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Techniques in Factoring Polynomials:

I. Always factor out the largest common factor first.

$$\begin{aligned} & 2x^2(3x^2 - 5x + 7) \\ &= 6x^4 - 10x^3 + 14x^2 \\ &= 2x^2(3x^2 - 5x + 7) \end{aligned}$$

$$\begin{aligned} \text{A. } & 6n^3 + 24n^2 + 12n \\ &= 6n(n^2 + 4n + 2) \end{aligned}$$

$$\begin{aligned} \text{B. } & a(b-2) + c(b-2) \\ &= (b-2)(a+c) \end{aligned}$$

$$\begin{array}{ccc} & 2 \cdot 3 & = 6 \leftarrow \text{Product} \\ & \swarrow & \\ & \text{factors} & \end{array}$$

$$\text{c. } 18a^2b - 15ab^2 = 3ab(6a - 5b)$$

II. Consider factoring by grouping.
(4 terms)

$$\begin{aligned} \text{A. } & x^3 + 3x^2 + 6x + 18 \\ &= x^3 + 3x^2 + 6x + 18 \\ &= x^2(x+3) + 6(x+3) \\ &= \boxed{(x+3)(x^2+6)} \end{aligned}$$

1. Group the terms into pairs.
2. Factor out the common factor from each pair.

3. Factor out common binomial factor.

$$\begin{aligned} \text{B. } & 2x^3 - 3x^2 + 6x - 9 \\ &= 2x^3 - 3x^2 + 6x - 9 \\ &= x^2(2x-3) + 3(2x-3) \\ &= \boxed{(2x-3)(x^2+3)} \end{aligned}$$

$$\begin{aligned} \text{C. } & a^3 - 3a^2 - 2a + 6 \\ &= a^2(a-3) - 2(a-3) \\ &= \boxed{(a-3)(a^2-2)} \end{aligned}$$

$$\begin{aligned} \text{or, } & a^3 - 2a - 3a^2 + 6 \\ &= a(a^2-2) - 3(a^2-2) \\ &= \boxed{(a^2-2)(a-3)} \end{aligned}$$

Same

Commutative property:

Order doesn't matter in multiplication or add.