

Scientific Measurement

Accuracy—the closeness of a measurement to the accepted value.
Precision—how close a set of measurements are to one another.

Accepted Value	Data Set	Accuracy?	Precision?
10.0g	9g, 8g, 5g		
10.0g	9.9g, 9.8g, 10.1g		
10.0g	7.2g, 7.0g, 7.1g		

Reliable data have both accuracy and precision!

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Significant Figures

Significant Figures: all of the known digits in a measurement with one final digit that is estimated.

Is the measure of the line above 11.50cm, 11.51cm, or 11.52cm ?

certainty uncertainty

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Rules for Significant Figures

- Exact numbers have infinite significant figures
Ex) 5 apples, 10 fingers, 3 pennies
- All non-zero numbers are significant
Ex) 1, 2, 3, 4, 5, 6, 7, 8, 9
- Sandwiched zeros ARE significant
Ex) 1.01, 505, 1.002
- Zeros in front of only other zeros are NOT significant
Ex) 0.03, 0.00005, 0.000000000000006
- Placeholder zeros are NOT significant UNLESS there is a decimal point at the end of the number.
Ex) NOT SIGNIFICANT: 100 g, 5,000mL
Ex) SIGNIFICANT: 100. g, 5,000. mL
What is the difference in meaning?
- Zeros at the END of a number AND to the RIGHT of a decimal ARE SIGNIFICANT
Ex) 1.00, 1.050, 1,000.00

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Addition & Subtraction

Your answer cannot be more precise than the original measurement with the LEAST amount of precision.

$$3.67\text{mL} + 3.510\text{mL} =$$

$$10.90\text{mL} - 2.5\text{mL} =$$

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Multiplication & Division

Answer must have the same number of significant digits as the measurement with the fewest number of SF's.

$$2.50\text{m} \times 2.5\text{m} =$$

$$12.700\text{cm} \times 5.31\text{cm} =$$

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