

# Significant Figures

	Example	Sig. Digits	Sci-Notation
<b>1 All non-zero digits are significant</b>			
	1.589	4	1.589E+00
	0.897	3	8.97E-01
	36000	2	3.6E+04

<b>2 Significant Zero's</b>			
a All sandwiched zero's	13.02	4	1.302E+01
	1.0002	5	1.0002E+00
	10.5	3	1.05E+01
b All trailing zero's preceded by a digit to the right of the decimal point.	5.000	4	5.000E+00
	20.000	5	2.00000E+01
	15.00	4	1.500E+01

<b>3 Non significant Zero's</b>			
a Leading Zeros	0.0200	3	2.00E-02
	0067	2	6.7E+01
b Trailing Zero's to the left of the decimal point in a number without a decimal point	56000	2	5.6E+04
	1360	3	1.36E+03

\*NOTE: Write the numbers in exponential notation if you have any doubt. All zeros used to indicate the power of 10 (order of magnitude) are not significant.

## Rounding Off

1 If the last digit to be retained in a number is followed by a number less than 5 (<5),

### ROUND DOWN.

Round to 3 significant figures:

28.23	rounds to	28.2
578.1	rounds to	578

2 If the last digit to be retained in a number is followed by a number greater than 5 (>5),

### ROUND UP.

Round to 2 significant figures:

5.998	rounds to	6.0
0.00258	rounds to	0.0026
3.6502	rounds to	3.7

3 If the last digit to be retained in a number is followed by 5 (0000000... implied),

### ROUND the last digit retained to an EVEN NUMBER.

Round to 2 significant figures:

1.75	rounds to	1.8
1.050	rounds to	1.0
1.45	rounds to	1.4

Round to 4 significant figures:

67.835	rounds to	67.84
67.885	rounds to	67.88

# Calculations

## Uncertainty and Significant Figures

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The **Least Accurate Number (LAN)** determines the number of digits to which the answer is expressed.

### ***Addition and Subtraction***

1. The LAN is the number with the least number of digits following the decimal point.
2. The answer (*sum* or *difference*) can have no more digits *following* the decimal point than the LAN.

Example:

What is the total mass of a mixture made by mixing the following substances?

212	g water (LAN)
1.8	g salt
1.88	g sugar
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<del>215.98</del>	<del>g (incorrect)</del>
216	g (correct)

### **Multiplication and Division**

1. The LAN is the number with the least number of significant figures.
2. The answer (*product* or *quotient*) can have no more significant figures than the LAN.

Example:

Calculate the volume of a rectangular solid that has a length of 4.16 cm, a width of 2.2 cm, and a height of 2.00 cm.

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$

$$\text{Volume} = (4.16\text{cm}) (2.2\text{cm}) (2.00\text{cm})$$

LAN

$$\text{Volume} = \del{18.304 \text{ cm}^3} \text{ (incorrect)}$$

$$\text{Volume} = 18 \text{ cm}^3 \text{ (correct)}$$