

## Expansion of a Trinomial

Example 1

$$\begin{aligned} & (x+1)(x+2)(x+3) \\ &= (x^2+x+2x+2)(x+3) \\ &= (x^2+3x+2)(x+3) \\ &= x^3 + 3x^2 + 2x \\ &\quad + 3x^2 + 9x + 6 \\ &= x^3 + 6x^2 + 11x + 6 \end{aligned}$$

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Ex 2

$$\begin{aligned} & (2x-3)(x+1)(3x-2) \\ &= (2x^2-3x+2x-3)(3x-2) \\ &= (2x^2-x-3)(3x-2) \\ &= 6x^3 - 3x^2 - 9x \\ &\quad - 4x^2 + 2x + 6 \\ &= 6x^3 - 7x^2 - 7x + 6 \end{aligned}$$

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Extension

$$\begin{aligned} & (2x^2+5x-3)(x^2+2x+4) \\ &= 2x^4 + 5x^3 - 3x^2 \\ &\quad + 4x^3 + 10x^2 - 6x \\ &\quad + 8x^2 + 20x - 12 \\ &= 2x^4 + 9x^3 + 15x^2 + 14x - 12 \end{aligned}$$

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## Exercise

$$\begin{aligned} 1) & (x+2)(x+3)(x+4) \\ &= (x^2 + 2x + 3x + 6)(x+4) \\ &= (x^2 + 5x + 6)(x+4) \\ &= x^3 + 5x^2 + 6x \\ &\quad + 4x^2 + 20x + 24 \\ &= \underline{x^3 + 9x^2 + 26x + 24} \end{aligned}$$

$$\begin{aligned} 2) & (x+1)(x+1)(x+1) \\ &= (x^2 + x + x + 1)(x+1) \\ &= (x^2 + 2x + 1)(x+1) \\ &= x^3 + 2x^2 + x \\ &\quad + x^2 + 2x + 1 \\ &= \underline{x^3 + 3x^2 + 3x + 1} \end{aligned}$$

$$\begin{aligned} 3) & (2x+3)(2x-1)(x+5) \\ &= (4x^2 + 6x - 2x - 3)(x+5) \\ &= (4x^2 + 4x - 3)(x+5) \\ &= 4x^3 + 4x^2 - 3x \\ &\quad + 20x^2 + 20x - 15 \\ &= \underline{4x^3 + 24x^2 + 17x - 15} \end{aligned}$$

$$\begin{aligned} 4) & \quad (x+6)(x+2)(x+4) \\ & = (x^2 + 6x + 2x + 12)(x+4) \\ & = (x^2 + 8x + 12)(x+4) \\ & = x^3 + 8x^2 + 12x \\ & \quad + 4x^2 + 32x + 48 \\ & = x^3 + 12x^2 + 44x + 48 \end{aligned}$$

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