

NOTES: SECONDARY 2H
Unit 9: Solving Trigonometric Equations

Solve the following for the unknown:

1. $2x - 1 = 0$	2. $4x^2 - 3 = 0$	3. $9x^2 - 25 = 0$
4. $2x^2 + 5x - 12 = 0$	5. $\sin 30^\circ = x$	6. $\sin 150^\circ = x$

Question:

- How many answers do you have to the problem $\sin \theta = \frac{1}{2}$?
- How many answers would you have if I restricted your solutions to $0^\circ \leq \theta \leq 360^\circ$?

When solving trigonometric equations, there a couple of steps we can follow.

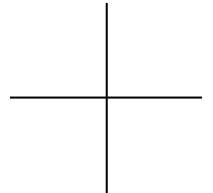
STEP #1: Solve for the trigonometric equation. (So the only term on one side of the equal sign is a trigonometric function and everything else is on the other side.)

STEP #2: Determine what two quadrants your solution will fall in. (Between $0^\circ \leq \theta \leq 360^\circ$, there will always be two quadrants.)

STEP #3: Solve for your reference angle using the table of the 9 basic trig functions.

STEP #4: Using the reference angle in #3 and the quadrants in #2, write your final solution.

Remember, your answer should be a positive angle between 0° and 360° .



Example 1: Find the values of x if $0^\circ \leq x \leq 360^\circ$.

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

b. $\sin x + \sqrt{2} = -\sin x$

c. $2 \tan x + 2\sqrt{3} = 0$

d. $2 \cos x + \sqrt{3} = 0$

Sometimes, we need to factor before we can solve.

Example 2: Find the values of θ if $0^\circ \leq \theta \leq 360^\circ$.

a. $\cos \theta - \cos \theta \sin \theta = 0$

b. $\sin^2 \theta - 2 \sin \theta = 0$

c. $2 \sin \theta + \sin \theta = 1$

d. $2 \cos^2 x + \cos x - 1 = 0$

CHALLENGE PROBLEMS:

a. $\frac{\cos^3 x}{\sin x} = \cot x$

b. $2 \sin^2 x - 3 \cos x = 0$