scientific notation and show the first two digits as significant, you would write the following.

$$6.5 \times 10^4 \text{ km}$$

Writing the M factor as 6.5 shows that there are exactly two significant figures. If, instead, you intended the first three digits in 65 000 to be significant, you would write 6.50×10^4 km. When numbers are written in scientific notation, only the significant figures are shown.

Suppose you are expressing a very small quantity, such as the length of a flu virus. In ordinary notation this length could be 0.000 12 mm. That length can be expressed in scientific notation as follows.

$$0.000\,12 \text{ mm} = 1.2 \times 10^{-4} \text{ mm}$$

Move the decimal point four places to the right, and multiply the number by 10^{-4}.

1. Determine M by moving the decimal point in the original number to the left or the right so that only one nonzero digit remains to the left of the decimal point.
2. Determine n by counting the number of places that you moved the decimal point. If you moved it to the left, n is positive. If you moved it to the right, n is negative.

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, or it may then require adjustment if the M factor of the answer has more than one digit to the left of the decimal point. Consider the example of the addition of 4.2×10^4 kg and 7.9×10^3 kg.

   We can make both exponents either 3 or 4. The following solutions are possible.

$$\begin{array}{rl} 4.2 & \times 10^4 \text{ kg} \\ +0.79 & \times 10^4 \text{ kg} \\ \hline 4.99 & \times 10^4 \text{ kg rounded to } 5.0 \times 10^4 \text{ kg} \end{array}$$

or

$$\begin{array}{rl} 7.9 & \times 10^3 \text{ kg} \\ +42 & \times 10^3 \text{ kg} \\ \hline 49.9 & \times 10^3 \text{ kg} = 4.99 \times 10^4 \text{ kg rounded to } 5.0 \times 10^4 \text{ kg} \end{array}$$

   Note that the units remain kg throughout.