14-4 Using Identities in Trig Equations

we already know these:

$\csc\theta = \dfrac{1}{\sin\theta}$

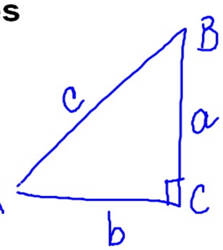
$\sec\theta = \dfrac{1}{\cos\theta}$

$\cot\theta = \dfrac{1}{\tan\theta}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$

$\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

Pythagorean Identities



$\left(\dfrac{a}{c}\right)^2 + \left(\dfrac{b}{c}\right)^2 = \dfrac{a^2+b^2}{c^2} = \dfrac{c^2}{c^2} = 1$

1. $\sin^2 A + \cos^2 A = 1$

$\sin^2 A = 1 - \cos^2 A$

$\cos^2 A = 1 - \sin^2 A$

2. $1 + \cot^2 A = \csc^2 A$

$1 = \csc^2 A - \cot^2 A$

$\cot^2 A = \csc^2 A - 1$

3. $\tan^2 A + 1 = \sec^2 A$

$\tan^2 A = \sec^2 A - 1$

$1 = \sec^2 A - \tan^2 A$

1 **Solve over** $0 \le x < 2\pi$

$$2\cos^2 x - \sin x - 1 = 0$$

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

$2 - 2\sin^2 x - \sin x - 1 = 0$

$-2\sin^2 x - \sin x + 1 = 0$

$2\sin^2 x + \sin x - 1 = 0$ $\quad 2y^2 + y - 1 = 0$

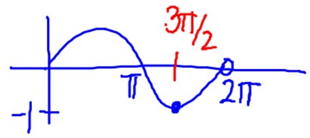
$(2\sin x - 1)(\sin x + 1) = 0$

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

Q1, Q2 $\quad$ $x = 270°$

30°, 150° $\quad$ $\frac{3\pi}{2}$

$\frac{\pi}{6}, \frac{5\pi}{6}$



2 **Solve over** $0° \le x < 360°$

$$\csc^2 x - \cot^2 x = \tan^2 x - 8$$

$(1 + \cot^2 x) - \cot^2 x = \tan^2 x - 8$

$1 = \tan^2 x - 8$

$9 = \tan^2 x$

$\pm 3 = \tan x$

Q1 Q2 Q3 Q4

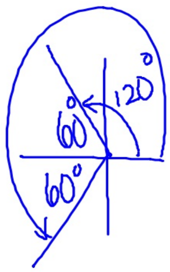
71.6°, 108.4°, 251.6°, 288.4°

3 Solve over $0 \le x < 2\pi$ 360°

Double angle

$\cos 2x = \frac{-1}{2}$

$\cos y = -\frac{1}{2}$



	1st rotation	2nd rotation
	Q2 Q3	Q2 Q3
y (2x) =	120°, 240°	480°, 600°
x =	60°, 120°	240°, 300°

$\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$