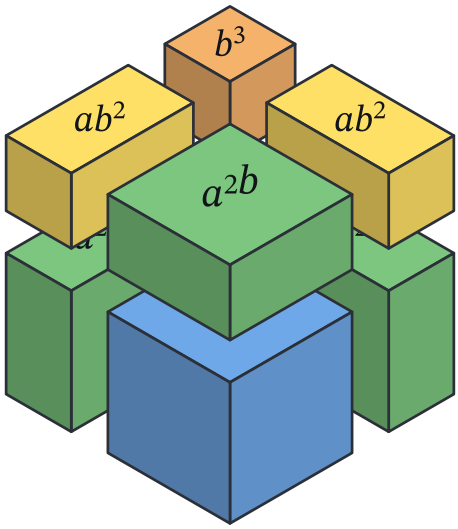
Names (group) _____ Date _____

The Cube of a Sum and of a Difference

Example



A cube with edge $a + b$ comes apart into 8 pieces:

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

The cube of a difference: $(a - b)^3 = (a + (-b))^3$

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

Remember

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ and $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$. The coefficients 1, 3, 3, 1 are a row of Pascal's triangle. Careful: $(a + b)^3$ is **not** $a^3 + b^3$.

1 IN A GROUP **Count the pieces of the cube.** For $a = 3$ and $b = 2$ work out the volume of each kind of piece and check that the total is $5^3 = 125$.

Piece	How many?	Volume of one	Total
a^3			
a^2b			
ab^2			
b^3			

Names (pair) _____ Date _____

2 ON YOUR OWN Use the formula.

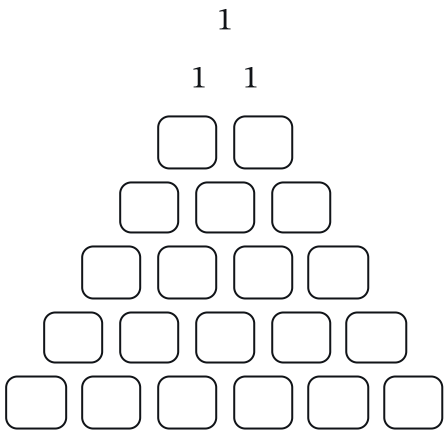
$(x+1)^3 =$ ☐

$(a-2)^3 =$ ☐

$(2x+1)^3 =$ ☐

$(x-3y)^3 =$ ☐

3 IN PAIRS **Pascal's triangle.** Each number is the sum of the two numbers above it. Fill in the rows and write $(a+b)^4$.



$(a+b)^4 =$ ☐

4 ON YOUR OWN **With numbers.** Work out $11^3 = (10+1)^3$ and $9^3 = (10-1)^3$ using the formulas.

$11^3 =$ ☐

$9^3 =$ ☐

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

Take the cube apart, tap a term of the formula and see which pieces it is.

★ ON YOUR OWN **Exit card.** $(x-1)^3 =$ ☐