DO NOW

Simplify: 1. $(x+5)^2$

2. $(b-10)^2$

8.3 Solving Quadratic Equations by Completing the Square

***Use completing the square to solve unfactorable quadratic equations.

What pattern can you find in these perfect square trinomials?

1. $(x+5)^2$ $x^2+10x+25$

2. $(b-10)^2$ $b^2-20b+100$

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

a. Add a constant to make the resulting trinomial a perfect square.
b. Write as the perfect square of a binomial.

3. x^2-8x
$\left(\frac{b}{2}\right)^2 \left(\frac{-8}{2}\right)^2 = 16$
a) $x^2-8x+16$
b) $(x-4)^2$

4. n^2+20n
$\left(\frac{20}{2}\right)^2 = 100$
a. $n^2+20n+100$
b. $(n+10)^2$

5. y^2+6y
$\left(\frac{6}{2}\right)^2 = 9$
a. y^2+6y+9
b. $(y+3)^2$

6. a^2-16a
$\left(\frac{-16}{2}\right)^2 = 64$
a. $a^2-16a+64$
b. $(a-8)^2$

PROCEDURE:

1. Rewrite to $x^2+bx=c$
2. Add $\left(\frac{b}{2}\right)^2$ to each side
3. Write the left side as $(\text{binomial})^2$
4. Take the square root of both sides (use $\pm$ sign)
5. Solve for x
6. Write the two solutions.

Examples:

7. $x^2+6x+7=0$
$x^2+6x=-7$
$\left(\frac{6}{2}\right)^2 = 9$
$x^2+6x+9=-7+9$
$(x+3)^2=2$
$x+3=\pm\sqrt{2}$
$x=-3\pm\sqrt{2}$
$x=-3+\sqrt{2}$ or $x=-3-\sqrt{2}$

8. $b^2-2b-10=0$
$b^2-2b=10$
$\left(\frac{-2}{2}\right)^2 = 1$
$b^2-2b+1=10+1$
$(b-1)^2=11$
$b-1=\pm\sqrt{11}$
$b=1\pm\sqrt{11}$
$b=1+\sqrt{11}$ or $b=1-\sqrt{11}$

9. $2x^2=-4x-1$
Divide by 2
$2x^2+4x+1=0$
$x^2+2x+.5=0$
$x^2+2x=-.5$
$\left(\frac{2}{2}\right)^2 = 1$
$x^2+2x+1=-.5+1$
$(x+1)^2=.5$
$x+1=\pm\sqrt{.5}$
$x=-1\pm\sqrt{.5}$
$x=-1+\sqrt{.5}$ or $x=1-\sqrt{.5}$

10. $4x+8=2x^2$
$0=2x^2-4x-8$
$0=x^2-2x-4$
$4=x^2-2x$
$4+1=x^2-2x+1$
$5=(x-1)^2$
$\pm\sqrt{5}=x-1$
$1\pm\sqrt{5}=x$
$x=1+\sqrt{5}$ or $x=1-\sqrt{5}$

HOMEWORK

Worksheet - HW 8.3