Factor the Sum and Difference of Two Cubes

1. Formulas for factoring the **Sum** and **Difference** of two cubes:

Sum: $\boxed{a^3+b^3= (a+b)\,(a^2-ab+b^2)}$

Difference: $\boxed{a^3-b^3= (a-b)\,(a^2+ab+b^2)}$

Note: Keep in mind that the middle of the trinomial is always opposite the sign of the binomial

2. Identification of Sum and Difference in the given problem:

	a^3+b^3	or	a^3-b^3
	↓		↓
Ex:	x^3+8		$27x^3-8$
	↓		↓
	$x^3 + 2^3$		$(3x)^3 - 2^3$
	↓ ↓		↓ ↓
let:			
	a=x b=2		a=3x b=2

(The cubed roots of each term in the original)

Sample of perfect cubes:

1	x^3	$27x^3$
8	x^3y^3	$8x^3$
27	x^6	$64x^3y^3$
64	x^9	$125x^6y^3$
125	The exponents must be divisible by 3 for a perfect cube	

3. Match it to the sum or difference formulas:
Use your "a" and "b" values to match "a" and "b" in the formula you have chosen:

Factor: $x^3 + 8$

Sum: $a^3+b^3 = (a+b)\,(a^2-ab+b^2)$

↑ ↑ ↑ ↑ ↑ ↑ ↑

(cube roots x 2) $(x+2)\,(x^2-2x+2^2)$

So: $x^3+8 = x^3+2^3 = (x+2)\,(x^2-2x+4)$

Note: the middle sign of the trinomial is opposite of the binomial

3. To prove your answer is right multiply $(x+2)(x^2-2x+4)$ → using the distributive property :

↔

$(x+2)(x^2-2x+4)$

↔

So: $x^3-2x^2+4x+2x^2-4x+8$ Simplify by canceling like terms

You get x^3**+8** which proves that your answer is correct.