Quadratic Factor by Grouping Example
Math 130 *Kovitz*

Solve for x.

$$10x^2 - 23x + 12 = 0.$$

Decide on a method of solution. Then either leave the x terms isolated on the left side (if completing the square) or set the right side to 0 (if factoring or using the quadratic formula).

Do not divide both sides by the coefficient after factoring out an x. That's definitely not correct; it is not a linear equation, so methods for solving a linear equation are not applicable.

It is always a good idea to check the solutions in the *original* equation, using a calculator if necessary.

$10x^2 - 23x + 12 = 0.$ Try to factor this expression. Use grouping.

$10x^2 - 15x - 8x + 12 = 0.$ The middle (x) term must be split into two numbers.
Their product is the product of the first and last constants.
Their sum is the coefficient of the given middle term.

The numbers that have a product of 120 and a sum of -23 are -15 and -8.

$5x(2x - 3) - 4(2x - 3) = 0.$ Take the largest common factors out of the first two and last two terms.
If the third term is negative take the largest common factor out with a minus sign in front.

$(5x - 4)(2x - 3) = 0.$

$x = 4/5 = 0.8$ or $x = 3/2 = 1.5.$

Check the answers.

$$10(0.8)^2 - 23(0.8) + 12 = 10(0.64) - 18.4 + 12 = 6.4 - 18.4 + 12 = 0.$$

It checks.

and

$$10(1.5^2) - 23(1.5) + 12 = 10(2.25) - 34.5 + 12 = 22.5 - 34.5 + 12 = 0.$$

So, both answers check. A calculator would make both checks much easier, but it is not absolutely necessary.