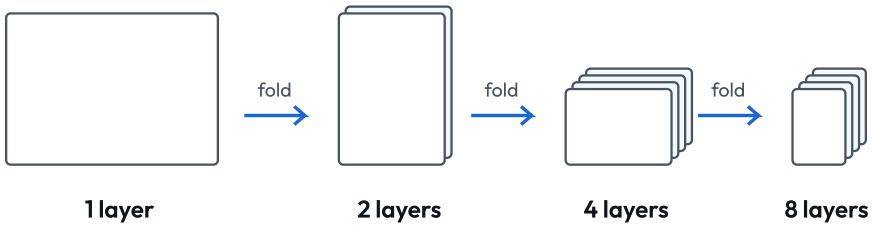
Names (pair) _____ Date _____

Growing by Multiplying

Example

Fold a sheet of paper in half, then in half again, and again. Each fold **doubles** the number of layers: we do not add the same number, we **multiply by the same number**.



$1 \rightarrow 2 \rightarrow 2 \times 2 = 4 \rightarrow 2 \times 2 \times 2 = 8$

1 IN PAIRS Fold a sheet of paper in half as many times as you can. Record the number of layers. Then continue the table by calculating.

folds	0	1	2	3	4	5	6	7	8
layers	1	2							

How many layers would there be after 10 folds? How did you work it out?

2 IN PAIRS Ana saves: each day she puts 2 euros **more** into her money box than the day before (on day one, 2 euros). Ivan puts in 2 euros on day one, then each day **twice as much** as the day before. Complete the table.

day	1	2	3	4	5	6	7	8
Ana (+ 2)	2	4	6					
Ivan (× 2)	2	4	8					

On the first two days they both put in the same. What happens after that? Describe the difference in words.

Names (pair) _____ Date _____

Remember

A sum of equal addends is written in short with multiplication: $3 + 3 + 3 + 3 = 4 \times 3$. A product of equal factors is written in short as a **power**: $3 \times 3 \times 3 \times 3 = 3^4$. We read it "three to the power of four". The number 3 is the **repeated factor**, and the small raised number tells us **how many factors** there are.

3 ON YOUR OWN Adding the same number or multiplying by the same number? Complete and work out the value.

	sum	product
three twos	$2 + 2 + 2 =$ ☐	$2 \times 2 \times 2 =$ ☐
four threes	$3 + 3 + 3 + 3 =$ ☐	$3 \times 3 \times 3 \times 3 =$ ☐
three fives	☐ = ☐	☐ = ☐
five tens	☐ = ☐	☐ = ☐

4 IN PAIRS **Find the mistake.** Luke says: "$2 \times 2 \times 2 = 6$, because there are three twos." What did Luke actually work out? How would you explain the difference to him?

5 IN A GROUP CHALLENGE Put 1 grain of rice on the first square of a chessboard, 2 on the second, 4 on the third, and so on: twice as many on each next square. On which square are there more than $1{,}000$ grains for the first time? Write the number of grains on that square as a product of twos.

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Starting from 1 mode: start from 1 and press **× 2**. Watch the chain of steps and the step counter. Try **× 3** too.

★ ON YOUR OWN **Exit card.** Work out and compare: $5 + 5 + 5 =$ ☐ $5 \times 5 \times 5 =$ ☐

Write as a power: $5 \times 5 \times 5 =$ ☐