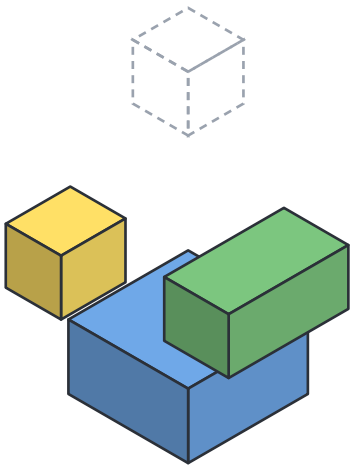
Name _____ Date _____

The Sum and Difference of Cubes

Example



Take the cube b^3 out of the cube a^3

. What is left is three boxes, and each has an edge $a - b$:

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

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

Remember

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ and $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$. Signs: **the same, the opposite, always plus**. Don't confuse it with $(a-b)^3$, and the second factor is not the square of a binomial.

1 ON YOUR OWN **Check by multiplying** that $(x-2)(x^2+2x+4) = x^3 - 8$.

×	x^2	$2x$	4
x			
-2			

Sum of all the products:

2 ON YOUR OWN Factorise.

$x^3 - 27 =$ _____

$a^3 + 8 =$ _____

$8y^3 - 1 =$ _____

$27a^3 + b^3 =$ _____

$x^3 - 64y^3 =$ _____

$1 + 125a^3 =$ _____

Names (pair) _____ Date _____

3 IN PAIRS **Similar but different.** Match each expression at the top with the equal one at the bottom. Check with $a = 3, b = 1$.

A	B	C	D
$(a-b)^3$	$a^3 - b^3$	$(a-b)^2$	$a^2 - b^2$
1	**2**	**3**	**4**
$(a-b)(a+b)$	$a^3 - 3a^2b + 3ab^2 - b^3$	$(a-b)(a^2+ab+b^2)$	$a^2 - 2ab + b^2$

A → ☐ B → ☐ C → ☐ D → ☐

4 ON YOUR OWN **With numbers.** Factorise $1000 - 1 = 10^3 - 1^3$ and $125 + 8 = 5^3 + 2^3$ using the formulas.

$999 =$ ☐

$133 =$ ☐

5 IN A GROUP **The sum of cubes from the cube.** Subtract $3a^2b + 3ab^2 = 3ab(a+b)$ from $(a+b)^3$ and factor out $a+b$.

$a^3 + b^3 = (a+b)^3 - 3ab(a+b) =$ ☐

The Binomial Cube app · otooly.com/binomial-cube

In the $a^3 - b^3$ mode take the cube apart and look at the three boxes.

6 ON YOUR OWN Simplify.

$(a-b)(a^2+ab+b^2) + (a+b)(a^2-ab+b^2) =$ ☐

★ ON YOUR OWN **Exit card.** Factorise: $x^3 + 1 =$ ☐