

<u>RULE</u>	<u>EXAMPLES</u>
1. Zeros appearing between nonzero digits are significant.	a. 40.7 L has three significant figures b. 87 009 km has five significant figures
2. Zeros appearing in front of all nonzero digits are not significant.	a. 0.095 897 m has five significant figures b. 0.0009 kg has one significant figure
3. Zeros at the end of a number and to the right of a decimal point are significant.	a. 85.00 g has four significant figures. b. 9.000 000 000 mm has 10 significant figures
4. Zeros at the end of a number but to the left of a decimal point may or may not be significant. If a zero has not been measured or estimated but is just a placeholder, it is not significant. A decimal point placed after zeros indicates that they are significant.	a. 2000 m may contain from one to four significant figures, depending on how many zeros are placeholders. For measurements given in this text, assume that 2000 m has one significant figure. b. 2000. M contains four significant figures, indicated by the presence of the decimal point.

Rounding

When you perform calculations involving measurements, you need to know how handle significant figures. This is especially true when you are using a calculator to carry out mathematical operations. The answers given on a calculator can be derived results with more digits than are justified by the measurements.

<u>If the digit following the last digit to be retained is:</u>	<u>Then the last digit should:</u>	<u>Example (rounded to three significant figures)</u>
Greater than 5	Be increased by 1	42.68 g: 42.7 g
Less than 5	Stay the same	17.32 m: 17.3 m
5, followed by nonzero digit(s)	Be increased by 1	2.7851 cm: 2.79 cm
5, not followed by nonzero digit(s), and preceded by an odd digit	Be increased by 1	4.635 kg: 4.64 kg (because 3 is odd)
5, not followed by nonzero digit(s), and the preceding significant digit is even	Stay the same	78.65 mL: 78.6 mL (because 6 is even)

Addition or Subtraction with Significant Figures

When adding or subtracting decimals, the answer must have the same number of digits to the right of the decimal point as there are in the measurement having the fewest digits to the right of the decimal point.

Multiplication and Division with Significant Figures

For multiplication or division, the answer can have no more significant figures than are in the measurement with the fewest number of significant figures.

Scientific Notation

In **scientific notation**, numbers are written in the form $M \times 10^n$, where the factor M is a number greater than or equal to 1 but less than 10 and n is a whole number.

Mathematical Operations Using Scientific Notation

1. *Addition and subtraction* These operations can be performed only if the values have the same exponent (n factor). If they do not, adjustments must be made to the values so that the exponents are equal. Once the exponents are equal, the M factors can be added or subtracted. The exponent of the answer can remain the same,