

Factoring Quadratic Trinomials (a=1)



Level 1 - Factor simple quadratic trinomials

Level 2 - Factor quadratic trinomials by first removing a GCF

Level 3 - Expand, collect like terms and then factor

Reminder:

As we have previously discussed, factoring is like “undoing” multiplication.

Quadratics are polynomials of the form $ax^2 + bx + c$ and when the leading coefficient, a , is 1, the method to factor is quite simple.

To factor a quadratic with a leading coefficient of 1:

1. Find two numbers that multiply to give c and add to give b .
2. Using those numbers, write the product of two binomials written in the form:

$$(x + \text{first number})(x + \text{second number})$$

- Always factor out a **GCF** first if possible
- If c is **positive**, both factors will have the same sign (both + or both -).
- If c is **negative**, the two factors will have opposite signs (one +, one -).
- The sign of b tells you which one is positive and which is negative.

Example #1	Example #2	Example #3
$x^2 + 7x + 12$	$x^2 - 8x + 15$	$3x^2 - 6x - 24$
$c = +12$ $b = +7$ factor pairs of 12: (1, 12) or (-1, -12) (2, 6) or (-2, -6) (3, 4) or (-3, -4) $3 + 4 = 7$ so,	$c = +15$ $b = -8$ factor pairs of 15: (1, 15) or (-1, -15) (3, 5) or (-3, -5) $(-3) + (-5) = -8$ so,	factor out a gcf : $3(x^2 - 2x - 8)$ inside brackets : $c = -8$ $b = -2$ factor pairs of -8: (1, -8) or (-1, 8) (2, -4) or (-2, 4) $2 + (-4) = -2$ so, $(x + 2)(x - 4)$ apply the factored out GCF
<div style="border: 1px dashed black; padding: 5px; width: fit-content; margin: 0 auto;">$(x + 3)(x + 4)$</div>	<div style="border: 1px dashed black; padding: 5px; width: fit-content; margin: 0 auto;">$(x - 3)(x - 4)$</div>	<div style="border: 1px dashed black; padding: 5px; width: fit-content; margin: 0 auto;">$3(x + 2)(x - 4)$</div>

Remember:

- Once again, always check for a GCF before trying any other factoring method.
- Look for difference of squares and perfect squares for a possible shortcut (next topic).