PreCalculus
Solving Trig Equations

Name: KEY

Solving a Quadratic Equation in Algebra …

If x^2 is the only variable, then get x^2 by itself & take a $\sqrt{}$. (Don't forget $\pm$)

If there is a x^2 AND a x but no constant term, then factor out an x.

If there is a x^2 AND a x AND a constant term, then factor the quadratic (use the box)

Solve each equation on the inverval [0,2π).

1. $2\sin^2(x) - 5\sin(x) + 2 = 0$

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

$2\sin x = 1$ $\quad$ $\sin x = 2$ (not possible)

$\sin x = 1/2$

$x = \pi/6$ or $5\pi/6$

2. $\sin^2(x) - 2\sin(x) - 3 = 0$

$(\sin x - 3)(\sin x + 1) = 0$

$\sin x = 3$ (not possible) $\quad$ $\sin x = -1$

$x = 3\pi/2$

3. $4\cos(x) - \sqrt{3} = 2\cos(x)$

$2\cos x = \sqrt{3}$

$\cos x = \sqrt{3}/2$

$x = \pi/6$ or $11\pi/6$

4. $2\cos^2(x) - 1 = 0$

$2\cos^2 x = 1$

$\cos^2 x = 1/2$

$\cos x = \pm \frac{1}{\sqrt{2}}$

$x = \pi/4, 3\pi/4, 5\pi/4, 7\pi/4$

Solve each equation for all values of x.

5. $\sin(x) - \sin(x)\cos(x) = 0$

$\sin x (1 - \cos x) = 0$

$\sin x = 0$ or $1 - \cos x = 0$

$x = 0, \pi$ $\quad$ $1 = \cos x$

$x = 0$

$x = 0 + k \cdot 2\pi$ $\quad$ $x = \pi + k \cdot 2\pi$ $\quad$ $x = 0 + k \cdot \pi$

6. $\tan^2(x) + \tan(x) = 0$

$\tan x (\tan x + 1) = 0$

$\tan x = 0$ $\quad$ $\tan x = -1$

$x = 0, \pi$ $\quad$ $x = 3\pi/4$ or $7\pi/4$

$x = 0 + k \cdot 2\pi$ $\quad$ $x = \pi + k \cdot 2\pi$ $\quad$ $x = 3\pi/4 + k \cdot 2\pi$ $\quad$ $x = 7\pi/4 + k \cdot 2\pi$

$x = k \cdot \pi$, $x = \frac{3\pi}{4} + k\pi$

7. $3\cos^2(x) + \cos(x) = 2$

$3\cos^2(x) + \cos(x) - 2 = 0$

$(3\cos(x) - 2)(\cos x + 1) = 0$

$\cos x = 2/3$ $\quad$ $\cos x = -1$

$x = \cos^{-1}(2/3) \approx .841$ $\quad$ $x = \pi$

$x \approx 5.442$

$x = .841 + k \cdot 2\pi$ or $5.442 + k \cdot 2\pi$ $\quad$ $x = \pi + k \cdot 2\pi$

8. $3\sin(t) = 2\cos^2(t)$

$3\sin(t) = 2(1 - \sin^2(t))$

$3\sin t = 2 - 2\sin^2 t$

$2\sin^2 t + 3\sin t - 2 = 0$

$(2\sin t - 1)(\sin t + 2) = 0$

$\sin t = 1/2$ $\quad$ $\sin t = -2$ (not possible)

$t = \pi/6, 5\pi/6$

$t = \frac{\pi}{6} + k \cdot 2\pi$

$t = \frac{5\pi}{6} + k \cdot 2\pi$