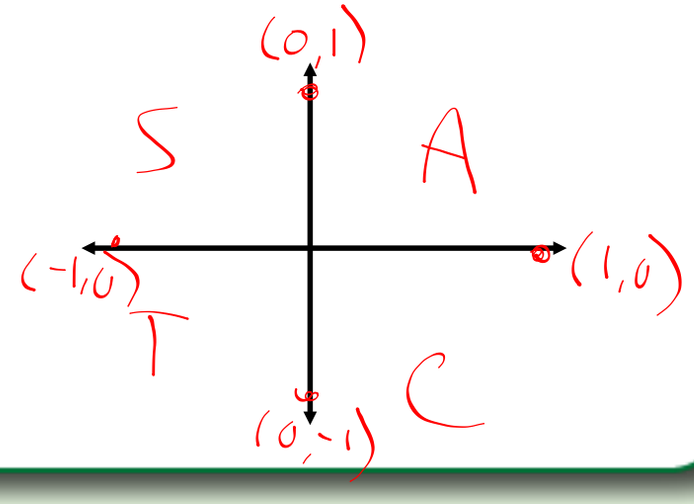
Notes 3.2 - Solving Advanced Trig Equations

* WARM UP *

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und



Notes 3.2 - Solving Advanced Trig Equations

* EXPLORATION *

Before we begin...

$$\sin^2\theta = (\sin\theta)^2$$

Notes 3.2 - Solving Advanced Trig Equations

* EXPLORATION *

What is the solution to the trig function below?

$$1+\sin^2\theta = 5\sin^2\theta$$

$-\sin^2\theta \quad -\sin^2\theta$

$$\frac{1}{4} = \frac{4\sin^2\theta}{4}$$

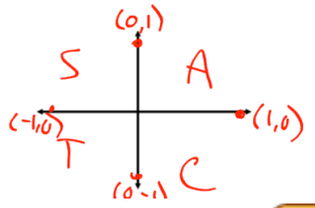
$$\sqrt{\frac{1}{4}} = \sqrt{\sin^2\theta}$$

$$\sqrt{\frac{1}{4}} = \sqrt{(\sin\theta)^2}$$

$$\pm\frac{1}{2} = \sin\theta$$

$$\sin\theta = -\frac{1}{2} \qquad \sin\theta = \frac{1}{2}$$

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	UND

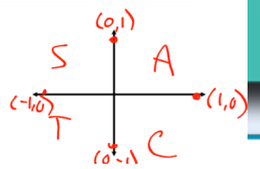


$0 \le \theta < 2\pi$

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

Notes 3.2 - Solving Advanced Trig Equations

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	UND



Solving trig equations w/ square roots.

$$-4\cos^2\theta - 3 = -6$$

$+3 \quad +3$

$$\frac{-4\cos^2\theta}{-4} = \frac{-3}{-4}$$

$$\sqrt{\cos^2\theta} = \sqrt{\frac{3}{4}}$$

$$\cos\theta = \pm\frac{\sqrt{3}}{2}$$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

$$2 + 2\csc^2\theta = 3\csc^2\theta$$

$-2\csc^2\theta \quad -2\csc^2\theta$

$$2 = \csc^2\theta$$

$$\sqrt{\frac{1}{2}} = \sqrt{\sin^2\theta}$$

$$\pm\frac{\sqrt{2}}{2} = \sin\theta$$

$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Notes 3.2 - Solving Advanced Trig

EXPLORATION *

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und

What is the solution to the trig function below?

$$2\cot\theta = -\sqrt{3}\cos\theta + 3\cos\theta\cot\theta + 2\cot\theta$$

$$0 = -\sqrt{3}\cos\theta + 3\cos\theta\cot\theta$$

$$0 = \cos\theta(-\sqrt{3} + 3\cot\theta)$$

$\cos\theta = 0$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

$-\sqrt{3} + 3\cot\theta = 0$

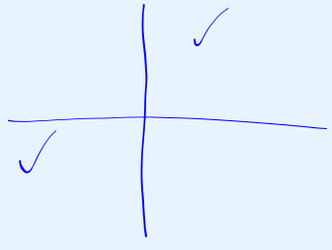
$+\sqrt{3} \qquad +\sqrt{3}$

$\frac{3\cot\theta}{3} = \frac{\sqrt{3}}{3}$

$\cot\theta = \frac{\sqrt{3}}{3}$

$\tan\theta = \sqrt{3}$

$\theta = \frac{\pi}{3}, \frac{4\pi}{3}$



$\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{4\pi}{3}$

$$0 = (2x-3)(x-5)$$

$$x = 5$$

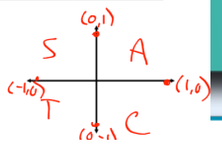
$$x = \frac{3}{2}$$

$$2x-3=0$$
$$+3 \quad +3$$
$$x = \frac{3}{2}$$

$$x-5=0$$
$$+5 \quad +5$$

Notes 3.2 - Solving Advanced Trig Equations

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	und



Solving trig equations w/ factoring.

$\sqrt{2}\tan\theta - 3\sin\theta = -2\tan\theta\sin\theta - 3\sin\theta$

$+2\tan\theta\sin\theta$

$\sqrt{2}\tan\theta + 2\tan\theta\sin\theta = 0$

$\tan\theta(\sqrt{2} + 2\sin\theta) = 0$

$\tan\theta = 0$

$\theta = 0, \pi$

$\sqrt{2} + 2\sin\theta = 0$

$-\sqrt{2} \quad -\sqrt{2}$

$\frac{2\sin\theta}{2} = \frac{-\sqrt{2}}{2}$

$\sin\theta = -\frac{\sqrt{2}}{2}$

$\theta = \frac{5\pi}{4}, \frac{7\pi}{4}$

✓	
✓	✓

$-3\sec\theta - 3 = -\sec^2\theta + 5$

$3\sec\theta + 3 = -\sec^2\theta + 5$

$+\sec^2\theta \quad +\sec^2\theta$

$\sec^2\theta - 3\sec\theta + 2 = 0$

$(\sec\theta - 2)(\sec\theta - 1) = 0$

$\sec\theta - 2 = 0$ | $\sec\theta - 1 = 0$

$\sec\theta = 2$ | $\sec\theta = 1$

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

✓	
✓	

$\theta = \frac{\pi}{3}, \frac{5\pi}{3}$ | $\theta = 0$