Warm Up

Factor.

1. $x^2+10x+25$

25

5 5

10

$(x+5)(x+5)$

$(x+5)^2$

2. $x^2-12x+36$

36

-6 -6

-12

$(x-6)(x-6)$

$(x-6)^2$

Completing the Square Notes:

1. If the leading coefficient is not a positive one divide all terms by that number in order to make it a positive one.

2. Put the constant on one side of the equation and the linear and quadratic terms on the other side.

3. Find one-half of the coefficient of the linear term, square it, and add it to both sides of the equation.

4. Factor the side with the trinomial and simplify the other side.

5. Take the square root of both sides- don't forget to put plus and minus

6. Simplify.

$3x^2+6x+15=0$	Original Equation
$x^2+2x+5=0$	Divide all terms by 3
$x^2+2x=-5$ $x^2+2x+\_\_=-5+\_\_$	Quadratic and linear on one side constant on the other.
$x^2+2x+1=-5+1$	Middle term over 2, squared, and added to both sides. $\left(\frac{2}{2}\right)^2=1$
$(x+1)^2=-4$	Factor using big X and simplify the other side
$x+1=\pm\sqrt{-4}$	Take the square root of both sides
$x+1=\pm 2i$	Simplify the square root
$x+1=2i$ $x+1=2i$	Separate
$x=-1-2i$ $x=-1+2i$	Finish solving

Another type of completing the square question is: Find the value of c that makes the expression a perfect square trinomial. Take half of the linear term, square it and this is the value of c which makes a perfect square trinomial.

Find the value of c that makes $x^2 - 10x + c$ a perfect square trinomial.

$\left(\frac{-10}{2}\right)^2 = 25$ So $c = 25$ Therefore, $x^2 - 10x + 25$ is a perfect square trinomial, and the expression written as the square of a binomial is $(x-5)(x-5) = (x-5)^2$

Solve by completing the square.

1. $x^2 - 16x + 8 = 0$

$-8 \quad -8$

$x^2 - 16x + 64 = -8 + 64$

$(x-8)(x-8) = 56$

$\sqrt{(x-8)^2} = \sqrt{56}$

$x - 8 = \pm 2\sqrt{14}$

$+8 \quad +8$

$x = 8 \pm 2\sqrt{14}$

$\left(\frac{-16}{2}\right)^2$

$(-8)^2 = 64$

64, -8, -8, -16

2. $x^2 - 10x + 6 = 0$

$-6 \quad -6$

$x^2 - 10x + 25 = -6 + 25$

$(x-5)(x-5) = 19$

$\sqrt{(x-5)^2} = \sqrt{19}$

$x - 5 = \pm\sqrt{19}$

$+5 \quad +5$

$x = 5 \pm \sqrt{19}$

$\left(\frac{-10}{2}\right)^2$

$(-5)^2 = 25$

25, -5, -5, -10

3. $2x^2 + 16x + 8 = 0$

$\frac{2x^2}{2} + \frac{16x}{2} + \frac{8}{2}$

$x^2 + 8x + 4 = 0$

$-4 \quad -4$

$\left(\frac{8}{2}\right)^2 = 4^2 = 16$

$x^2 + 8x + 16 = -4 + 16$

16 → 4, 4 (4 + 4 = 8)

$(x+4)(x+4) = 12$

$\sqrt{(x+4)^2} = \pm\sqrt{12}$

$x + 4 = \pm 2\sqrt{3}$

$-4 \quad -4$

$x = -4 \pm 2\sqrt{3}$

4. $5x^2 - 10x + 30 = 0$

$\frac{5x^2}{5} - \frac{10x}{5} + \frac{30}{5}$

$\left(\frac{2}{2}\right)^2 = 1$

$x^2 - 2x + 6 = 0$

$-6 \quad -6$

$x^2 - 2x + 1 = -6 + 1$

$x^2 - 2x + 1 = -5$

$\sqrt{(x-1)^2} = \pm\sqrt{5} - 1$

$-1 \quad -1$

$x - 1 = \pm i\sqrt{5}$

$+1 \quad +1$

$x = 1 \pm i\sqrt{5}$

5. Find the value of c which makes x^2+2x+c a perfect square trinomial, then write the expression as a square of a binomial.

$x^2+2x+1=(x+1)^2$

$c=1$

6. Find the value of c which makes $x^2-18x+c$ a perfect square trinomial, then write the expression as a square of a binomial.

$x^2-18x+81=(x-9)(x-9)$

$(x-9)^2$

$c=81$