

$$\begin{aligned}
 10 i \quad & 27y^3 + 125z^3 \\
 &= (3y)^3 + (5z)^3 \\
 &= (3y + 5z) [(3y)^2 - 3y \times 5z + (5z)^2] \\
 &= (3y + 5z) (9y^2 - 15yz + 25z^2)
 \end{aligned}$$

$$\begin{aligned}
 10 \text{ ii} \quad & 64m^3 - 343n^3 \\
 &= (4m)^3 - (7n)^3 \\
 &= (4m - 7n) [(4m)^2 + 4m \times 7n + (7n)^2] \\
 &= (4m - 7n) (16m^2 + 28mn + 49n^2)
 \end{aligned}$$

$$\begin{aligned}
 11 \quad & 27x^3 + y^3 + z^3 - 9xyz \\
 &= (3x)^3 + y^3 + z^3 - 3 \times 3x \times y \times z \\
 &= (3x + y + z) [(3x)^2 + y^2 + z^2 - 3xy - yz - z \times 3x] \\
 &= (3x + y + z) (9x^2 + y^2 + z^2 - 3xy - yz - 3zx)
 \end{aligned}$$

$$\begin{aligned}
 12 \quad & \text{RHS} \\
 &= \frac{1}{2} (x + y + z) [(x - y)^2 + (y - z)^2 + (z - x)^2] \\
 &= \frac{1}{2} (x + y + z) (x^2 + y^2 - 2xy + y^2 + z^2 - 2yz + z^2 + x^2 - 2zx) \\
 &= \frac{1}{2} (x + y + z) (x^2 + y^2 + z^2 - xy - yz - zx) \\
 &= (x + y + z) (x^2 + y^2 + z^2 - xy - yz - zx) \\
 &= x^3 + y^3 + z^3 - 3xyz \\
 &= \text{LHS}
 \end{aligned}$$