SCIENCE FOUNDATIONS

Significant figures

Difficulty level: Intermediate

Science Foundations

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Overview of the concept

This is how you report a calculated result honestly, like a drug dose or a bridge measurement, without pretending the answer is more precise than the measurements that went into it. A pharmacist who calculates a dose from a rough weight does not report it to five decimal places, because the weight was never that precise. An engineer reporting a beam length keeps only the digits the measuring tool could actually support. Knowing significant figures tells you how many digits your answer has earned, and when extra digits are just decoration.



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Rule

Significant figures: leading zeros do not count, because they only place the decimal point. Zeros between digits count. Zeros after the decimal point count. Trailing zeros with no decimal point shown do not count: 500 g has 1 significant figure.

When you multiply or divide, round the answer to the fewest significant figures in the inputs.

Worked examples

EXAMPLE 1

Q **Count significant figures in 0.00450.**

SOLUTION

Skip the leading zeros: all they do is place the decimal point.

Count from the first non-zero digit: 4, 5, and the final 0.

Total the digits counted.

The result is 3 significant figures.

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EXAMPLE 2

Q Multiply 2.5 by 3.42 and round correctly.

SOLUTION

Multiply:

2.5 × 3.42 = 8.55

Find the least precise input: 2.5 has two significant figures.

Round the answer to two significant figures.

The result is 8.6.

Practice questions

1 **How many significant figures are in 0.02040 g?**

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2 **How many significant figures are in 0.000402 L?**

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3 Round 4.567 to three significant figures.

- A 4.57
- B 4.56
- C 4.6
- D 4.567

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4 Multiply 3.6 cm by 2.14 cm and round the area correctly.

- A 7.7 cm^2
- B 7.70 cm^2
- C 7.704 cm^2
- D 7.8 cm^2

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5 Divide 12.6 by 3.2 and round the answer correctly.

- **A** 3.9
- **B** 3.94
- **C** 3.9375
- **D** 4.0

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6 How many significant figures are in 1002 m?

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7 How many significant figures are in 500 g, with no decimal point shown?

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8 Do leading zeros count as significant figures?

A Yes

B No

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9 Do zeros between digits count as significant figures?

A Yes

B No

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10 **How many significant figures should the answer to 2.5×3.42 have?**

A 2

B 3

C 4

D 5

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ANSWER KEY

1. 4

2. 3

3. 4.57

4. 7.7 cm^2

5. 3.9

6. 4

7. 1

8. No

9. Yes

10. 2

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