

L7 – 5.4 Solve Quadratic Trigonometric Equations

MHF4U

A quadratic trigonometric equation may have multiple solutions in the interval $0 \leq x \leq 2\pi$.

You can often **factor** a quadratic trigonometric equation and then solve the resulting two linear trigonometric equations. In cases where the equation cannot be factored, use the **quadratic formula** and then solve the resulting linear trigonometric equations.

You may need to use a Pythagorean identity, compound angle formula, or double angle formula to create a quadratic equation that contains only a single trigonometric function whose arguments all match.

Remember that when solving a linear trigonometric equation, consider all 3 tools that can be useful:

1. Special Triangles
2. Graphs of Trig Functions
3. Calculator

Part 1: Solving Quadratic Trigonometric Equations

Example 1: Solve each of the following equations for $0 \leq x \leq 2\pi$

a) $(\sin x + 1) \left(\sin x - \frac{1}{2} \right) = 0$

b) $\sin^2 x - \sin x = 2$

c) $2\sin^2 x - 3\sin x + 1 = 0$

Part 2: Use Identities to Help Solve Quadratic Trigonometric Equations

Example 2: Solve each of the following equations for $0 \leq x \leq 2\pi$

a) $2\sec^2 x - 3 + \tan x = 0$

b) $3 \sin x + 3 \cos(2x) = 2$