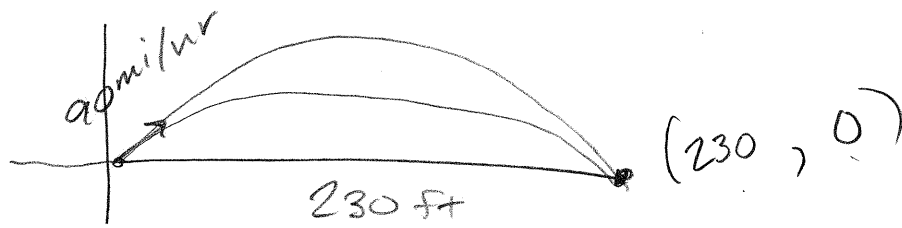


#63

11/2/12 - Sec 4.4

Math 1060



$$\frac{90 \cancel{\text{mi}}}{\cancel{\text{hr}}} \cdot \frac{1 \text{ hr}}{60 \cancel{\text{min}}} \cdot \frac{1 \cancel{\text{min}}}{60 \text{ sec}} \cdot \frac{5280 \text{ ft}}{1 \cancel{\text{mi}}}$$

$$\frac{90 \cdot 5280 \cancel{\text{ft}}}{60 \cdot 60 \cancel{\text{sec}}} = 132 \text{ ft/sec}$$

$$V_0 = 132 \text{ ft/sec}$$

$$d = 230 \text{ ft}$$

$$V_0^2 \sin 2\theta = 32d$$

$$\frac{132^2 \sin 2\theta = 32(230)}{132^2}$$

$$\sin 2\theta = 0.42$$

$$2\theta = \sin^{-1}(\downarrow)$$

$$2\theta = 24.9866$$

$$\frac{2}{2} \quad \frac{24.9866}{2}$$

$$\theta = 12.4933^\circ$$

$$x = V_0 t \cos \theta$$

$$\theta = 12.4933$$

$$\theta = 77.5067$$

$$230 = \frac{132 t \cos 12.4933}{132 \cos 12.4933}$$

$$t = \frac{230}{132 \cos 12.4933}$$

$$t = 1.7847 \text{ sec}$$

$$t = \frac{230}{132 \cos 77.5067}$$

$$t = 8.0546$$

$$\text{time saved: } 8.0546 - 1.7847 = 6.27 \text{ sec}$$

$$2\theta = 180 - 24.9866$$

$$\frac{2\theta}{2} = \frac{155.0134}{2}$$

$$\theta = 77.5067^\circ$$

# Sec 4.4 Trig Equations of Quadratic Type

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

How to solve?  $ax^2 + bx + c = 0$

factor

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

$$\tan^2 x + 3 \tan x + 2 = 0$$

$$\left\{ \begin{array}{l} u^2 + 3u + 2 = 0 \\ (u+1)(u+2) = 0 \end{array} \right.$$

$$u = \tan x$$

$$u^2 = \tan^2 x$$

$$\rightarrow (\tan x + 1)(\tan x + 2) = 0$$

$$\tan x + 1 = 0$$

$$\tan x = -1$$

$$x = -\frac{\pi}{4} + \pi k$$

$$\tan x + 2 = 0$$

$$\tan x = -2$$

$$x = \tan^{-1}(-2) + \pi k$$

$$x = -1.1071 + \pi k$$



$$x = -\frac{\pi}{4} + \pi k$$

$$x = -1.1071 + \pi k$$

Solve  $\sin(2x) = \cos(x)$  for  $(0, 2\pi)$

$$2\sin x \cos x = \cos x$$

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

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

$$\cos x = 0$$

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

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

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

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

$$x = \frac{\pi}{6} + 2\pi k$$

$$x = \frac{5\pi}{6} + 2\pi k$$

$$\left\{ x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{3\pi}{2} \right\}$$

$$\cos^2 x - 3\sin x = -2$$

between  $0 \leq x \leq 360^\circ$

$$\cos^2 x - 3\sin x + 2 = 0$$

$$[-\sin^2 x - 3\sin x + 2] = 0$$

$$\frac{-\sin^2 x}{-1} - \frac{3\sin x}{-1} + \frac{2}{-1} = 0$$

$$\sin^2 x + 3\sin x - 3 = 0$$

$$a = 1 \quad b = 3 \quad c = -3$$

$$\sin x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-3)}}{2(1)}$$

$$\sin x = \frac{-3 \pm \sqrt{9 + 12}}{2}$$

$$\sin x = \frac{-3 \pm \sqrt{21}}{2}$$

~~$$\begin{aligned}\sin x &= -5.291288 \\ &= -3.791288\end{aligned}$$~~

~~$$\sin x = 0.791222$$~~  
$$= 0.791288$$

$$x = \sin^{-1}(0.791288)$$

$$x = 52.306 + 360k$$

$$x = 180 - 52.306$$

$$x = 127.694 + 360k$$

$127.694, 52.306$

## Strategies to Solve

1. Know how to solve

$$\sin x = a, \quad \cos x = a, \quad \tan x = a$$

2. Solve an angle with multiple angles as if it had a single variable

3. Simplify equations using identities

Try to get an equation involving one trig function and one type of angle

4. If possible factor different trig functions into separate factors
  5. For Equations of Quadratic type use Quadratic formula
  6. Square each side if necessary so that identities involving squares can be applied
- Note: Remember to check answers for extraneous solutions