

Section 4.2

Trigonometric Ratios and Special Angles

To determine trigonometric ratios of angles measured in radians, you must switch your calculator to RADIAN (RAD,R) Mode.

Examples: Use a calculator to determine the following trigonometric ratios to 3 decimal places.

a) $\sin \frac{\pi}{6}$

b) $\cos \frac{\pi}{4}$

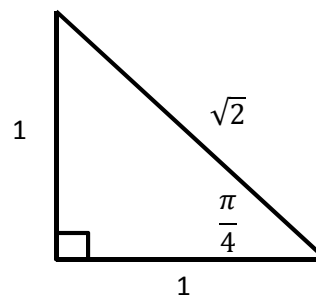
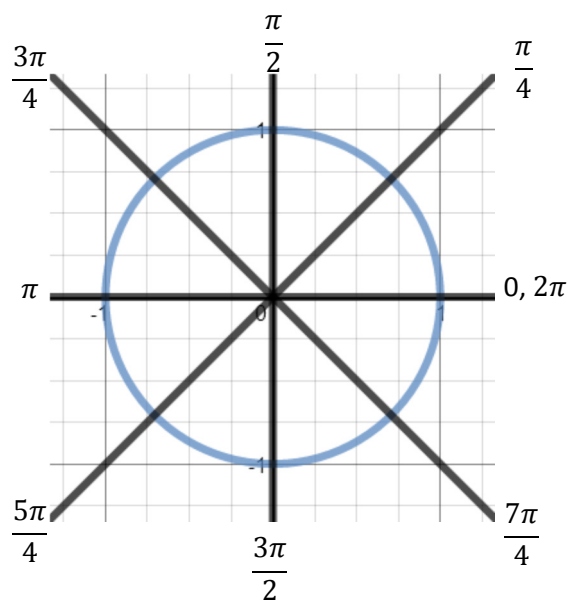
c) $\tan \frac{2\pi}{3}$

d) $\csc \frac{\pi}{6}$

e) $\sec \frac{\pi}{4}$

f) $\cot \frac{2\pi}{3}$

Special Angles between 0 and 2π are displayed on the unit circle below increments of $\pi/4$ (45°). These special angles and the CAST rule are useful in solving trigonometry problems without using a calculator.



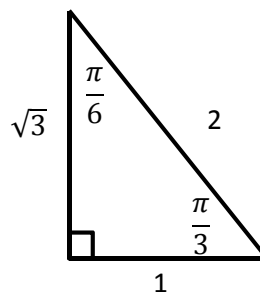
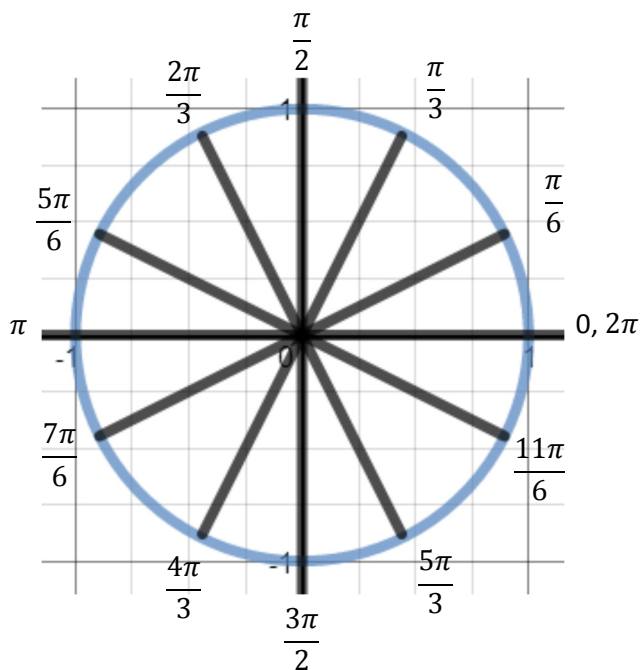
Example: Determine the following exact trigonometric ratios.

a) $\sin \frac{7\pi}{4} =$

b) $\sec \frac{\pi}{4} =$

c) $\tan \frac{3\pi}{4} =$

Special angles between 0 and 2π are displayed on the unit circle below in increments of $\pi/6$ (30°) and/or $\pi/3$ (60°). These special angles and the CAST rule are useful in solving trigonometry problems without using a calculator.



Example: Determine the following exact trigonometric ratios.

a) $\sin \frac{\pi}{6} =$

b) $\tan \frac{2\pi}{3} =$

c) $\cot \frac{5\pi}{3} =$

To solve problems using exact trigonometric ratios, you can use the properties of similar triangles.

Recall: Similar triangles have the same angles and corresponding sides are proportional.

Example: Sarah is flying a kite at the end of a 30m string. The sun is directly overhead and the string makes an angle of $\pi/6$ with the ground. Suddenly the wind speed increases and the kite flies higher until the string makes an angle of $\pi/3$ with the ground.

a) Determine an exact expression for the horizontal distance of the shadow when the kite is in position 1.

b) Determine an exact expression for the horizontal distance of the shadow when the kite is in position 2.

c) Determine an exact expression for the horizontal distance that the shadows moves between the 2 positions of the kite.

d) Determine the approximate distance from part c) to the nearest tenth of a meter.