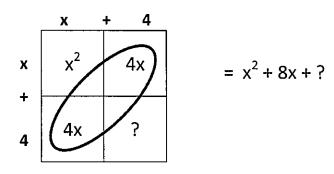
Lesson 32 Completing the Square

Completing the Square:

$$(x + 4)^2$$
 is a perfect square

Box Method:



Steps to Follow: for $ax^2 + bx + ?$

- 1. Factor a out of both terms
- 2. Find b
- 3. Divide b by 2
- 4. Square this new value
- 5. Multiply back through by a

Examples: Complete the square.

1.
$$x^{2} + 16x + 64$$

2. $x^{2} - 10x + 25$
 $\left(\frac{16}{2}\right)^{2} = (8)^{2} = 64$
 $\left(-\frac{10}{2}\right)^{2} = (5)^{2} = 25$

Solving Equations by Completing the Square.

Steps to Follow:

- 1. Get all x terms on the left side and all number terms on the right side, by using opposite operations.
- 2. Complete the square on the left.
- 3. Add the new c value to both sides of the equal sign.
- 4. Factor the left side of the equation as a perfect square.
- 5. Simplify the right side of the equation.
- 6. Square root both sides of the equation.
- 7. Put a \pm in front of the right side of the equation.
- 8. Write out 2 new equations.

(One equation with a + on the right side, and one equation with a - on the right side)

9. Solve each equation.

Examples: Solve the equation by completing the square.

3.
$$(x-3)^2 = 25$$

$$\sqrt{(x-3)^2} = \pm \sqrt{25}$$

$$x-3 = \pm 5$$

$$x-3 = 5 \text{ or } x-3 = -5$$

$$+3 +3 +3 +3$$

$$x=8$$

$$x=-2$$

$$5. x^{2}+6x-7=0
+7 +7$$

$$X^{2}+6x+=7+$$

$$(\frac{6}{2})^{2}=3^{2}=9$$

$$X^{2}+6x+9=7+9$$

$$(x+3)^{2}=16$$

$$\sqrt{(x+3)^{2}}=\pm\sqrt{16}$$

$$X+3=\pm4$$

4.
$$(3x+5)^2 = 16$$

$$\sqrt{(3x+5)^2} = \pm \sqrt{16}$$

$$3x+5 = \pm 4$$

$$3x+5 = 4 \text{ or } 3x+5 = -4$$

$$-5 -5$$

$$3x = -1$$

$$3x = -1$$

$$x = -1$$

$$x = -3$$