MATHEMATICS · GRADES 7-9

Exponents as repeated multiplication

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is the shorthand for writing a number multiplied by itself. The area of a square floor is its side times itself, and the number of bacteria after a few doublings is two times itself again and again. Writing it as a power keeps the calculation short and readable. It is the first step toward all the power rules that come later.



Rule

Exponent: a^n means the base a multiplied by itself n times, where n is the exponent.

So $2^4 = 2 \times 2 \times 2 \times 2 = 16$.

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Worked examples

EXAMPLE 1

Q Write 2^4 as repeated multiplication and work it out.

SOLUTION

An exponent tells you how many times to multiply the base by itself: 2^4 means 2 multiplied by itself 4 times.

$2 \times 2 \times 2 \times 2 = 16$

EXAMPLE 2

Q Write 5^3 as repeated multiplication and work it out.

SOLUTION

5^3 means 5 multiplied by itself 3 times.

$5 \times 5 \times 5 = 125$

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Practice questions

1 A square has side 4 cm. Its area is 4^2 square centimetres. Which shows 4^2 as repeated multiplication, worked out?

- **A** $4 \times 4 = 8$
- **B** $4 \times 4 \times 4 = 64$
- **C** $4 \times 4 = 16$
- **D** $4 \times 2 = 8$

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2 A square garden has side 6 m. Its area is 6^2 square metres. Which shows 6^1 as repeated multiplication, worked out?

- **A** $6 = 6$
- **B** $6 \times 6 = 36$
- **C** $6 \times 1 = 6$
- **D** $1 \times 1 \times 1 \times 1 \times 1 \times 1 = 1$

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3 A bacteria doubles 5 times. The number of bacteria is 2^5. Which shows 2^5 as repeated multiplication, worked out?

- **A** $2 \times 2 \times 2 \times 2 \times 2 = 32$
- **B** $2 \times 5 = 10$
- **C** $2 \times 2 \times 2 \times 2 = 16$
- **D** $2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

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4 A cube has side 3 cm. Its volume is 3^3 cubic centimetres. Which shows 3^3 as repeated multiplication, worked out?

- **A** $3 \times 3 = 9$
- **B** $3 \times 3 \times 3 = 27$
- **C** $3 \times 3 \times 3 \times 3 = 81$
- **D** $3 \times 3 \times 3 = 9$

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5 A square has side 10 m. Its area is 10^2 square metres. Which shows 10^0 as repeated multiplication, worked out?

- **A** 1
- **B** 10 × 0 = 0
- **C** 0 × 0 = 0
- **D** 10 = 10

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6 A sheet of paper is folded in half 5 times. The number of layers is a power of 2. Which power is it?

- **A** 2^5
- **B** 5^2
- **C** 2 × 5
- **D** 5^5

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7 A chessboard has 8 rows of 8 squares. How many squares are there in total?

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8 A player's score is multiplied by −2 three times, starting from 1: $(-2)^3$. Which shows $(-2)^3$ as repeated multiplication, worked out?

A (-2) × (-2) × (-2) = -8

B (-2) × (-2) × (-2) = 8

C (-2) × (-2) = 4

D (-2) × 3 = -6

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9 A square field has side 7 m. Its area is 7^2 square metres. Which of these is NOT equal to 7^2?

- **A** $7 \times 7 = 49$
- **B** 49
- **C** $7 \times 2 = 14$
- **D** 7×7

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10 A coin is flipped 4 times. The number of possible outcomes is 2^4. Which shows it as repeated multiplication, worked out?

- **A** $2 \times 2 \times 2 = 8$
- **B** $2 \times 2 \times 2 \times 2 = 16$
- **C** $2 \times 4 = 8$
- **D** $2 \times 2 \times 2 \times 2 \times 2 = 32$

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ANSWER KEY

1. $4 \times 4 = 16$

2. $6 = 6$

3. $2 \times 2 \times 2 \times 2 \times 2 = 32$

4. $3 \times 3 \times 3 = 27$

5. 1

6. 2^5

7. 64

8. $(-2) \times (-2) \times (-2) = -8$

9. $7 \times 2 = 14$

10. $2 \times 2 \times 2 \times 2 = 16$

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