Standard Form of Quadratic

$$ax^2 + bx + c$$

$$(x+p)(x+q)$$

$ax^2 \rightarrow$ Quadratic term

$bx \rightarrow$ Linear term

$C \rightarrow$ constant term

Difference of Squares
$a^2 - b^2$
$(a+b)(a-b)$

Factoring when $\underline{a = 1}$

Steps
1) Find numbers that will multiply to constant (c) that will add together to get linear term (b).

2) Write as linear factors $(x \pm p)(x \pm q)$

Write each quadratic as a product of linear factors.

$x^2 + 9x + \underline{20}$ $\overset{20}{\boxed{4.5}}$
$(x+4)(x+5)$ $\begin{array}{l}10 \cdot 2 \\ 20 \cdot 1\end{array}$

$x^2 - 10x + 21$ $\dfrac{21}{7 \cdot 3}$
$(x-7)(x-3)$ $\begin{array}{l}21 \cdot 1 \\ \boxed{-7 \cdot -3}\end{array}$

$x^2 - 5x - 24$ $\overset{-24}{}$
$(x-8)(x+3)$ $\begin{array}{l}- 3 \cdot 8 \\ \boxed{- 8 \cdot 3} \\ -6 \cdot 4 \\ -4 \cdot 6 \\ -12 \cdot 2 \\ -2 \cdot 12\end{array}$

$x^2 - 8x + 15$
$(x-5)(x-3)$

$x^2 + 9x - 36$
$(x+12)(x-3)$

$x^2 - 5x - 6$
$(x-6)(x+1)$

$x^2 - 36$
$(x-6)(x+6)$

$x^2 - 121$
$(x+11)(x-11)$

Factoring a≠1

First look for greatest common factor (GCF)

$GCF \rightarrow$ Largest # that divides into all terms evenly

If NO GCF either guess and check or split the middle term

GCF = 2
$$2x^2 + 20x + 18$$
$$2\left(x^2 + 10x + 9\right)$$
$$2(x+1)(x+9)$$

$$3x^2 - 63x + 240$$
$$3\left(x^2 - 21x + 80\right)$$
$$3(x-5)(x-16)$$

$$9x^2 - 81$$
$$9\left(x^2 - 9\right)$$
$$9(x-3)(x+3)$$

Guess and Check

$$3x^2 - x - 2$$
$$(3x + 2)(x - 1)$$

$\dfrac{-2}{}\;\dfrac{+1}{}$
$\dfrac{+1}{2}\;\dfrac{-1}{-2}$

$3x - 2x = x$
$6x - x = 5x$
$-3x + 2x = x$

$$3x^2 + 8x - 3$$
$$(3x - 1)(x + 3)$$
$\dfrac{-3}{-1}\;\dfrac{+1}{3}$ = 3x - 3x
$\quad\quad$ = 9x - x = 8x
$\dfrac{1}{3}\;\dfrac{-3}{-1}$

GCF = -5
$$-5x^2 - 15x - 10$$
$$-5\left(x^2 + 3x + 2\right)$$
$$-5(x+2)(x+1)$$

$$10x^2 + 140x + 490$$
$$10\left(x^2 + 14x + 49\right)$$
$$10(x+7)(x+7)$$
$$10(x+7)^2$$

$$-3x^2 + 48$$
$$-3\left(x^2 - 16\right)$$
$$-3(x-4)(x+4)$$

$5x$

$$5x^2 - 7x - 6$$
$$(5x + 3)(x - 2)$$
$\dfrac{6}{}\quad\dfrac{1}{}$
$\begin{array}{cc}-3 & 2\\-1 & 6\\-2 & 3\\1 & -6\\2 & -3\\6 & -1\\3 & -2\end{array}$

$$2x^2 + 9x - 5$$
$$(2x - 1)(x + 5)$$
$\dfrac{5}{-1}\quad\dfrac{5}{5}$ -10x + 1x
$\dfrac{5}{-5}\quad\dfrac{-1}{1}$ 10x - x = 9x