## <u>Concept</u>

Methods for Solving a Quadratic Equation

Square Root Property: Best method for quadratic equations of the form  $a(x-h)^2 + k = 0$  and  $ax^2 + c = 0$ .

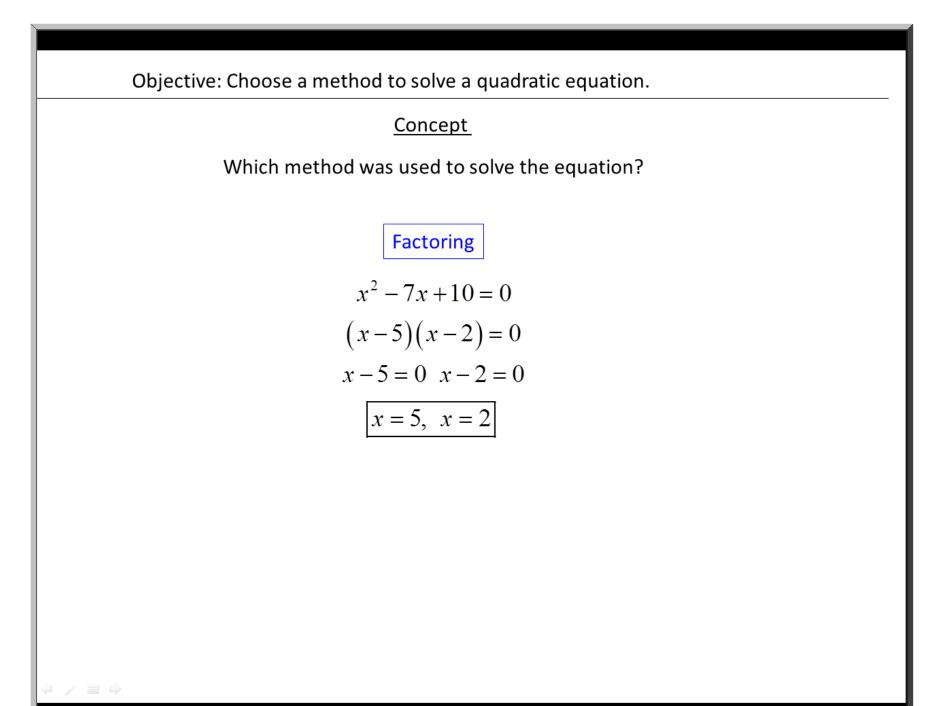
**<u>Complete the Square</u>**: Best method for quadratic equations of the form  $x^2 + bx + c = 0$  that cannot be factored and where b is an even number.

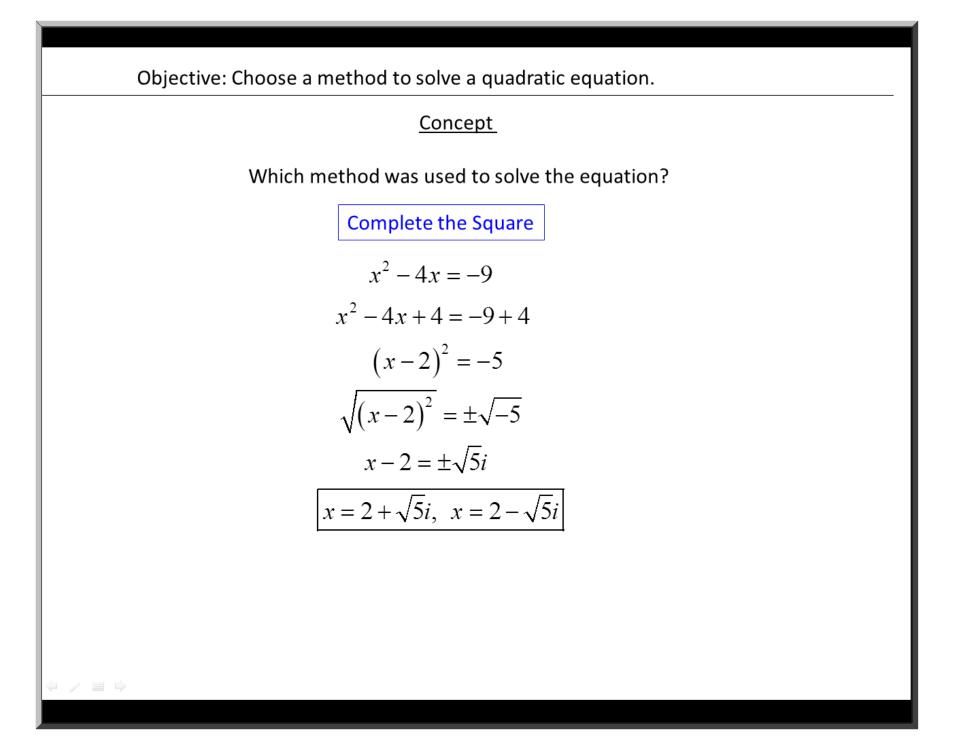
**Factoring**: Best method for quadratic equations of the form  $ax^2 + bx + c = 0$ that can be factored easily.

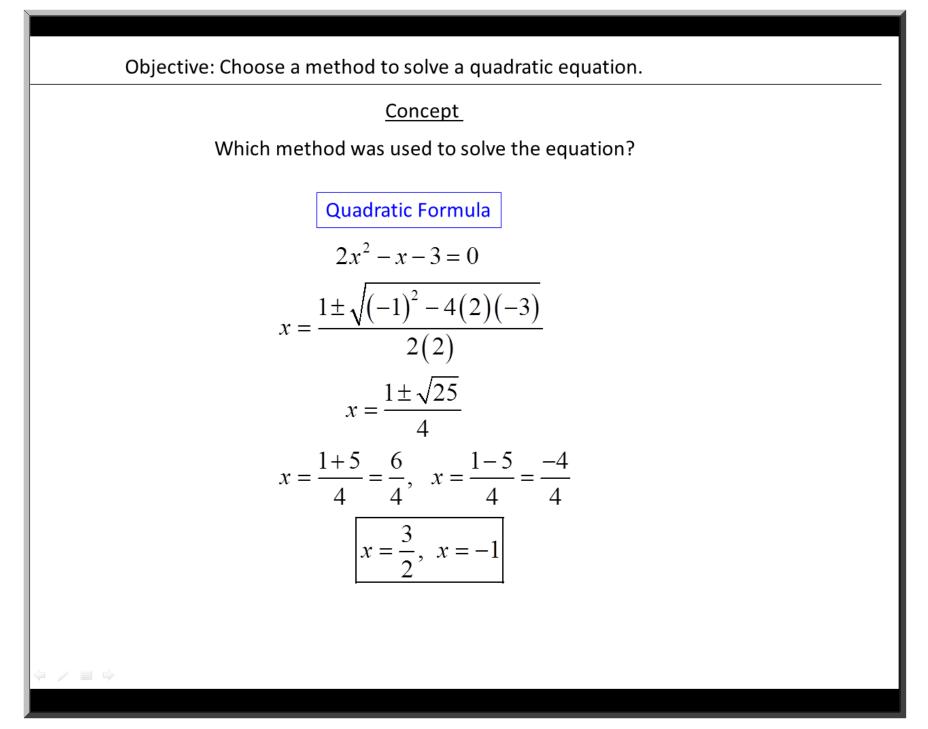
Also, best method for quadratic equations of the form  $ax^2 + bx = 0$  where x is a common factor.

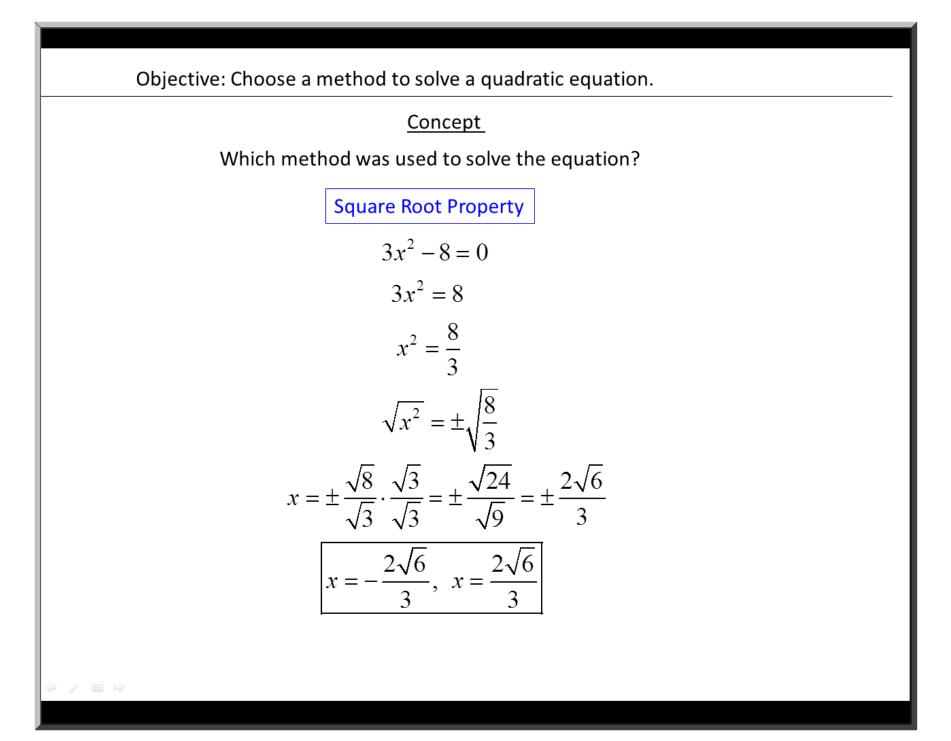
Also a good method for quadratic equations with a difference of two squares structure.

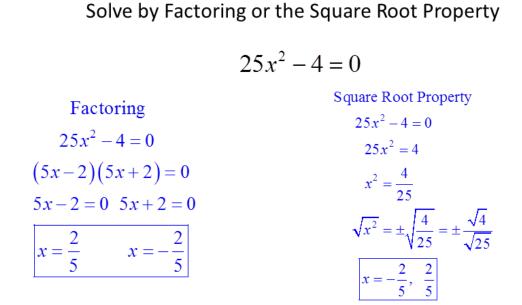
**<u>Quadratic Formula</u>**: Best method for quadratic equations of the form  $ax^2 + bx + c = 0$  that cannot be factored or cannot be factored easily.

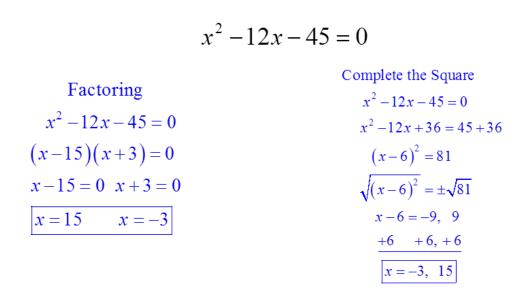












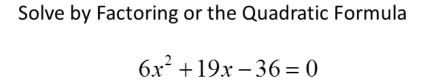
Solve by Factoring or Completing the Square

Solve by Completing the Square or the Quadratic Formula

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

Complete the Square  $x^{2} + 8x - 2 = 0$   $x^{2} + 8x + 16 = 2 + 16$   $(x + 4)^{2} = 18$   $\sqrt{(x + 4)^{2}} = \pm\sqrt{18} = \pm\sqrt{9} \cdot\sqrt{2}$   $x + 4 = \pm 3\sqrt{2}$  -4 - 4  $x = -4 - 3\sqrt{2}, -4 + 3\sqrt{2}$ Quadratic Formula  $x = \frac{-1(8) \pm \sqrt{(8)^{2} - [4(1)(-2)]}}{2(1)}$   $x = \frac{-8 \pm \sqrt{64 - [-8]}}{2}$   $x = \frac{-8 \pm \sqrt{72}}{2}$   $x = \frac{-8 \pm \sqrt{72}}{2}$  $x = -4 - 3\sqrt{2}, -4 + 3\sqrt{2}$ 

Objective: Choose a method to solve a guadratic equation. Solve by the Quadratic Formula or the Square Root Property  $3x^2 + 17 = 0$ Quadratic Formula Square Root Property  $x = \frac{-1(0) \pm \sqrt{(0)^2 - [4(3)(17)]}}{2(3)}$  $3x^2 = -17$  $x = \frac{0 \pm \sqrt{0 - 204}}{6}$   $x = \frac{\pm \sqrt{-204}}{4} \pm \sqrt{4}$  $x^2 = \frac{-17}{3}$  $x = \frac{\pm\sqrt{-204}}{6} = \frac{\pm\sqrt{4}\cdot\sqrt{51}\cdot\sqrt{-1}}{6} \qquad \qquad \sqrt{x^2} = \pm\sqrt{\frac{-17}{3}} = \frac{2\sqrt{51}}{6}$  $x = \pm \frac{\sqrt{17}i}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \pm \frac{\sqrt{51}}{\sqrt{9}}i = \pm \frac{\sqrt{51}}{3}i$  $x = \pm \frac{2\sqrt{51}}{6}i$  $x = -\frac{\sqrt{51}}{2}i, \frac{\sqrt{51}}{2}i$  $x = -\frac{\sqrt{51}}{i}, \quad \frac{\sqrt{51}}{i}i$ 



	Quadratic Formula
Factoring	$x = \frac{-1(19) \pm \sqrt{(19)^2 - [4(6)(-36)]}}{2(6)}$
$6x^2 + 19x - 36 = 0$	$x = \frac{2(6)}{2}$
(2x+9)(3x-4)=0	$x = \frac{-19 \pm \sqrt{361 - \left[-864\right]}}{}$
2x + 9 = 0 $3x - 4 = 0$	12
$x = -\frac{9}{-}$ $x = \frac{4}{-}$	$x = \frac{-19 \pm \sqrt{1225}}{12}$
2 3	$x = \frac{-19}{12} \pm \frac{35}{12}$
	$x = \frac{-19}{12} - \frac{35}{12} = -\frac{54}{12},  x = \frac{-19}{12} + \frac{35}{12} = \frac{16}{12}$
	$x = -\frac{9}{2}, \frac{4}{3}$

## <u>Closure</u>

What method would you use to solve the equation shown? Explain your reasoning.

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

I would use factoring because the GCF is x. The equation would factor into x(x - 4) = 0 and then using the Zero Product Property I would find the solutions: x = 0 and x = 4.