Steps for Completing the Square

The equation must be in ax^2+bx+c ***form and the number in front of*** x^2 ***must be a 1.***

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

1. Divide by 2 so number in front of x^2 is a 1. $\frac{2x^2}{2}+\frac{4x}{2}-\frac{8}{2}=\frac{0}{2}$

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

2. Move the constant to the other side of the = sign.
   (For this problem add 4 to each side) $x^2+2x-4+4=0+4$

   Simplify $x^2+2x \quad =4$

3. Take the number in front of the x and multiply it by $\frac{1}{2}$

   $2\cdot\frac{1}{2}=1$ and square $(1)^2=1$

   Add the result to both sides of the equation. $x^2+2x+1=4+1$

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

4. Factor. ***(The left side will always factor as a Perfect Square.)*** $(x+1)^2=5$

   (The number that goes inside the parenthesis is the number you got from step 3 ***BEFORE*** *you squared it!)*

6. Take the square root of each side. $\sqrt{(x+1)^2}=\pm\sqrt{5}$
7. Simplify each side. $x+1=\pm\sqrt{5}$
8. Solve for x $x=-1\pm\sqrt{5}$

Practice Problems

1. $2x^2 - 4x - 2 = 0$

2. $4x^2 - 12x - 1 = 0$

3. $2x^2 + 5x + 2 = 0$

4. $-4x = -x^2 + 12$

Solutions:

1. $x = 1 \pm \sqrt{2}$
2. $x = \frac{3 \pm \sqrt{10}}{2}$
3. $x = \frac{-1}{2}, -2$
4. x = 6, -2