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

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

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 :

$\leftrightarrow$

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

$\leftrightarrow$

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.