MATHEMATICS · GRADES 7-9

Scientific notation

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you write the distance to the Moon or the mass of a speck of dust in a short, readable form instead of a long string of zeros. A student writing the distance to the Moon in kilometres would fill a line with zeros, but the short form fits in a few characters. An engineer writing the mass of a speck of dust avoids a decimal that is mostly zeros. Knowing scientific notation tells you how to keep very large and very small numbers short, readable, and easy to compare.



Rule

Scientific notation: a number is written as $a \times 10^n$, where a is at least 1 and less than 10.

The power tells you how many places the decimal point moved, positive for a big number and negative for a small one.

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Worked examples

EXAMPLE 1

Q Write 6,400,000 in scientific notation

SOLUTION

Picture it

Write 6,400,000 in scientific notation

Work it one step at a time, top to bottom.

Move the decimal point until one non-zero digit is left of it: 6.4.

Count the places moved: 6 places to the left.

So $6{,}400{,}000 = 6.4 \times 10^6$

EXAMPLE 2

Q Write 3.2×10^5 as an ordinary number

SOLUTION

Picture it

Write 3.2×10^5 as an ordinary number

Work it one step at a time, top to bottom.

The exponent 5 means move the decimal point 5 places right.

Move it: 3.2 becomes 320,000.

So $3.2 \times 10^5 = 320{,}000$

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Practice questions

1 The Moon is 384,000 km away. Write it in scientific notation.

- **A** 3.84×10^5
- **B** 3.84×10^4
- **C** 38.4×10^5
- **D** 3.84×10^6

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2 A speck of dust has a mass of 0.0000007 g. Write it in scientific notation.

- **A** 7×10^{-7}
- **B** 7×10^7
- **C** 7×10^{-6}
- **D** 0.7×10^{-7}

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3 Write 2.5×10^4 as an ordinary number.

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4 Write 6,300,000 in scientific notation.

A 6.3×10^5

B 6.3×10^6

C 63×10^6

D 6.3×10^7

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5 A pill holds 8×10^{-3} g of medicine. How many grams is that?

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6 A city has 1,200,000 people. Write it in scientific notation.

- **A** 1.2×10^{7}
- **B** 12×10^{6}
- **C** 1.2×10^{6}
- **D** 1.2×10^{5}

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7 Write 0.000091 in scientific notation.

- **A** 9.1×10^{5}
- **B** 9.1×10^{-4}
- **C** 9.1×10^{-5}
- **D** 91×10^{-5}

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8 A builder measures 4.6×10^2 cm of timber. How many centimetres is that?

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9 Which is larger: 7×10^3 or 7×10^4?

A 7×10^3

B 7×10^4

C They are equal

D 7×10^5

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10 A river is 2,750,000 m long. Write it in scientific notation.

- **A** 2.75×10^{6}
- **B** 2.75×10^{5}
- **C** 27.5×10^{6}
- **D** 2.75×10^{7}

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ANSWER KEY

1. 3.84×10^{5}

2. 7×10^{-7}

3. 25,000

4. 6.3×10^{6}

5. 0.008

6. 1.2×10^{6}

7. 9.1×10^{-5}

8. 460

9. 7×10^{4}

10. 2.75×10^{6}

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