

## 6.4 The sum and difference of cubes

## Methods of Factoring

\* first factor out any common monomial factor

1. Difference of squares
2. Factorable trinomial
3. Sum or difference of cubes
4. Factorable by grouping  
the expression should be factored completely

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$

$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

x	x <sup>3</sup>
1	1
2	8
3	27
4	64
5	125
6	216
7	343
8	512
9	729
10	1000

examples

$$\begin{aligned} x^3 + y^3 &= (x+y)(x^2 - xy + y^2) \\ x^3 - y^3 &= (x-y)(x^2 + xy + y^2) \end{aligned}$$

$$x^3 + 8$$

$$\begin{aligned} x^3 + 2^3 \\ (x+2)(x^2 - 2x + 4) \end{aligned}$$

$$x^3 - 1$$

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

$$x^3 + 27$$

$$\begin{aligned} x^3 + 3^3 \\ (x+3)(x^2 - 3x + 9) \end{aligned}$$

$$8x^3 - 1$$

$$\begin{aligned} (2x)^3 - 1^3 \\ (2x-1)(4x^2 + 2x + 1) \end{aligned}$$

$$8x^3 + 125$$

$$\begin{aligned} (2x)^3 + 5^3 \\ (2x+5)(4x^2 - 10x + 25) \end{aligned}$$

$$8x^3 - 27y^3$$

$$\begin{aligned} (2x)^3 - (3y)^3 \\ (2x-3y)(4x^2 + 6xy + 9y^2) \end{aligned}$$

examples

$$\begin{aligned} x^3 + y^3 &= (x+y)(x^2 - xy + y^2) \\ x^3 - y^3 &= (x-y)(x^2 + xy + y^2) \end{aligned}$$

$$6x^3 + 48y^3$$

$$6(x^3 + 8y^3)$$

$$6(x+2y)(x^2 - 2xy + 4y^2)$$

$$4d^3 - 108$$

$$4(d^3 - 27)$$

$$4(d-3)(d^2 + 3d + 9)$$

$$(x-2)^3 - 1$$

$$((x-2)-1)((x-2)^2 + (x-2) + 1)$$