

Consider  $\sin x = \frac{1}{2}$

How many solutions are there?

Graph  $y_1 = \sin x$   
and graph  $y_2 = \frac{1}{2}$

Suggestion: Be in Radian mode and use  
Zoom Trig

Page 1

$$y = \sin x$$

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

Solve.

$$\sin x - .5 = 0$$

$$\sin x = .5$$

$a \cdot b = 0$   
 $a = 0 \quad b = 0$   
P. 464-465

Ch 7  
Sec 6

Page 2

EQ: How are trigonometric equations solved?

Ch 7  
Sec 6  
P. 461

Page 3

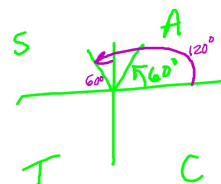
## Solving Trig Equations Ch 7 Section 6

Examples:

$$2 \sin x = \sqrt{3}$$

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

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



- \* Find the angles between 0 and  $2\pi$  that make the equation true.
- \* Express answers in radians.

Page 4

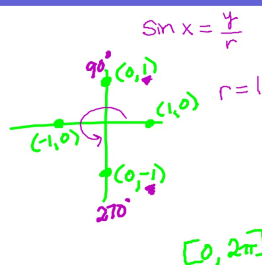
$$\sin^2 x - 1 = 0$$

$$+1 \quad +1$$

$$\sin^2 x = 1$$

$$\sin x = \pm 1$$

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



Alt. Approach

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

$$\sin x + 1 = 0$$

$$\sin x = -1$$

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

$$\sin x - 1 = 0$$

$$\sin x = 1$$

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

$$a \cdot b = 0$$

$$a = 0 \quad b = 0$$

Page 5

$$3. \quad 3 \tan^2 x - 1 = 0$$

$$3 \tan^2 x = 1$$

$$\tan^2 x = \frac{1}{3}$$

$$\tan x = \pm \sqrt{\frac{1}{3}} = \pm \frac{1}{\sqrt{3}} = \pm \frac{\sqrt{3}}{3}$$

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



Page 6

Try #2

If you finish #2, go on to #1 and #4

Page 7

Try #2 + 10 → hint:  $2y^2 + 3y + 1 = 0$   
 $(2y+1)(y+1) = 0$

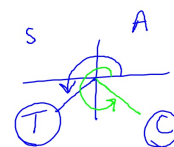
②  $\sin x + \sqrt{2} = -\sin x$

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

$2\sin x = -\sqrt{2}$

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

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



Page 8

Homework: Cream Wkt #1, 4, 9, 10

Page 9

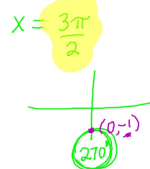
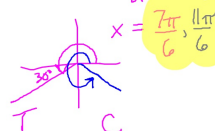
⑩  $2\sin^2 x + 3\sin x + 1 = 0$

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

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

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

$\sin x = -1$



Page 10

⑤  $2\cos 3x - 1 = 0$

$2\cos 3x = 1$

$\cos 3x = \frac{1}{2}$

Graph:  $y_1 = \cos x$   $y_2 = .5$   $[0, 2\pi]$

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

$x = \frac{\pi}{9}, \frac{5\pi}{9}$

$3x = \frac{5\pi}{3}$

$x = \frac{5\pi}{9}, \frac{11\pi}{9}, \frac{17\pi}{9}$

$\left\{ \frac{\pi}{9}, \frac{5\pi}{9}, \frac{7\pi}{9}, \frac{11\pi}{9}, \frac{13\pi}{9}, \frac{17\pi}{9} \right\}$

$\frac{\pi}{9} + \frac{2\pi}{3} = \frac{\pi}{9} + \frac{6\pi}{9} = \frac{7\pi}{9} + \frac{6\pi}{9} = \frac{13\pi}{9}$

Page 11