

Understanding Place Value

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Key concepts, terminology, and examples for mastering the foundation of our number system.

1. What Is Place Value?

- **Definition:** The value of a digit depends on its position (place) within a number.
- **Base-10 system:** Each place represents a power of 10 (... , 10^0 , 10^3 , 10^2 , 10^1 , 10^0 , 10^{-1} , 10^{-2} ...).
- **Why it matters:** Enables us to read, write, compare, and perform operations with large numbers efficiently.

2. The Standard Place Value Chart (Whole Numbers)

Position	Name	Power of 10	Example (in 5,432)
10^4	Ten-thousands	10,000	0 (no digit)
10^3	Thousands	1,000	5 × 5,000
10^2	Hundreds	100	4 × 400
10^1	Tens	10	3 × 30
10^0	Ones	1	2 × 2

The digit's **face value** is the digit itself (e.g., 4).

The **place value** is the face value multiplied by its positional weight (e.g., $4 \times 100 = 400$).

3. Extending to Decimals

Position	Name	Power of 10	Example (in 7.842)
10^{-1}	Tenths	0.1	8 × 0.8
10^{-2}	Hundredths	0.01	4 × 0.04
10^{-3}	Thousandths	0.001	2 × 0.002

- Digits right of the decimal point have **negative exponents**.
- The same rule applies: *digit* × *positional weight*.

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4. Reading and Writing Numbers Using Place Value

1. Identify each digit and its position.
2. Multiply the digit by its place value.
3. Add the results.

Example: 3,209

Digit	Position	Weight	Calculation
3	Thousands	1,000	$3 \times 1,000 = 3,000$
2	Hundreds	100	$2 \times 100 = 200$
0	Tens	10	$0 \times 10 = 0$
9	Ones	1	$9 \times 1 = 9$
Total			3,209

5. Common Misconceptions

Misconception	Correct Understanding
"The digit 5 always means five."	In 5,000, the digit 5 means $5 \times 1,000 = 5,000$.
"Zeros don't matter."	Zeros are placeholders that define the magnitude of other digits.
"Place value only applies to whole numbers."	It