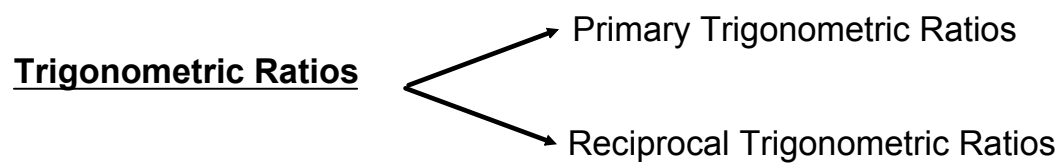


Lesson 4.3 Trigonometric Ratios

Lesson 4.3 Trigonometric Ratios



Primary Trig Ratios

Reciprocal Trig Ratios

sine \longrightarrow

cosine \longrightarrow

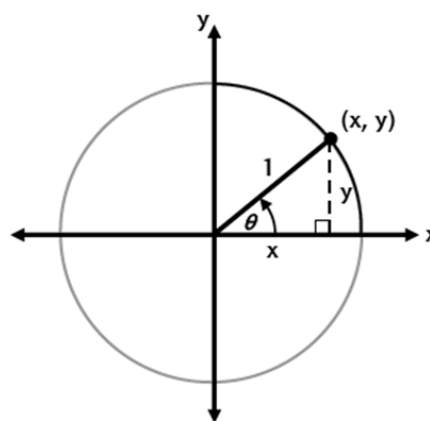
tangent \longrightarrow

Points on the Unit Circle

$\sin \theta$ $\qquad \qquad \qquad \csc \theta$

$\cos \theta$ $\qquad \qquad \qquad \sec \theta$

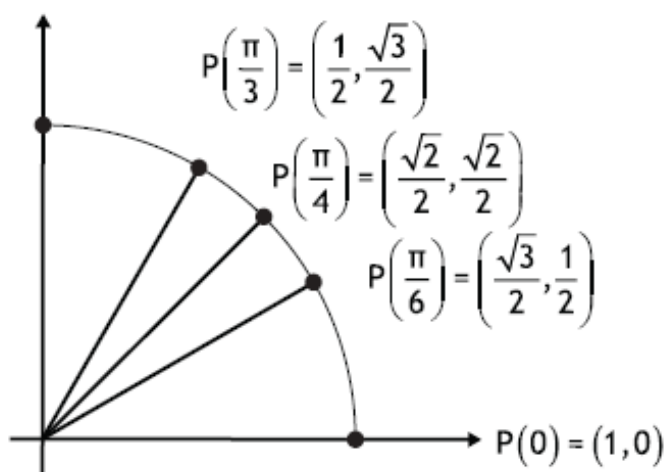
$\tan \theta$ $\qquad \qquad \qquad \cot \theta$



\longrightarrow

Lesson 4.3 Trigonometric Ratios

Review:



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

or

$$\sin \frac{\pi}{6} = \frac{1}{2}$$

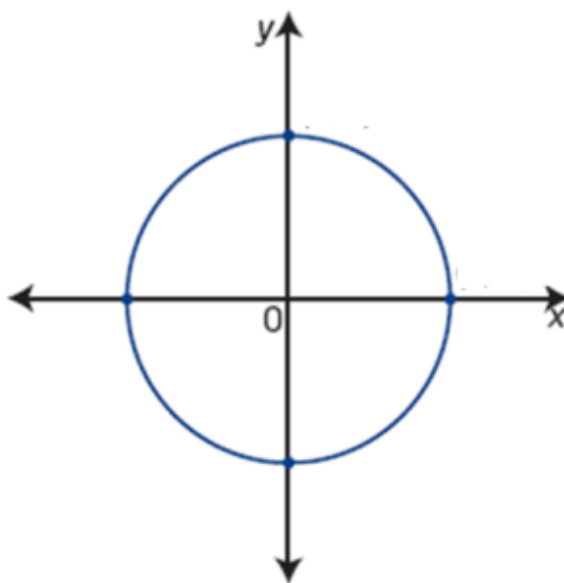
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Lesson 4.3 Trigonometric Ratios

Example:

The point $A(-\frac{3}{5}, -\frac{4}{5})$ lies at the intersection of the unit circle and the terminal arm of an angle θ is in standard position.

- 1) Draw a diagram to model the situation.
- 2) Determine the value of the six trigonometric ratios for θ in lowest terms.



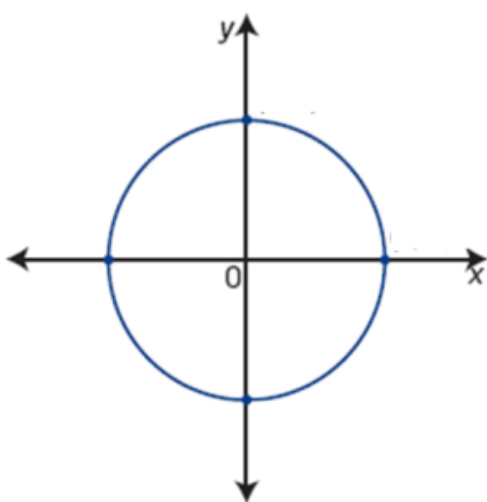
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Lesson 4.3 Trigonometric Ratios

Your Turn

The point $A(-\frac{1}{3}, \frac{2\sqrt{2}}{3})$ lies at the intersection of the unit circle and the terminal arm of an angle θ is in standard position.

- 1) Draw a diagram to model the situation.
- 2) Determine the value of the six trigonometric ratios for θ in lowest terms.



→

Lesson 4.3 Trigonometric Ratios

Exact Values for Trigonometric Ratios

Exact values for the trigonometric ratios can be determined using:

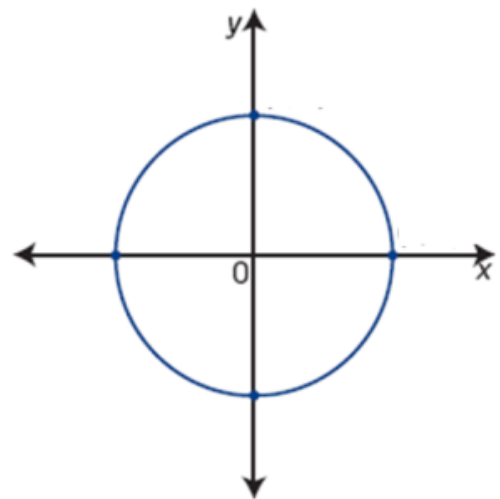
i) the special triangles ($30^\circ - 60^\circ - 90^\circ$ and $45^\circ - 45^\circ - 90^\circ$)

ii) multiples of $\theta = 0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}$ for points $P(\theta)$ unit circle

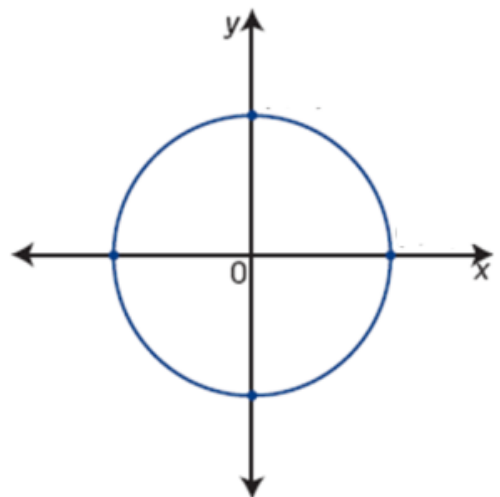
Example:

Determine the exact value for $\cos \frac{5\pi}{6}$.

Method 1: Use Unit Circle



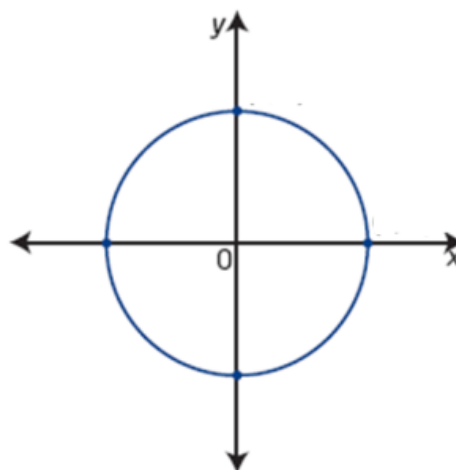
Method 2: Use Reference Angle



Lesson 4.3 Trigonometric Ratios

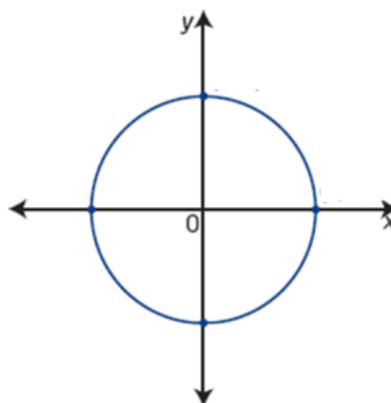
Example:

Determine the exact value for $\sec 315^\circ$.



Example:

Determine the exact value for $\sin -\frac{4\pi}{3}$.

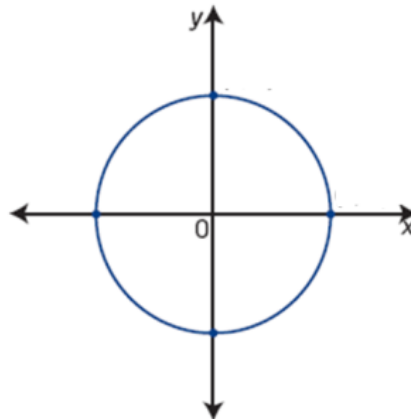


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Lesson 4.3 Trigonometric Ratios

Example:

Determine the exact value for $\cot 270^\circ$.



Example: Determine the exact values for each of the following:

(a) $\sin^2 120^\circ + \cos 135^\circ$

→

Lesson 4.3 Trigonometric Ratios

$$(b) \sin\left(\frac{\pi}{6}\right) + \cos\left(\frac{\pi}{3}\right)$$

$$(c) \cos\left(\frac{5\pi}{6}\right)\sin\left(\frac{5\pi}{3}\right)$$

$$(d) \frac{\sin^2\left(\frac{\pi}{4}\right) - 2\cos\left(\frac{\pi}{6}\right)}{\sin\left(\frac{11\pi}{6}\right)}$$

→

Lesson 4.3 Trigonometric Ratios

Your Turn

$$(a) \sin^2\left(\frac{\pi}{6}\right) + \cos^2\left(\frac{\pi}{6}\right)$$

$$(b) \frac{\cos\left(\frac{5\pi}{6}\right) + \sin\left(\frac{4\pi}{3}\right)}{\csc\left(\frac{\pi}{6}\right) \sin\left(\frac{11\pi}{6}\right)}$$

$$(c) \left(\cos\left(\frac{\pi}{3}\right)\right)^2$$



Lesson 4.3 Trigonometric Ratios

$$(d) \frac{3\sin\left(\frac{\pi}{2}\right) - \cos\pi}{\sin\left(\frac{7\pi}{6}\right)}$$

$$(e) \frac{\sec\left(\frac{5\pi}{4}\right) - \cot\left(\frac{5\pi}{3}\right)}{\sin\left(-\frac{2\pi}{3}\right)}$$

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Lesson 4.3 Trigonometric Ratios

Approximate Values for Trigonometric Ratios

- approximate values for sine, cosine and tangent using a calculator.
The values of csc, sec and cot can be determined using the reciprocal relationship.
- calculator must be in the appropriate mode: degree or radians

Example:

Determine the approximate value for $\cos(260^\circ)$

degree mode

Example:

Determine the approximate value for $\csc(-70^\circ)$

Example:

Determine the approximate value for $\tan\left(\frac{7\pi}{5}\right)$

radian mode

P.201 #2

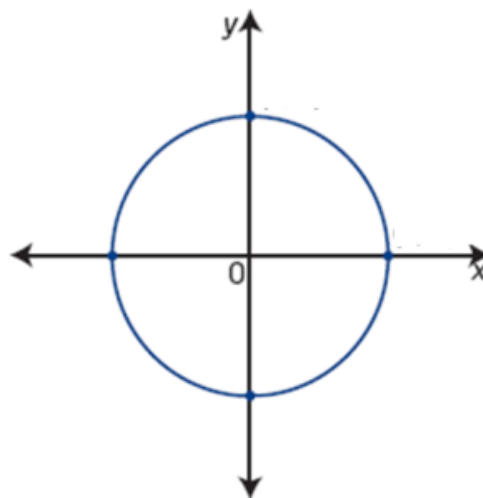
Determine the Angle Measure given the Trigonometric Ratio

Review Math 2200

Determine the value of θ where $-360 \leq \theta \leq 360^\circ$ if $\sin \theta = \frac{1}{2}$.

Think About:

- (1) What is the reference angle?
- (2) In which quadrant does the angle terminate?



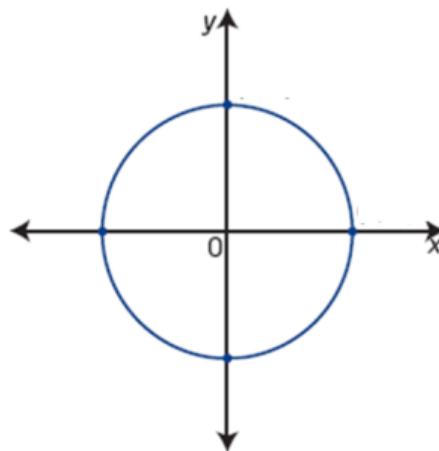
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Lesson 4.3 Trigonometric Ratios

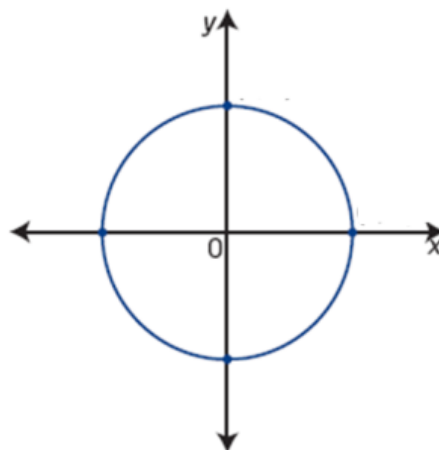
Example:

Determine the measure of all angles that satisfy the following conditions:

(i) $\sin \theta = 0.879$ where $0 \leq \theta \leq 2\pi$



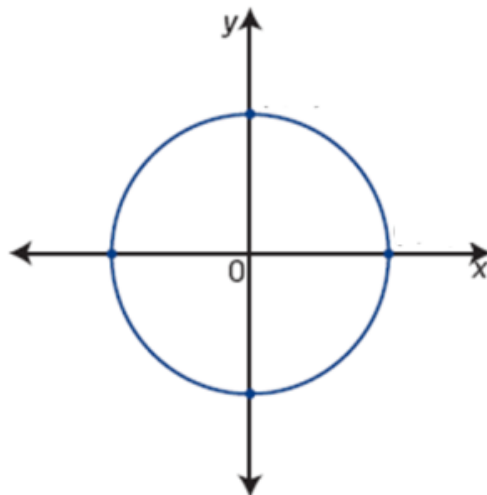
(ii) $\cos \theta = -0.366$ where $0^\circ \leq \theta \leq 360^\circ$



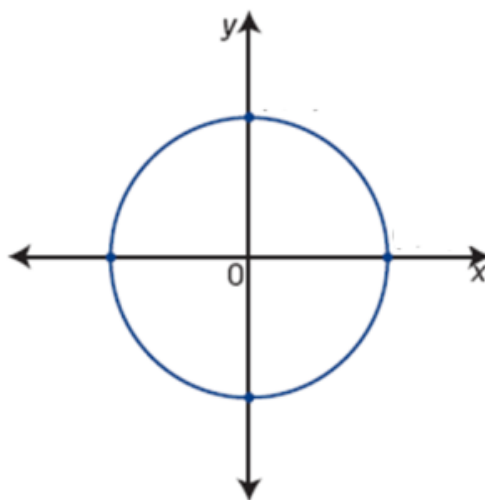
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Lesson 4.3 Trigonometric Ratios

(iii) $\tan \theta = \sqrt{3}$ where $-180^\circ \leq \theta < 180^\circ$



(iv) $\sec \theta = \frac{2}{\sqrt{3}}$ where $-2\pi \leq \theta < 2\pi$

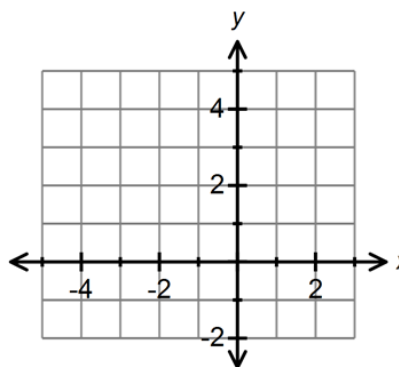


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Calculate Trigonometric Values for Points not on the Unit Circle

Example:

The position $A(-4,3)$ lies on the terminal arm of an angle θ in standard position. What is the exact value of each trigonometric ratio for θ ?



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