Name: _____ Date: _____

Learning Goal 4.2	Solving first- and second-degree equations over restricted domains and all real numbers.

When solving a quadratic equation,

1. Factor and set each bracket equal to zero
2. Completing the square.
3. Quadratic Formula.

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$x^2+2x=8$

$x^2+2x-8=0$

$+4 \times -2 = -8$

$+4 + -2 = 2$

$(x+4)(x-2)=0$

$x+4=0 \quad x=-4$

$x-2=0 \quad x=2$

$x^2+2x=8$

$1x^2+2x-8=0$ (a, b, c)

$$= \frac{-2 \pm \sqrt{(2)^2-4(1)(-8)}}{2(1)}$$

$$= \frac{-2 \pm \sqrt{4+32}}{2}$$

$$= \frac{-2 \pm \sqrt{36}}{2}$$

$$= \frac{-2 \pm 6}{2}$$

$x_+ = \frac{4}{2} = 2$

$x_- = \frac{-8}{2} = -4$

Example Solve $\tan^2\theta - 5\tan\theta + 4 = 0$ for $0 \le \theta < 360°$. Give solutions as exact values where possible. Otherwise give approximate angle measures to the nearest hundredth of a degree.

$x^2-5x+4=0$

$-4 \times -1 = 4$

$-4 + -1 = -5$

$(x-4)(x-1)=0$

$x-4=0 \quad x=4$

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

$-4 \times -1 = 4$

$-4 + -1 = -5$

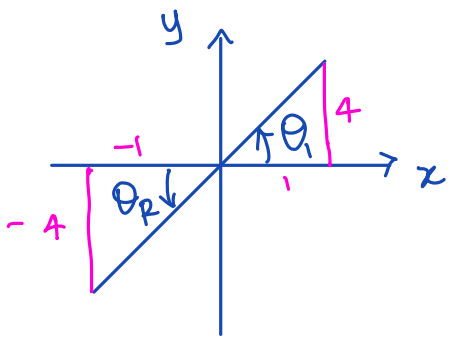
$(\tan\theta-4)(\tan\theta-1)=0$

$\tan\theta-4=0$

① $\tan\theta=4=\frac{y}{x}$

$\tan\theta-1=0$

$\tan\theta=1=\frac{y}{x}$ ②

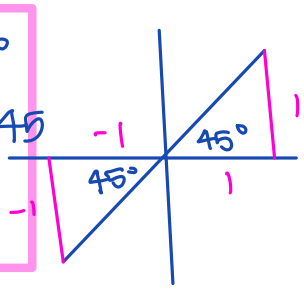


$\theta_1 = 76° = \theta_R$

$\theta_2 = 180 + 76 = 256°$

$\theta_3 = 45°$

$\theta_4 = 180 + 45 = 225°$



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Example Solve for x in the interval $0 \leq x < 2\pi$ if $\sin^2 x - 1 = 0$. Give answers in exact values.

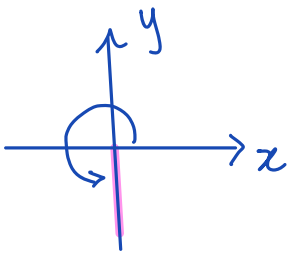
$(\sin x + 1)(\sin x - 1) = 0$

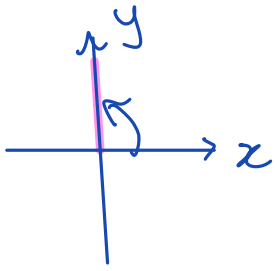
$\sin x + 1 = 0$ $\quad$ $\sin x - 1 = 0$

$\sin x = -1 = \frac{y}{r}$ $\quad$ $\sin x = 1 = \frac{y}{r}$

if $y = r$ then $x = 0$

$x_1 = \frac{3\pi}{2}$ $\quad$ $x_2 = \frac{\pi}{2}$





How would the answer change if the domain given was $0° \leq 0 < 360°$?

$x_1 = 270°$ $\quad$ $x_2 = 90°$

Example Solve the following second – degree trigonometric equations on the specified domain. Give exact values where possible. Otherwise give approximate measures to the nearest hundredth.

a. $\cos^2 x - \cos x = 2, \quad -2\pi \leq x < 2\pi$

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

$-2 \times 1 = -2$

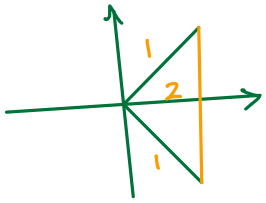
$-2 + 1 = -1$

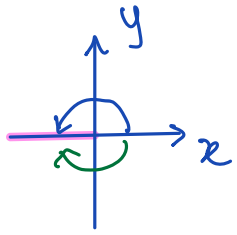
$(\cos x - 2)(\cos x + 1) = 0$

$\cos x - 2 = 0$ $\quad$ $\cos x + 1 = 0$

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

DNE $\quad$ ↑ radius is on the x-axis





$\theta_1 = \pi$

$\theta_2 = -\pi$

b. $6\cos^2\theta + \cos\theta = 1, 0° \leq \theta < 360°$

$6x^2 + x - 1 = 0$

$-2 \times 3 = -6$

$-2 + 3 = 1$

$6x^2 - 2x + 3x - 1 = 0$

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

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

$3x - 1 = 0$

$+1 \quad +1$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

$\cos\theta = \frac{1}{3}$

$\theta_1 = 71°$

$\theta_2 = 360 - 71 = 289°$

$2x + 1 = 0$

$-1 \quad -1$

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

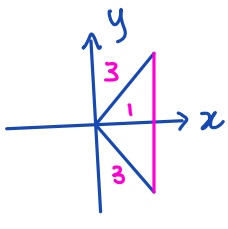
$x = -\frac{1}{2}$

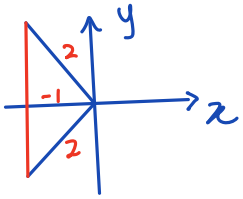
$\cos\theta = -\frac{1}{2}$

$\theta = 60°$

$\theta_3 = 180 - 60 = 120°$

$\theta_4 = 180 + 60 = 240°$





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