Guide to:
Factorising harder quadratics

maths Links

Explanation:

To factorise a harder quadratic $\mathbf{ax^2 + bx + c}$ (where a > 1) by splitting the middle term, multiply **a × c** first and find two numbers that multiply to give **ac** and add to give **b**. Rewrite the middle term bx using these two numbers, then factorise in pairs by grouping.

Always check first if there is a common numerical factor that can be taken out of all three terms, or if the expression is a difference of two squares such as $\mathbf{9x^2 - 16y^2 = (3x - 4y)(3x + 4y)}$. If solving an equation equal to zero, set each bracket equal to zero.

Example 1: Factorise $6x^2 - 11x - 10$

Solution:

ac = 6 × (−10) = **−60**; b = **−11**
Numbers multiplying to −60 and adding to −11 are **−15** and **+4**
Split middle term: $6x^2 - 15x + 4x - 10$
Factorise in pairs: 3x(2x − 5) + 2(2x − 5)
Answer: (3x + 2)(2x − 5)

Example 2: Solve $4x^2 + 5x - 6 = 0$

Solution:

ac = 4 × (−6) = −24; factors adding to +5 are **+8** and **−3**
$4x^2 + 8x - 3x - 6 = 0$
$4x(x + 2) - 3(x + 2) = 0 \Rightarrow (4x - 3)(x + 2) = 0$
Set each bracket to 0: 4x − 3 = 0 or x + 2 = 0
Answer: x = $\frac{3}{4}$ or x = −2

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