

## CONVERTING QUADRATICS

### FROM FACTORED FORM TO GENERAL FORM:

Example:  $A = -3(x-5)(2x+1)$

$$\begin{aligned} \rightarrow A &= -3(2x^2 + x - 10x - 5) \\ &= -3(2x^2 - 9x - 5) \\ &= -6x^2 + 27x + 15 \end{aligned}$$

Your turn:  $B = 5(x+4)(3x-1)$        $B = 15x^2 + 55x - 20$

$$C = -(3x+5)(3x-5) \quad C = -9x^2 + 25$$

### FROM GENERAL FORM TO FACTORED FORM (not always possible)

Examples: •  $D = x^2 - 3x - 18$

$$\rightarrow \begin{array}{l} \otimes -18 \\ \oplus -3 \end{array} \left\{ \begin{array}{l} -6 \neq 3 \\ -6 \neq 3 \end{array} \right. \quad D = (x-6)(x+3)$$

•  $E = x^2 - 16$

$$\rightarrow \text{difference of squares} \quad E = (x+4)(x-4)$$

•  $F = 5x^2 + 23x - 10$

$$\begin{aligned} \rightarrow \begin{array}{l} \otimes -50 \\ \oplus 23 \end{array} \left\{ \begin{array}{l} 25 \neq -2 \\ 25 \neq -2 \end{array} \right. & F = 5x^2 + 25x - 2x - 10 \\ & = 5x(x+5) - 2(x+5) \\ & = (5x-2)(x+5) \end{aligned}$$

$$\bullet G = 6x^2 - 28x - 10$$

↳ common factor: 2

$$\begin{aligned} G &= 2(3x^2 - 14x - 5) && \begin{matrix} \otimes -15 \\ \oplus -14 \end{matrix} \left. \vphantom{\begin{matrix} \otimes -15 \\ \oplus -14 \end{matrix}} \right\} -5 \neq 1 \\ &= 2(3x^2 - 15x + x - 5) \\ &= 2(3x(x-5) + 1(x-5)) \\ &= 2(3x+1)(x-5) \end{aligned}$$

Your turn:  $H = x^2 - x - 12 = (x-4)(x+3)$

$$I = 6x^2 + x - 2 = (2x-1)(3x+2)$$

$$J = -3x^2 + 12x + 15 = -3(x-5)(x+1)$$

$$K = 2x^2 - 50 = 2(x+5)(x-5)$$

$$L = 4x^2 - 12x + 9 = (2x-3)^2$$

### FROM VERTEX FORM TO GENERAL FORM

Example:  $M = 3(x-5)^2 + 4$

$$\begin{aligned} \text{↳ } M &= 3(x^2 - 10x + 25) + 4 \\ &= 3x^2 - 30x + 75 + 4 \\ &= 3x^2 - 30x + 79 \end{aligned}$$

Your turn:  $N = -2(x+3)^2 - 4$

$$\begin{aligned} &= -2(x^2 + 6x + 9) - 4 \\ &= -2x^2 - 12x - 22 \end{aligned}$$

## FROM GENERAL FORM TO VERTEX FORM

Example:  $P = 2x^2 - 12x + 19$

$$\hookrightarrow \text{vertex: } \frac{-b}{2a} = \frac{12}{4} = 3$$

$$\text{if } x=3: P = 2 \times 9 - 12 \times 3 + 19 = 1$$

$$(3; 1)$$

$$\Rightarrow P = 2(x-3)^2 + 1$$

Your turn:  $Q = -x^2 - 10x - 28 = -(x+5)^2 - 3$

$$R = 3x^2 + 6x - 2 = 3(x+1)^2 - 5$$

FACTORED FORM  $\iff$  GENERAL FORM  $\iff$  VERTEX FORM