Adam's amazing formula

$(a+b)^2 = a^2 + 2ab + c^2$

$ax^2 + bx + c = y$

$x^2 + \frac{b}{a}x + \frac{c}{a} = \frac{y}{a}$

$x^2 + \frac{b}{a}x = \frac{y}{a} - \frac{c}{a}$

$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \frac{y-c}{a} + \left(\frac{b}{2a}\right)^2$

$\left(x + \frac{b}{2a}\right)^2 = \frac{y-c}{a} + \frac{b^2}{4a^2}$ let k be a shift

$a\left(x + \frac{b}{2a}\right)^2 = y - c + \frac{b^2}{4a}$

$a\left(x + \frac{b}{2a}\right)^2 + c - \frac{b^2}{4a} = y$

$a\left(x + \frac{b}{2a} - k\right)^2 + c - \frac{b^2}{4a} = y$

↳ Simp. $ak^2 - 2akx + ax^2 - bk + bx + c = y$

$\Downarrow$

$ax^2 + \underbrace{2ak}_{\downarrow}x + \underbrace{ak^2 - bk + bx + c}$

$\downarrow$ $\quad\downarrow$

$ax^2 + bx + c$