

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

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

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 $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ **and their multiples**
- b) understand and use the "CAST Rule" with the "raa" (related acute angle).

4.2.1 Trigonometric Ratios of Special Angles

Date: Apr. 4/17

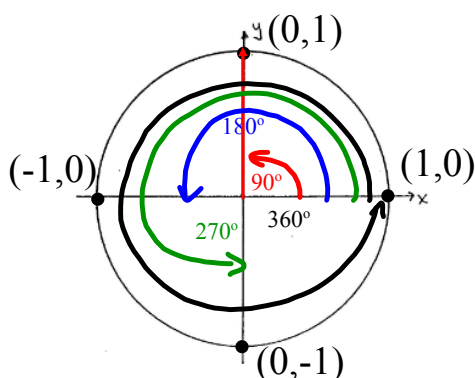
Recall: $\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

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

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



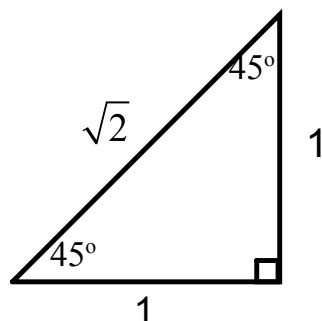
0°

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

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

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

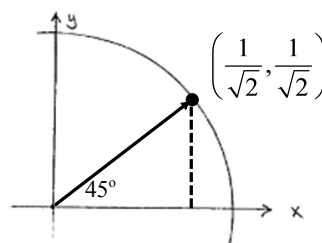
B) $\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$



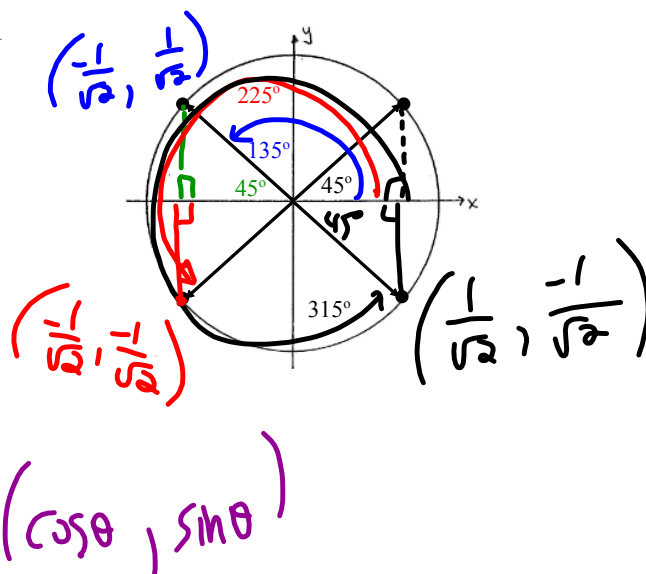
$$\sin 45^\circ = \frac{1}{\sqrt{2}} \text{ or } \frac{\sqrt{2}}{2}$$

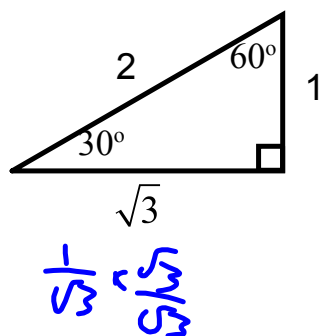
$$\cos 45^\circ = \frac{1}{\sqrt{2}} \text{ or } \frac{\sqrt{2}}{2}$$

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



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

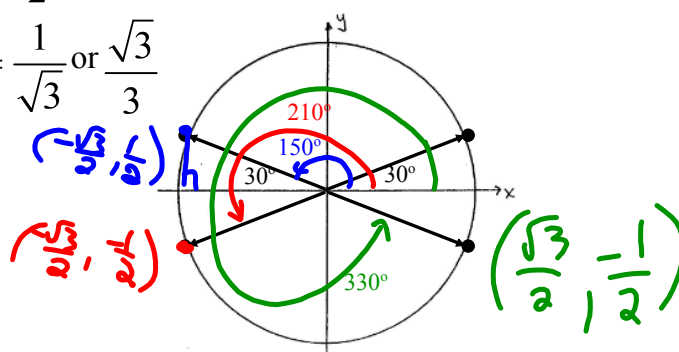
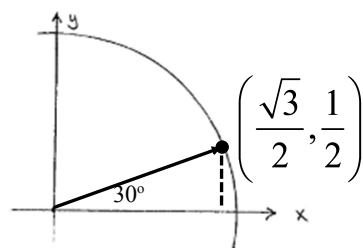
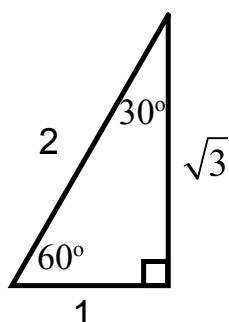


C) $\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$ 

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

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

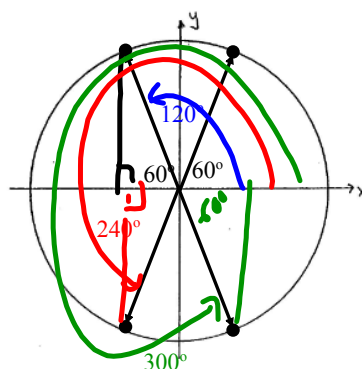
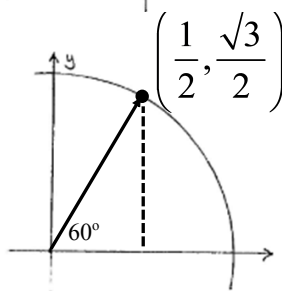
$$\tan 30^\circ = \frac{1}{\sqrt{3}} \text{ or } \frac{\sqrt{3}}{3}$$

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

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

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

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



4.2.2 Trigonometric Ratios of Special Angles

Date: _____

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

Memorize this Chart!

The CAST rule:

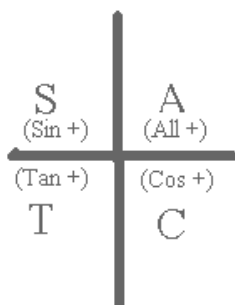
The CAST RULE is a memory aid which tells us the sign of the trig ratios in the various quadrants.

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]



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

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

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

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

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

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

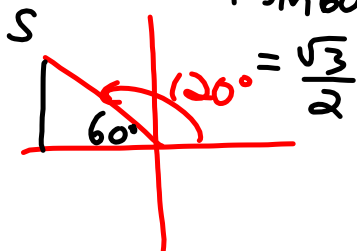
$$\sqrt{x} \cdot \sqrt{x} = x$$

4.2.3 Determining Trig Ratios of Special Angles

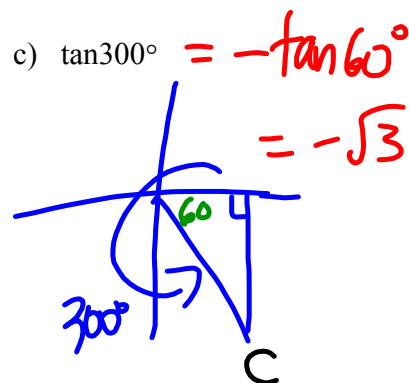
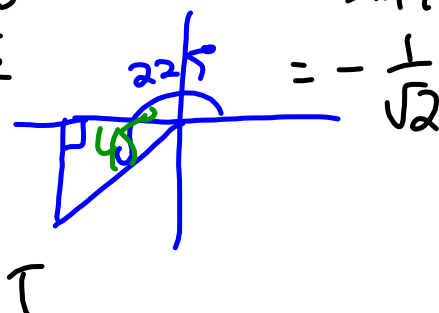
Method: Sketch, use the Related Acute Angle (raa), apply the CAST rule.

Evaluate:

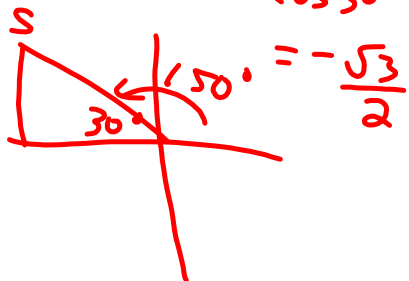
1a) $\sin 120^\circ = +\sin 60^\circ$



b) $\sin 225^\circ = -\sin 45^\circ$



2a) $\cos 150^\circ = -\cos 30^\circ$



b) $\sin 135^\circ = +\sin 45^\circ$

