

$$\begin{aligned}(x+2)(x^2+5x-6) &= (x+2) \cdot x^2 + (x+2) \cdot 5x + (x+2)(-6) \\ &= x \cdot x^2 + 2 \cdot x^2 + x \cdot 5x + 2 \cdot 5x + x(-6) + 2(-6) \\ &= x^3 + 2x^2 + 5x^2 + 10x - 6x - 12 \\ &= x^3 + 7x^2 + 4x - 12\end{aligned}$$