1. Solve: $(x - 7)^2 + 5 = 86$

$-5 \quad -5$

$\sqrt{(x-7)^2} = \sqrt{81}$

$x - 7 = \pm 9$

$+7 \quad +7$

$9 + 7 = 16$

$-9 + 7 = -2$

$x = 16, -2$

2. Solve: $(x + 2)^2 + 63 = 27$

$-63 \quad -63$

$\sqrt{(x+2)^2} = \sqrt{-36}$

$x + 2 = \pm 6i$

$-2 \quad -2$

$x = -2 \pm 6i$

Expand each:

3. $(x + 4)^2$

$x^2 + 8x + 16$

4. $(x - 5)^2$

$x^2 - 10x + 25$

Factor each:

5. $x^2 - 6x + 9$

$(x - 3)^2$

6. $x^2 + 16x + 64$

$(x + 8)^2$

Solving Quadratic Equations:

1. Factoring. Works only if quadratic is factorable.
2. Square Roots. Works only if b=0
3. Graphing. Works only if solutions are real #'s
4. Quadratic Formula. **ALWAYS WORKS!**
5. Completing the Square. Works only if a=1 and best if b is even.

Solve by factoring the left side of the equation.

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

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

$x - 3 = \pm 5 + 3$

$+3 \quad +3$

$x = 8, -2$

Fill in the blanks.

1. $x^2 + 20x +$ ___100___ $= (x +$ _10_ $)^2$

2. $x^2 - 4x +$ ___4___ $= (x$ _-2_ $)^2$

$x^2 + 12x + 36 = (x+6)^2$

$x^2 - 144x + 5184 = (x-72)^2$

This is called "completing the square"

In general, to complete the square:

$x^2 + bx + \left(\frac{b}{2}\right)^2 = (x + \frac{b}{2})^2$

What would you fill each blank with in order to complete the square?

3. $x^2 + 7x +$ ___$\frac{49}{4}$___ $= (x +$ _$\frac{7}{2}$_ $)^2$

4. $x^2 - 11x +$ ___$\frac{121}{4}$___ $= (x -$ _$\frac{11}{2}$_ $)^2$

Solving equations by completing the square:

a must equal 1 best if b is even

1. Write equation in the form: $x^2 + bx = c$
2. Complete the square by adding $\left(\frac{b}{2}\right)^2$ to both sides.

$$x^2 + bx + \left(\frac{b}{2}\right)^2 = c + \left(\frac{b}{2}\right)^2$$

3. Rewrite equation in the form: $(x + \frac{b}{2})^2 = c + \left(\frac{b}{2}\right)^2$
4. Solve using square roots.

Solve each by completing the square.

1. ~~$x^2 + 8x = 9$~~

$x^2+14x-4=0$ $+4$ $+4$

$\sqrt{(x+7)^2} = \sqrt{53}$

$x = \pm\sqrt{53} - 7$

2. $x^2 - 10x - 1 = 0$

$x^2-10x+25 = 1+25$

$\sqrt{(x-5)^2} = \sqrt{26}$

$x = +5\pm\sqrt{26}$

Solve each by completing the square.

3. $x^2 + 12x + 40 = 0$

$x^2+12x+36 = -40+36$

$\sqrt{(x+6)^2} = \sqrt{-4}$

$x = -6 \pm 2i$

4. $\frac{3x^2}{3} - \frac{12x}{3} = \frac{18}{3}$

$x^2-4x+4 = 6+4$

$(x-2)^2 = 10$

$x-2 = \pm\sqrt{10}$

$x = 2\pm\sqrt{10}$