Before we begin, are there any questions from last day's work? 4.1.2

(Tuesday's quiz will be based on this material)

1d)

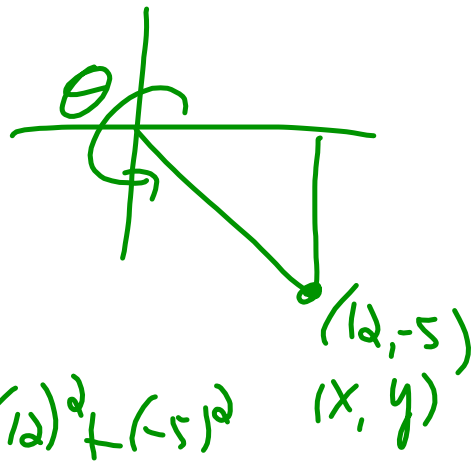
Today's Learning Goal(s):

By the end of the class, I will be able to:

a) determine the **EXACT** values of the sine, cosine, and tangent of the special angles $0°, 30°, 45°, 60°, 90°$ ***and their multiples***

b) understand and use the "CAST Rule" with the "raa" (related acute angle).

1d)



$r^2 = (12)^2 + (-5)^2$

$= 144 + 25$

$= 169$

$r = \sqrt{169}$

$= 13$

$\sin\theta = \frac{y}{r} \quad \cos\theta = \frac{x}{r}$

$= \frac{-5}{13} \quad = \frac{12}{13}$

$\tan\theta = \frac{y}{x}$

$= \frac{-5}{12}$

4.2.1 Trigonometric Ratios of Special Angles

Date: Apr. 7/16

SYR CXRTYX

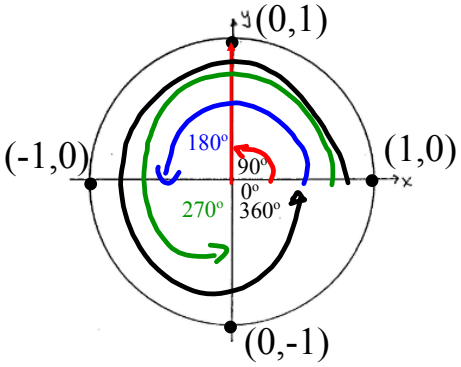
Recall: $\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$y = r\sin\theta$ $x = r\cos\theta$

Note: Any point $(x, y) = (r\cos\theta, r\sin\theta)$ and on a "unit circle", $r = 1$

Any point $(x, y) = (\cos\theta, \sin\theta)$ *alphabetical order*

A) $\theta = 0^0, 90^0, 180^0, 270^0, 360^0$

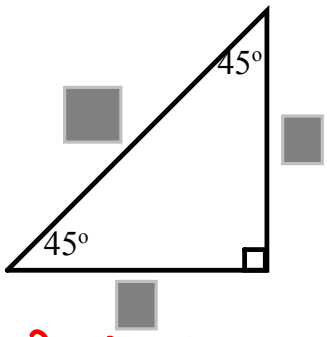


$\sin 90^0 = \frac{y}{r} = \frac{1}{1} = 1$

$\cos 90^0 = \frac{x}{r} = \frac{0}{1} = 0$

$\cos 180^0 = \frac{x}{r} = \frac{-1}{1} = -1$

B) $\theta = 45^0, 135^0, 225^0, 315^0$



$h^2 = 1^2 + 1^2$

$= 2$

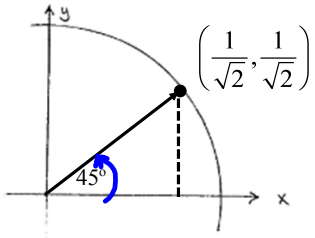
$h = \sqrt{2}$

$\sin 45^0 = \frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$

$\cos 45^0 = \frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$

$\tan 45^0 = \frac{1}{1}$

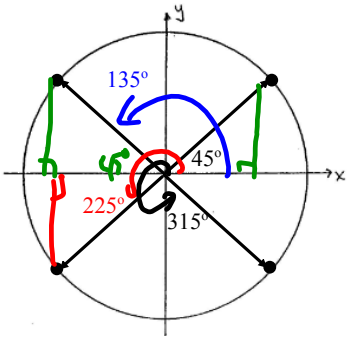
$= 1$



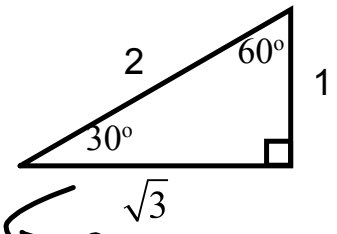
$\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{\sqrt{2}}{\sqrt{4}}$

$= \frac{\sqrt{2}}{2}$



C) $\theta = 30^0, 150^0, 210^0, 330^0$

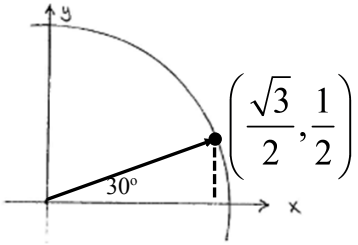


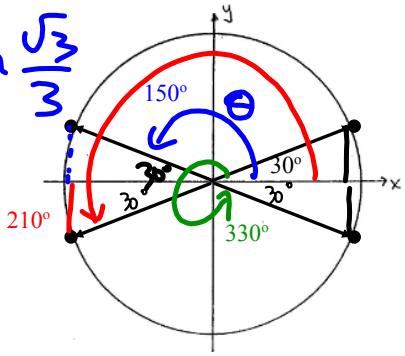
$x^2 = 2^2 - 1^2$
$= 4 - 1$
$= 3$
$x = \sqrt{3}$

$\sin 30^0 = \frac{1}{2}$

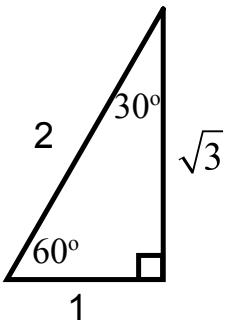
$\cos 30^0 = \frac{\sqrt{3}}{2}$

$\tan 30^0 = \frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$





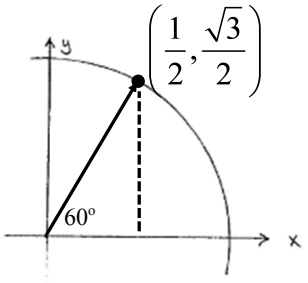
D) $\theta = 60^0, 120^0, 240^0, 300^0$

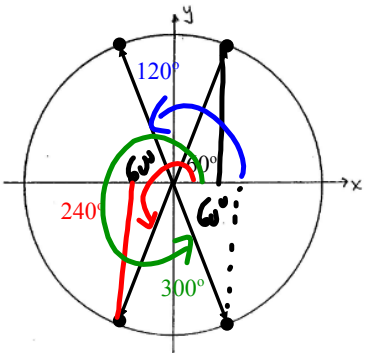


$\sin 60^0 = \frac{\sqrt{3}}{2}$

$\cos 60^0 = \frac{1}{2}$

$\tan 60^0 = \sqrt{3}$





$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$
$= \frac{\sqrt{3}}{3}$

$\sqrt{x} \cdot \sqrt{x}$
$= \sqrt{x^2}$
$= x$

$\sqrt{9} \cdot \sqrt{9}$
$= \sqrt{81}$
$= 9$

$\sqrt{9} \cdot \sqrt{9}$
$= 3 \cdot 3$
$= 9$

4.2.2 Trigonometric Ratios of Special Angles

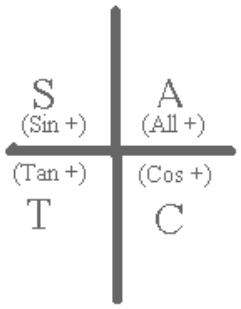
Date: _____

θ	30°	45°	60°
$\sin\theta$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$ $\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
$\cos\theta$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$ $\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
$\tan\theta$	$\frac{1}{\sqrt{3}}$ $\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

Memorize this Chart!

The CAST rule:

The CAST RULE is a memory aid which tells us the sign of the trig ratios in the various quadrants.
In the first quadrant, **ALL** are positive. This is denoted using the letter **A**.
In the second quadrant, **SINE** is positive. This is denoted by the letter **S**. [the other two ratios are negative]
In the third quadrant, **TANGENT** is positive. This is denoted by the letter **T**. [the other two ratios are negative]
In the fourth quadrant, **COSINE** is positive. This is denoted by the letter **C**. [the other two ratios are negative]

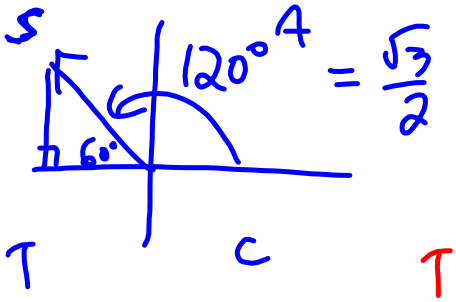


4.2.3 Determining Trig Ratios of Special Angles

Method: Sketch, use the Related Acute Angle (raa), apply the CAST rule.

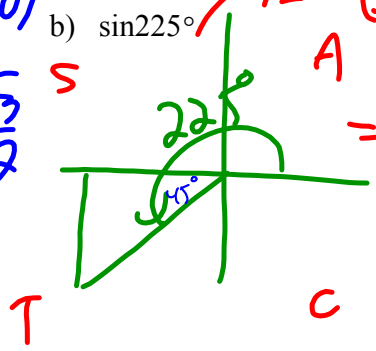
Evaluate:

1a) $\sin 120° = +\sin(60)$



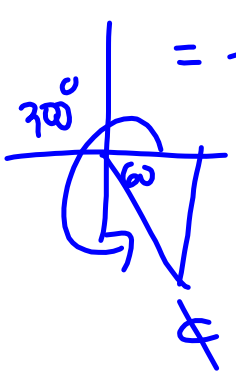
$= \frac{\sqrt{3}}{2}$

b) $\sin 225° = -(\sin 45°)$



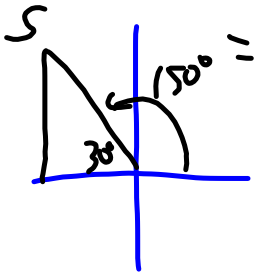
$= -\frac{1}{\sqrt{2}}$

c) $\tan 300° = -(\tan 60°)$



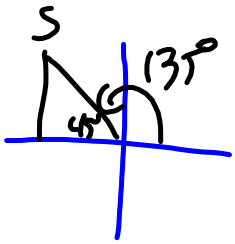
$= -\sqrt{3}$

2a) $\cos 150° = -(\cos 30°)$



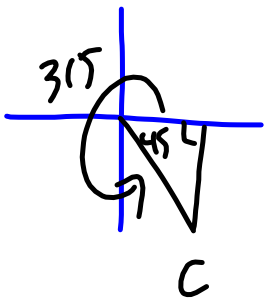
$= -\frac{\sqrt{3}}{2}$

b) $\sin 135° = +\sin 45°$



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

c) $\tan 315° = -(\tan 45°)$



$= -1$