

Evaluate

$\sin 210 = -\frac{1}{2}$

$\theta = 30$
 $\sin 30 = \frac{1}{2}$
 + / -

$\sin \theta = -\frac{1}{2}$
 Find θ
 III $\theta = 210^\circ$
 II $\theta = 330^\circ$

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14.4 Solving Trigonometric Equations (17)

You are looking for the angle that satisfies the equation.

You must isolate the variable

You cannot separate the trig from the variable

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Steps

- 1.) Solve for the variable
- 2.) Find the angle that satisfies the equation
 Use Special Right Triangles
 Use Unit Circle Quadrantal Angles
- 3.) Check Positive vs Negative angles ASTC
- 4.) Consider General vs Interval Solutions

$0 \leq x < 2\pi$ just provides solutions

each answer add $\pm 2\pi n$ represents all coterminal answers

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General vs Interval Solutions

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Solve. Provide General Solution:

1.) $2 \sin x - 1 = 0$

$\frac{2 \sin x}{2} = \frac{1}{2}$
 $\sin x = \frac{1}{2}$

@ $x = 30^\circ$ QI
 @ $x = 150^\circ$ QII
 150 has 30 as its θ

$x = 30^\circ, \frac{\pi}{6} \pm 2\pi n$
 $x = 150^\circ, \frac{5\pi}{6} \pm 2\pi n$

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2.)

$5 \tan x - 5 = 0$ over the interval $0 < x < 2\pi$

$\frac{5 \tan x - 5}{5} = \frac{0}{5}$
 $\tan x = 1$

@ $x = 45^\circ, \frac{\pi}{4}$ QI
 @ $x = 225^\circ, \frac{5\pi}{4}$ QIII

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3.) $2\sin x + 1 = 0$
 Interval Solution
 over the interval $0 < x < 2\pi$

$2\sin x + 1 = 0$
 $2\sin x = -1$
 $\sin x = -\frac{1}{2}$

$\textcircled{x = 30^\circ = 0}$

QIII $x = 210^\circ, \frac{7\pi}{6}$
 QIV $x = 330^\circ, \frac{11\pi}{6}$

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4.) $\cos^2 x = \frac{3}{4}$ General Solution

$\sqrt{\cos^2 x} = \sqrt{\frac{3}{4}}$
 $\cos x = \pm \sqrt{\frac{3}{4}}$
 $\pm \frac{\sqrt{3}}{2}$
 $\cos x = \pm \frac{\sqrt{3}}{2}$

QI = $30^\circ, \frac{\pi}{6}$
 QII = $150^\circ, \frac{5\pi}{6}$
 QIII = $210^\circ, \frac{7\pi}{6}$
 QIV = $330^\circ, \frac{11\pi}{6}$

$\pm 2\pi n$

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5.) Provide a general solution:
 $2 \cos x + 1 = 0$

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Solve a trigonometric equation

6.) Solve $2 \sin x - \sqrt{3} = 0$ over the interval $0 < x < 2\pi$

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7.)
 Solve:
 $\tan^2 x - 4 = 0$ in the interval $0 \leq x < 2\pi$

$4 \tan^2 x = 4$
 $\tan^2 x = 1$
 $\tan x = \pm 1$

$\theta = 45^\circ$
 135°
 225°
 315°

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8.) $6 \cos x - 6 = 0$ Provide a general solution

$6 \cos x = 6$
 $\cos x = 1$ what \angle has 1 as its cosine?
 $\textcircled{x = 90^\circ \pm 2\pi n}$

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9.) $3\csc^2x = 4$ Provide a solution over the interval $0 < x < 2\pi$

Feb 19-8:36 AM

What have we done to get to the point we could look for the angle? (i.e. Solving techniques)

What kind of solutions have we had so far?

How many solutions per problem?

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CONCEPT SUMMARY *For Your Notebook*

Degree and Radian Measures of Special Angles

The diagram shows equivalent degree and radian measures for special angles from 0° to 360° (0 radians to 2π radians). You may find it helpful to memorize the equivalent degree and radian measures of special angles in the first quadrant and for $90^\circ = \frac{\pi}{2}$ radians. All other special angles are just multiples of these angles.

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Multiple Choice What is a solution of the equation $4 \cos x + 2 = 0$?

(A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{5\pi}{3}$
 (D) $\frac{\pi}{4}$ (E) $\frac{3\pi}{4}$

Multiple Choice What is a solution of the equation $6 \cos x - 6 = 0$?

(A) $\frac{\pi}{4}$ (B) $\frac{2\pi}{3}$ (C) $\frac{3\pi}{4}$
 (D) $\frac{\pi}{2}$ (E) $\frac{5\pi}{6}$

Multiple Choice What is a solution of the equation $5 \tan x - 5 = 0$?

(A) $-\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $-\frac{3\pi}{4}$
 (D) $\frac{\pi}{12}$ (E) $-\frac{4\pi}{5}$

Multiple Choice What is an approximate solution of the equation $1 - 3 \sin^2 x = 0$?

(A) 0.583 (B) 0.615 (C) 0.672
 (D) 0.774 (E) 0.832

Multiple Choice What is a solution of the equation $\sin x = \sqrt{3} \cos x$?

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{2\pi}{3}$
 (D) $\frac{\pi}{4}$ (E) $\frac{5\pi}{4}$

Multiple Choice What is an approximate solution of the equation $2 \tan^2 x - 3 = 0$?

(A) 0.8423 (B) 0.8571
 (C) 0.8725 (D) 0.8861
 (E) 0.8973

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