Your notes

KS3 Maths: revision notes

# Powers and roots

## Contents

1. Squares, cubes and roots
2. Powers
3. Order of operations
4. Key terms
5. Quick questions
6. What to do next

## Squares, cubes and roots

- $7^2 = 7 \times 7 = 49$, and $\sqrt{49} = 7$. Every positive number has two **square roots**: 6 and –6 both square to 36.
- $4^3 = 4 \times 4 \times 4 = 64$, and the **cube root** of 64 is 4.
- Estimate roots using **square numbers**: $\sqrt{50}$ is between 7 and 8, because $49 < 50 < 64$.

## Powers

- $2^5$ means $2 \times 2 \times 2 \times 2 \times 2 = 32$. The small number is the power (or index).
- Multiplying powers of the same number: add the powers: $3^4 \times 3^2 = 3^6$.
- Dividing: subtract the powers: $5^7 \div 5^3 = 5^4$.
- A power of a power: multiply the powers: $(2^3)^2 = 2^6$.
- Any number (except 0) to the power 0 is 1: $10^0 = 1$.

## Order of operations

- **BIDMAS**: Brackets, Indices (powers), then Division and Multiplication (left to right), then Addition and Subtraction (left to right).
- $3 + 4 \times 2 = 3 + 8 = 11$, but $(3 + 4) \times 2 = 14$.
- $3 + 4 \times 2^2 = 3 + 4 \times 4 = 3 + 16 = 19$.

## Key terms

| | |
|---|---|
| **Square number** | A number multiplied by itself. |
| **Square root** | A number that multiplies by itself to give the original number. |
| **Cube number** | A number multiplied by itself twice. |
| **Cube root** | A number that cubes to give the original number. |

© LycoLearn · lycolearn.co.uk · Free GCSE and KS3 revision

| | |
|---|---|
| **Power (index)** | The small number that shows how many times to multiply a number by itself. |
| **Index laws** | Rules for multiplying and dividing powers of the same number. |
| **BIDMAS** | The order of operations: brackets, indices, division and multiplication, addition and subtraction. |

## Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is $7^2$?
2. What is $\sqrt{81}$?
3. What is $4^3$?
4. What is the cube root of 27?
5. What is $2^5$?
6. What is $3^4 \times 3^2$ as a power of 3?
7. What is $5^7 \div 5^3$ as a power of 5?
8. What is $(2^3)^2$ as a power of 2?

### Answers

1. 49
2. 9
3. 64
4. 3
5. 32
6. $3^6$
7. $5^4$
8. $2^6$

## What to do next

**Practise 14 questions on this topic**

**Try 4 exam questions, with mark schemes**

**Read the lesson, one step at a time**

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

Your notes