Factoring by Grouping

Split the middle term

$ax^2 + bx + c$

1st multiply *a* and *c* together.

2nd find numbers that multiply to get the product from above that add to get *b*.

3rd replace (or split) the middle term with the 2 numbers from step 2.

4th Group the first 2 terms together and group the second terms together

5th Find the GCF of each set of Parenthesis

6th Write as a product of linear factors

$4x^2 + 9x + 2$ — 8, $8 \cdot 1$, $9x$

$(4x^2 + 8x) + (x + 2)$

$4x(x+2) + 1(x+2)$

$(4x+1)(x+2)$

$6x^2 - 11x + 4$ — 24, $-3 \cdot -8$

$(6x^2 - 3x)(-8x + 4)$

$3x(2x-1) - 4(2x-1)$

$(3x-4)(2x-1)$

$9x^2 + 12x + 4$ — 36, $6 \cdot 6$

$(9x^2 + 6x) + (6x + 4)$

$3x(3x+2) + 2(3x+2)$

$(3x+2)(3x+2)$

$(3x+2)^2$

$12x^2 - 25x + 7$ — 84, $-21 \cdot -4$

$(12x^2 - 21x)(-4x + 7)$

$3x(4x-7) - 1(4x-7)$

$(3x-1)(4x-7)$

$4x^2 - 4x - 35$ — -140, $-14 \cdot 10$

$(2x+5)(2x-7)$

$6x^2 + 13x - 25$ — -150

$10x^2 + 3x - 4$ — -40, $8 \cdot -5$

$(5x+4)(2x-1)$

$25x^2 - 10x + 4$ — 100

Both GCF and Split the middle term	$4x^2 - 2x - 20$ $2(2x^2 - x - 10)$ $\frac{-20}{-5 \cdot 4}$ $(2x^2 - 5x) + (4x - 10)$ $x(2x-5) + 2(2x-5)$ $2(2x-5)(x+2)$	$-3x^2 + 12x + 15$ $-3(x^2 - 4x - 5)$ $-3(x-5)(x+1)$
$(4x-10)(x+2)$ $(2x-5)(2x+4)$	$8x^2 - 28x - 60$ $\frac{-30}{-10 \cdot 3}$ $4(2x^2 - 7x - 15)$ $4(2x+3)(x-5)$	$12x^2 + 10x - 8$
	$112x^2 - 168x + 63$	
Special Cases		
Difference of squares	$x^2 - 25$	$x^2 - 49$
	$4x^2 - 9$	$9x^2 - 1$

$\frac{-5}{-5 \cdot 1}$