

Units and Measurement · Concept 2

Significant Figures — The Rules That Decide Precision

A visual guide to the typography
of physical measurements.

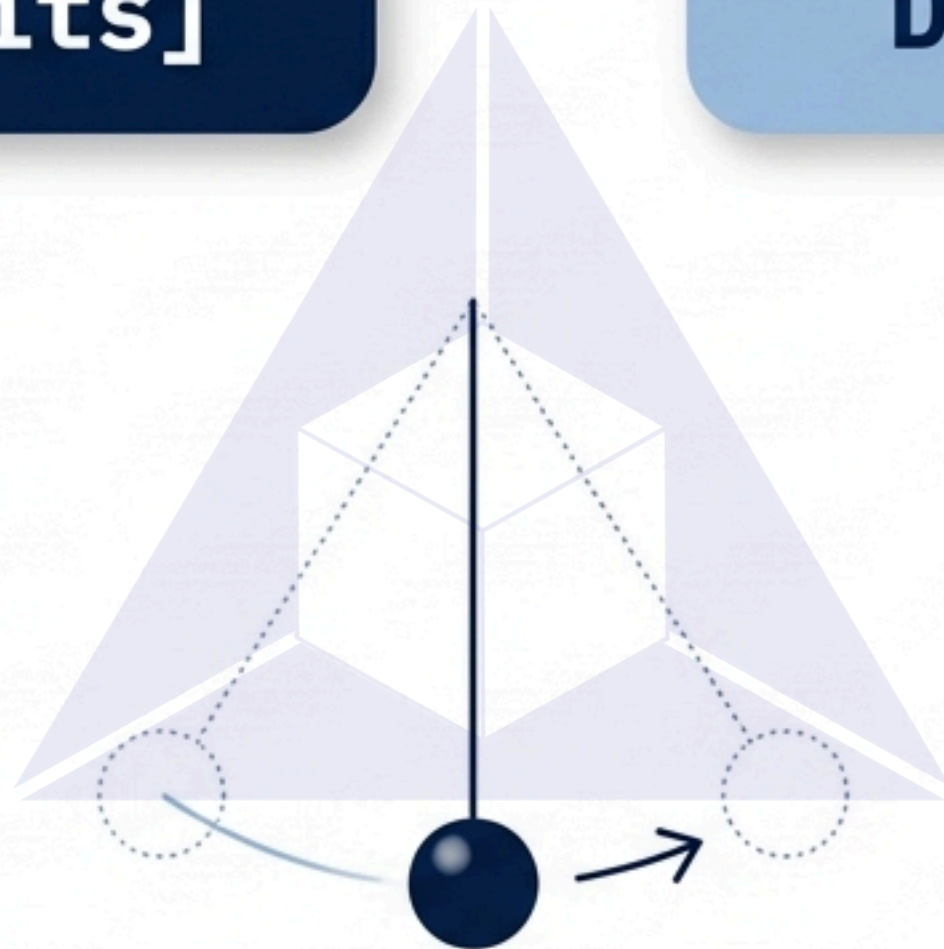
[All
Reliable
Digits]

+

[The First
Uncertain
Digit]

=

[Significant
Figures]



Reliable and certain



Uncertain

Total: 3 Significant Figures

The Taxonomy of Zeros

Sandwiched Zeros

Always significant.

205

Leading Zeros

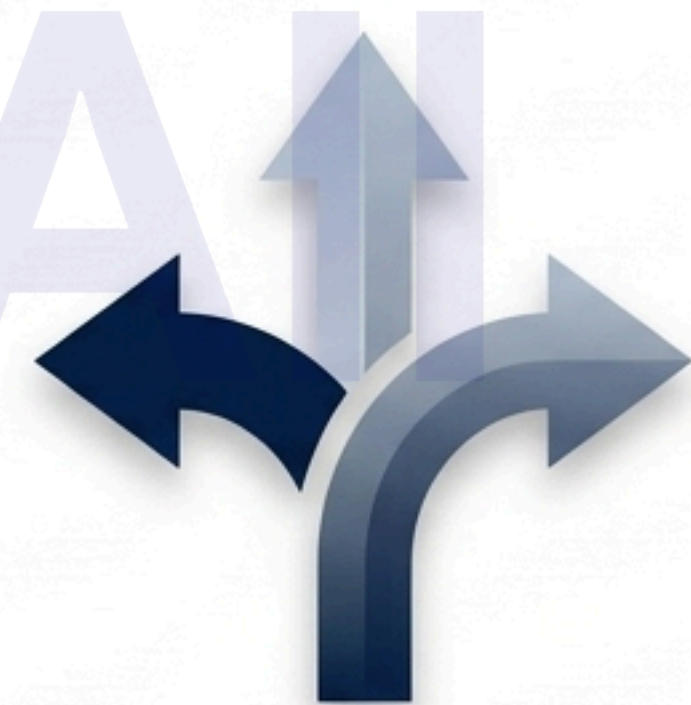
Never significant; mere placeholders for numbers < 1 .

0.0025

2 Significant Figures

Trailing Zeros

The Wildcard. Conditionally significant based on context.





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$$E=mc^2$$



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$$\mathbf{123 \text{ m} = 12300 \text{ cm} = 123000 \text{ mm}}$$

All three values have exactly 3 significant figures. The trailing zeros are merely placeholders to accommodate the smaller unit.



Converting units never changes the number of significant figures.

Do not be tricked by numbers that ‘look’ larger after converting from meters to millimeters. The precision of the original measuring instrument remains unchanged.

The Decimal Switch

The Placeholder

123000

No decimal point. Zeros are non-significant placeholders.

3 Sig Figs

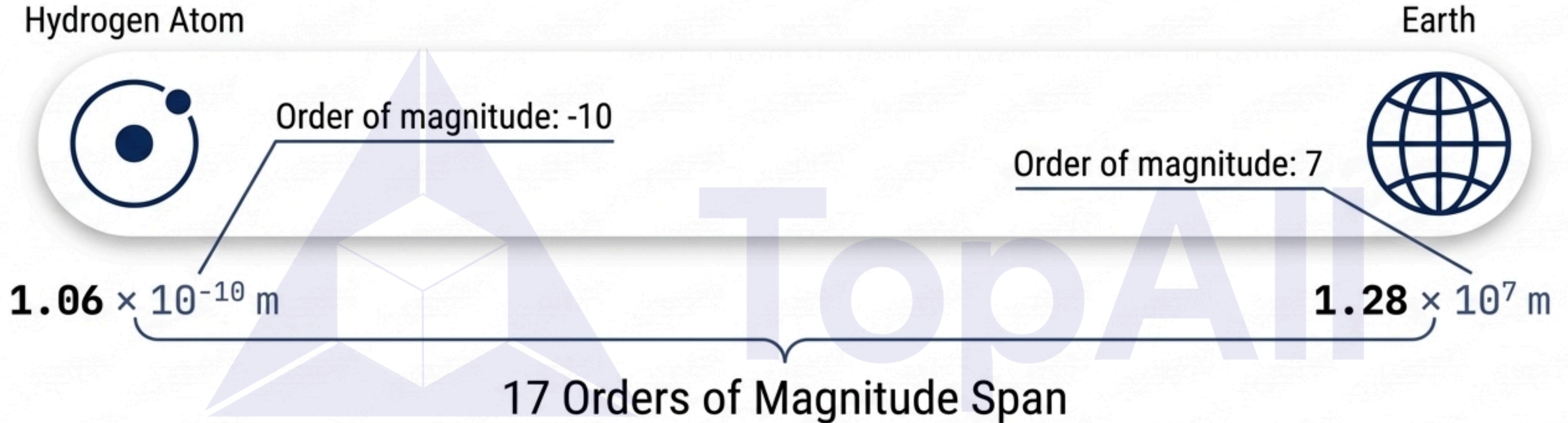
The Decimal Switch

3.500
0.06900

Decimal point present. Trailing zeros are intentionally measured precision.

Both have 4 Sig Figs

$$a \times 10^b$$



The base number 'a' purely communicates the precision. The exponent " 10^b " handles the scale, removing all ambiguous placeholder zeros.



**Sig figs measure precision,
not the unit chosen; a decimal
point is what activates trailing
zeros as significant.**



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