Example 1: Consider the equation \( \sin \theta = \frac{\sqrt{3}}{2} \).

(a) Is \( \theta = 60^\circ \) a solution of this equation?

(b) Is \( \theta = 420^\circ \) a solution of this equation?

(c) Is \( \theta = 780^\circ \) a solution of this equation?

(d) Is \( \theta = -300^\circ \) a solution of this equation?

(e) Is \( \theta = -660^\circ \) a solution of this equation?

Result. Trigonometric equations have an infinite number of solutions: the solutions between 0\(^\circ\) and 360\(^\circ\), and any multiple of 360\(^\circ\) added to these solution.

Example 2: Solve for \( \theta \) (give all solutions): \( \sin \theta = \frac{\sqrt{3}}{2} \)
Example 3: Solve for $\theta$, $0^\circ \leq \theta < 360^\circ$: $\cos \theta = -\frac{1}{2}$

Example 4: Solve for $\theta$. Give all solutions AND those for which $0^\circ \leq \theta < 360^\circ$:

(a) $\sin \theta = \frac{1}{2}$

(b) $\tan \theta = -1$
(c) $\sec \theta = -2$

(d) $\sin \theta = 1$

(e) $\cos \theta = 0$
Example 5: Use your calculator to solve for $\theta$, $0^\circ \leq \theta < 360^\circ$. Give answers to two decimal places:

(a) $\sin \theta = 0.7$

(b) $\tan \theta = 5$

(c) $\cos \theta = 0.34$
(d) \( \sin \theta = -0.225 \)

(e) \( \tan \theta = -11.5 \)

(f) \( \cos \theta = -0.511 \)
Example 6: Solve for $\theta$, $0^\circ \leq \theta < 360^\circ$:

(a) $\tan(2\theta) = \frac{1}{\sqrt{3}}$

(b) $\sin(3\theta) = \frac{\sqrt{3}}{2}$

(c) $\sec(5\theta) = -\sqrt{2}$
Example 7: Solve each equation. If the variable is $\theta$, find all solutions for which $0^\circ \leq \theta < 360^\circ$. If the variable is $x$, find all solutions for which $0 \leq x < 2\pi$.

(a) $2 \sin \theta + 1 = 0$

(b) $4 \sec x + 8 = 0$
(c) \[2 \sin(3\theta) - \sqrt{3} = 0\]

(d) \[\cos(4x) = 1\]
(e) \[ 2 \cos(3x) + \sqrt{2} = 0 \]

(f) \[ \sin x \cos x - \sin x = 0 \]
(g) \( \sin x \tan x = \sin x \)

(h) \( 2 \cos^2 x + \cos x - 1 = 0 \)
(i) \[ 4 \sin^2 \theta - 5 \sin \theta + 1 = 0 \]

(j) \[ \sin^2 \theta - \cos^2 \theta + \cos \theta = 0 \]
(k) \( \sec^2 x + \tan^2 x = 3 \)

(l) \( 4 \sin x = \csc x \)
(m) \( \cos \theta - \cot \theta = 0 \)

(n) \( \tan x - \cot x = 0 \)
(o) \[ \sin x = \cos x \]

(p) \[ \sin x + \cos x = 0 \]
(q) \[ \sin(2x) - \cos x = 0 \]

(r) \[ \cos^2 x - \sin^2 x = 1 \]
(s) \( \sec \theta - \tan \theta - \cos \theta = 0 \)

(t) \( \cos x + 1 = \sin x \)