

The Panda Math Tutor

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Standard Form

IGCSE Mathematics

Prepared by

Nikolas Agisilaou

Quality Mathematics Education for Students

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1 Introduction to Standard Form

Note

Standard form (also called scientific notation) is a convenient way of writing very large or very small numbers. Scientists, engineers, and mathematicians use standard form every day to handle numbers like the distance between planets or the size of atoms.

In this chapter, we will explore:

- What standard form is and why we use it
- Converting ordinary numbers to standard form
- Converting standard form back to ordinary numbers
- Ordering and comparing numbers in standard form
- Performing calculations in standard form
- Using your calculator with standard form
- Real-world applications

2 What is Standard Form?

Definition

A number is in **standard form** when it is written as:

$$a \times 10^n$$

where:

- a is a number such that $1 \leq a < 10$ (i.e. a has exactly one non-zero digit before the decimal point)
- n is an integer (positive, negative, or zero)

Examples:

- $3.2 \times 10^5 = 320\,000$
- $7.08 \times 10^{-3} = 0.00708$

Note**Key Facts:**

- If the original number is large (≥ 10), the power n is **positive**
- If the original number is between 1 and 10, the power n is **zero**
- If the original number is small (< 1), the power n is **negative**

Warning

Common Mistake: Not all expressions with $\times 10^n$ are in standard form!
The value of a must satisfy $1 \leq a < 10$.

NOT standard form:

- 32×10^4 ($a = 32$, which is ≥ 10)
- 0.5×10^6 ($a = 0.5$, which is < 1)

Correct standard form:

- $32 \times 10^4 = 3.2 \times 10^5$
- $0.5 \times 10^6 = 5 \times 10^5$

3 Converting Ordinary Numbers to Standard Form

3.1 Large Numbers

Method**Converting Large Numbers to Standard Form**

Step 1: Place the decimal point after the first non-zero digit to get the value of a

Step 2: Count how many places the decimal point has moved from its original position

Step 3: This count becomes the positive power n

Step 4: Write as $a \times 10^n$

Preview ends here

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