Learning How to Express the Very Large and the Very Small

Scientists (and those studying science) frequently must deal with numbers that are very large or very small. Have you met Avogadro's number yet (6.02×10^{23})? Or have you calculated the wavelength of red light (6.10×10^{-7}m)? If those numbers weren't written the way they are, all of us who must deal with them would be spending much of our time just counting the zeros that separate the figures from the decimal point. To avoid that kind of time-wasting, a method of writing very large and very small numbers was invented. It is called "scientific notation."

The rules for writing numbers in scientific notation are:

1. The first figure is a number from 1 to 9.
2. The first figure is followed by a decimal point and then the rest of the figures.
3. Then multiply by the appropriate power of 10.

Here are some examples:

$425 = 4.25 \times 10^2$

We use a decimal point after the 4, but to make 4.25 equal to 425, we must multiply by 100, or 10^2.

$36000 = 3.6000 \times 10^4$

Decimal point after the 3.
Multiplication by 10,000, or 10^4.

$0.00098 = 9.8 \times 10^{-4}$

This time, after putting the decimal point after the 9, we multiply by 1/10,000, or 10^{-4}.
(You could also think of it as dividing by 10,000.)

$0.0135 = 1.35 \times 10^{-2}$

Decimal point after the 1.
Multiplication by 1/100, or 10^{-2}.