

Factoring Quadratic Equations by the Windowpane Method

A quadratic equation is made up of the product of two linear equations, and is of the form $ax^2 + bx + c$, where $a \neq 0$. To factor the quadratic equation, we find the linear equations that, when multiplied together, make the quadratic equation. The process is “find the factors of ac that add to b ”, and then factor by grouping or this windowpane method.

To use the “Windowpane Method”, imagine a window with four pieces of glass oriented like the Cartesian coordinate system. We will call the top right area Q1, the top left Q2, the bottom left Q3 and the bottom right Q4, just like the quadrants in the Cartesian Coordinate system. Now picture a frame around Q1, Q2, Q3, and Q4. We will be using this format in the factoring process. We will explain the process while doing and example:

Explanation	Example
1. Look at the general form of the quadratic	$ax^2 + bx + c$
2. Start with a quadratic equation	$12x^2 - 14x - 40$
3. Factor out the Greatest Common Factor (GCF)	$2(6x^2 - 7x - 20)$
4. We will now work with the quadratic equation inside the brackets, and add the GCF at the end	$6x^2 - 7x - 20$ $ax^2 + bx + c$
5. Identify a, b and c, including the sign (+ or -)	$a = 6, b = -7, c = -20$
6. Multiply the a and c	$6 * -20 = -120$
7. Find the factors of ac, including the sign. a) If the product of ac is positive, the factors will both be positive or both negative. b) If the product of ac is negative, one factor will be positive, and one will be negative.	$120 * -1, 60 * -2, 40 * -3, 30 * -4,$ $24 * -5, 20 * -6, 15 * -8, 12 * -10$ And $-120 * 1, -60 * 2, -40 * 3, -30 * 4,$ $-24 * 5, -20 * 6, -15 * 8, -12 * 10$
8. Look at the quadratic we are trying to factor. We want the factors of ac that add to b.	The factors of -120 that add to -7 are -15 and 8.
9. We are replacing the second term, the “x” term, with these factors, so we want to include the “x”	-15x and 8x
10. Now we get to the window. a) Put the ax^2 in Q2, put the c in Q4 – including the signs of each. b) Put one each of the factors times the variable in Q1 and Q3. It does not matter which Q you put which factor times variable in.	It should look like Figure I below.