

**Date:**

**Chapter:** Chapter 5:5 --> Completing the Square

**Objectives:** Solve quadratic equations by using the  
Square Root Property and by Completing the Square

**Notes:**

**Square Root Property**

- 1) Need a perfect square trinomial on one side of the equation and a constant on the other side.
- 2) Factor the perfect square trinomial.  $(x \pm \#)^2$
- 3) Use the Square Root Property to solve for the variable.

**Completing the Square**

*--Method used to solve any quadratic equation--*

- 1) Get all variables on one side of the equation and constants on the other.
- 2) Make sure the coefficient on the  $x^2$  term is 1. If it's not, divide by the coefficient on all terms!
- 3) Add blanks to both sides.  $+ \underline{\hspace{2cm}}$
- 4) Take  $1/2$  of  $b$  and put in parentheses in #6
- 5) Square it ( $1/2$  of  $b$ ) and put it in the blanks
- 6) Parentheses squared  $( \quad )^2$
- 7) Square Root Property ( $\pm!!$ )
- 8) Solve for the variable

**Examples:**

**Ex. 1** - Solve by using the Square Root Property.

a)  $x^2 - 12x + 36 = 0$

$$(x-6)(x-6) = 0$$

$$\sqrt{(x-6)^2} = \sqrt{0}$$

$$x-6 = 0$$

$$x = 6$$

b)  $x^2 - 16x + 64 = 0$

$$\sqrt{(x-8)^2} = \sqrt{49}$$

$$x-8 = \pm 7$$

$$x = 15, 1$$

c)  $x^2 + 8x + 16 = 20$

$$(x+4)^2 = 20$$

$$x+4 = \pm \sqrt{20}$$

$$x+4 = \pm 2\sqrt{5}$$

$$x = -4 \pm 2\sqrt{5}$$

d)  $x^2 - 6x + 9 = 0$

**Ex. 2** - Find the value of c that makes the quadratic equation a perfect square.

a)  $x^2 + 16x + c = 64$

b)  $x^2 - 14x + c = 49$

**Ex. 3** - Solve by Completing the Square.

a)  $x^2 - 10x + 24 = 0$

$$x^2 - 10x = -24$$

$$x^2 - 10x + 25 = -24 + 25$$

$$(x-5)^2 = 1$$

$$x-5 = \pm 1$$

$$x = 6, 4$$

b)  $x^2 + 10x = -9$

$$x^2 + 10x + 25 = -9 + 25$$

$$(x+5)^2 = 16$$

$$x+5 = \pm 4$$

$$x = -1, -9$$

c)  $3x^2 + 10x = 8$

$$x^2 + \frac{10}{3}x = \frac{8}{3}$$

$$x^2 + \frac{10}{3}x + \frac{25}{9} = \frac{8}{3} + \frac{25}{9}$$

$$(x + \frac{5}{3})^2 = \frac{49}{9}$$

$$x + \frac{5}{3} = \pm \frac{7}{3}$$

$$x = \frac{2}{3}, -4$$

d)  $3x^2 - 14x = -16$

$$x^2 - \frac{14}{3}x = -\frac{16}{3}$$

$$x^2 - \frac{14}{3}x + \frac{49}{9} = -\frac{16}{3} + \frac{49}{9}$$

$$\sqrt{(x - \frac{7}{3})^2} = \sqrt{\frac{1}{9}}$$

$$x - \frac{7}{3} = \pm \frac{1}{3}$$

$$x = \frac{8}{3}, 2$$

e)  $x^2 + 2x + 2 = 0$

$$x^2 + 2x = -2$$

$$x^2 + 2x + 1 = -2 + 1$$

$$\sqrt{(x+1)^2} = \sqrt{-1}$$

$$x+1 = \pm i$$

$$x = i-1, -i-1$$

f)  $x^2 - 6x + 25 = 0$

$$x^2 - 6x = -25$$

$$x^2 - 6x + 9 = -25 + 9$$

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

$$x-3 = \pm 4i$$

$$x = 4i+3, -4i+3$$

**Homework:**

p. 288 (#14-46 Evens, 58, 59, 63-65)