Scientific Notation

In science, we deal with very large numbers and very small numbers. One such large number is 93,000,000. This is the average distance of the Earth to the sun. (This is also one of those numbers I think everyone should know.) One such small number is 0.000 000 000 000 000 000 000 060 221 141 3. This is known as Avogadro's number and is used in chemistry and physics. For mathematicians and scientists to write these types of numbers repeatedly would be impossible. The system of scientific notation was developed in order to ease the notation.

Scientific notation has a form that can be represented by $a \times 10^n$ where $1 \le a < 10$ and *n* is an integer. Notice that this means that *a* can be any number 1.0000… through 9.99999… . That is, there can be only one digit to the left of the decimal point. The number examples given above would then be written as 9.3×10^7 and $6.02211413 \times 10^{-23}$. The integer *n* is determined by direction and scale. That is, any number originally larger than 1 will have an integer exponent on the power of 10 that is positive. Similarly, given a number in scientific notation, the positive exponent tells you that the original number is larger than 1. Any number less than 1 originally, such as Avogadro's number, will have a negative exponent on the power of 10. Given a number in scientific notation, if it has a negative exponent, then the original number must be less than 1.

Practice Problems: Rewrite each of the following in scientific notation.

1) 12,340	2) 0.000 328 9	3) 78,900,000,000
4) 0.000 012 309	5) 25,800,000	6) 0.000 000 0034

Practice Problem Solutions:

1) 1.234×10^{4}
2) 3.289×10^{-4}
3) 7.89×10^{10}
4) 1.2309×10^{-5}
5) 2.58×10^{7}
6) 3.4×10^{-9}