


The **radian** measure of the central angle of a circle is **ratio** of the _length_ of the intercept arc ***s*** with the circle radius ***r***:

$$\text{Angle in radian} = \frac{s}{r}.$$

When $r = 1$ and half circumference of this circle is $\pi r = \pi$, then we have the central angle to be 180 in degree or π in radian.

3. Right Triangle Definitions of **Trigonometric Functions** and **Reciprocal Identities**:



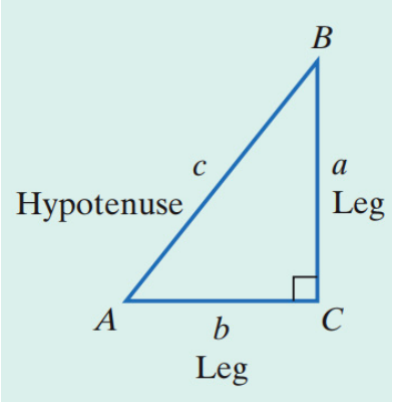
adjacent

opposite

$\sin(\theta) = \frac{\text{length of side opposite angle } \theta}{\text{length of Hypotenuse}} = \frac{a}{c}$	$\csc(\theta) = \frac{1}{\sin(\theta)} = \frac{c}{a}$
$\cos(\theta) = \frac{\text{length of side adjacent to angle } \theta}{\text{length of Hypotenuse}} = \frac{b}{c}$	$\sec(\theta) = \frac{1}{\cos(\theta)} = \frac{c}{b}$
$\tan(\theta) = \frac{\text{length of side opposite angle } \theta}{\text{length of side adjacent to angle } \theta} = \frac{a}{b}$	$\cot(\theta) = \frac{1}{\tan(\theta)} = \frac{b}{a}$

4. Quotient Identities:

$$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} \qquad \cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$$

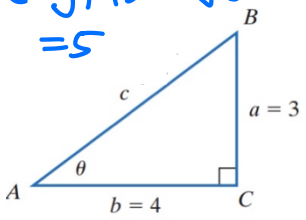


5. The Pythagorean Theorem:

The sum of the square of the lengths of the legs of a right triangle equals the square of the length of the hypotenuse.

$a^2 + b^2 = c^2$.

6. Given the right triangles. Find $\sin(\theta)$, $\cos(\theta)$, $\tan(\theta)$.

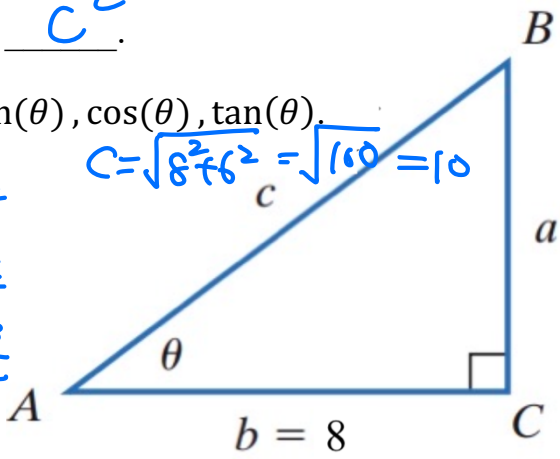


$c = \sqrt{4^2+3^2} = \sqrt{25} = 5$

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

$\cos(\theta) = \frac{4}{5}$

$\tan(\theta) = \frac{3}{4}$



$c = \sqrt{8^2+6^2} = \sqrt{100} = 10$

$\sin(\theta) = \frac{6}{10} = \frac{3}{5}$

$\cos(\theta) = \frac{8}{10} = \frac{4}{5}$

$\tan(\theta) = \frac{3}{4}$

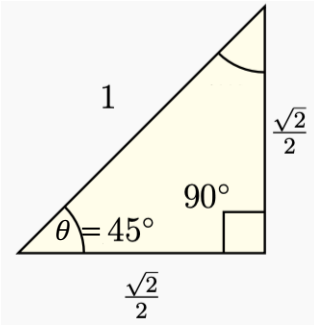
7. Pythagorean Triple:

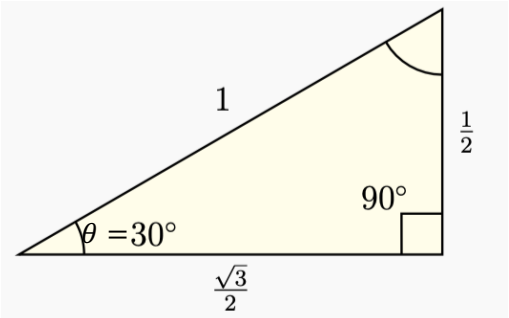
(3, 4, 5), (5, 12, 13), (7, 24, 25), (8, 15, 17)

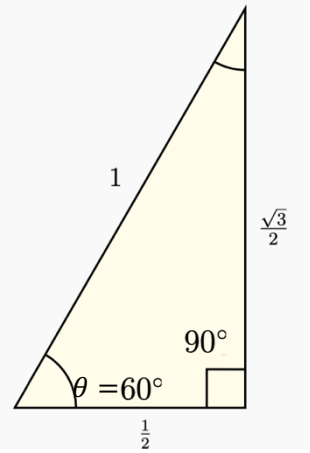
(6, 8, 10)

8. The values of trigonometric functions only depend on the size of the angle, not the size of the triangle.

9. The values of trigonometric functions with special angles:







θ	0 (or 0°)	$\frac{\pi}{6}$ (or 30°)	$\frac{\pi}{4}$ (or 45°)	$\frac{\pi}{3}$ (or 60°)	$\frac{\pi}{2}$ (or 90°)
y-coord. $\sin(\theta)$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
x-coord. $\cos(\theta)$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan(\theta)$	0	$\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	undefined.