MATHEMATICS · GRADES 7-9

Standard form versus scientific notation

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you sort out two names that mean different things in different classrooms, so you can tell whether a question wants the ordinary number or the short scientific form. In some places standard form means the ordinary written out number, while in others it means the scientific form, and mixing them up gives the wrong answer. Knowing which meaning your class uses tells you what form the answer should be in. That keeps you from losing marks over a naming difference, instead of over the maths itself.



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Rule

Scientific notation: a number written as one non-zero digit before the point, times a power of ten, such as 4.5×10^3.

In many curricula this is also called standard form. In others, standard form means the ordinary written-out number, such as 4,500. Check which meaning your question wants.

Worked examples

EXAMPLE 1

Q **Is 4.5×10^3 in scientific notation? If so, write it in ordinary form.**

SOLUTION

This is an is-it-scientific-notation question, so start with the one rule to remember: a number is in scientific notation when it is a number from 1 up to but not including 10, times 10 to a power.

Here the first part is 4.5, which is between 1 and 10, so it is in scientific notation. The power of 3 means move the decimal point 3 places to the right.

So the number is 4,500 in ordinary form.

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EXAMPLE 2

Q Write 0.00072 in scientific notation.

SOLUTION

This is a small-number question, so the rule is the same, but the power will be negative, because a negative power means move the decimal point to the left.

Move the decimal point right until the number is between 1 and 10: 0.00072 becomes 7.2, and the point moved 4 places, so the power is –4.

So the answer is 7.2×10^{-4}.

Practice questions

1 How is 6,700 written in scientific notation?

A 67×10^{2}

B 6.7×10^{3}

C 6.7×10^{2}

D 67×10^{3}

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2 **Write 3.4×10^2 in ordinary form.**

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3 **Is 45×10^3 in scientific notation?**

A Yes

B No

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4 **Is 6.8×10^4 in scientific notation?**

A Yes

B No

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5 Change 0.0081 into scientific notation.

A 8.1×10^{3}

B 8.1×10^{-3}

C 8.1×10^{-2}

D 81×10^{-4}

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6 Write 9.9×10^{4} in ordinary form.

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7 Put 250,000 in scientific notation.

- **A** 25×10^4
- **B** 2.5×10^6
- **C** 2.5×10^5
- **D** 0.25×10^6

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8 What is 1×10^0 in ordinary form?

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9 Express 0.5 in scientific notation.

- **A** 5×10^{-1}
- **B** 5×10^{1}
- **C** 0.5×10^{0}
- **D** 5×10^{-2}

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10 Write 12,300,000 in scientific notation.

- **A** 12.3×10^{6}
- **B** 1.23×10^{6}
- **C** 123×10^{5}
- **D** 1.23×10^{7}

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ANSWER KEY

1. 6.7×10^{3}

2. 340

3. No

4. Yes

5. 8.1×10^{-3}

6. 99000

7. 2.5×10^{5}

8. 1

9. 5×10^{-1}

10. 1.23×10^{7}

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