Quick Guide to Order of Operations

To do the operations in the right order, remember **PEMDAS**, which stands for:

- **P** Parentheses, start by working inside parentheses, innermost first.
- **E** Exponents, simplify any exponent expression next.
- **M-D** Multiplication and Division, then work all multiplication and division, from left to right, as they appear.
- **A-S** Addition and Subtraction, finally work all addition and subtraction from left to right.

ACRONYM TIP: **Powerful Earthquakes May Deliver After-Shocks.**

**Example:** What is \(2 + 3 \times 4\) ?

- Do it in your head, and then try it on your calculator.
- If either answer is 20, then think again (and get a better calculator!).
- Don't do the \(2 + 3\) (addition) until all multiplications are done:

\[2 + 3 \times 4 = 2 + 12 = 14\] (the answer!)

**Question:** What's wrong with doing \(2 + 3 = 5\), then \(5 \times 4 = 20\)?

- Some calculators will give you 20; throw them out or send them back to the factory, then get a "scientific" calculator (about \$9).

**Example:** What about **PEMDAS** in \(3 + 4 \times 6\) from the previous section?

- Well, again the multiplication has been done first; \(4 \times 6 = 24\). Answer = 25.

**Prime Numbers and Factorizations**

Primes are a lot of fun for me; they're the "building blocks" of the natural numbers!

First things first: 1 (one) is NOT a prime. Well then, what is?

**Definition:** A prime number is a natural number with exactly two divisors.

- This excludes 1, since it has only itself as a divisor.

Every whole number starting with 2 can be written as a product of primes; for example \(10 = 2 \times 5\) or \(2 \times 5\), while \(36 = 2 \times 2 \times 3 \times 3\). This is called the **prime factorization** of the number, and is what gives each number its own individual character, or "DNA sequence," if you will.

With the help of **exponents**, we can write: \(36 = 2^2 \times 3^2\), or \(1 \text{ million} = 10^6 = (2 \times 5)^6 = 2^6 \times 5^6\).

**How can you tell if a number is prime? . . . (11/97)**

**Let's try 101.** We can try 2, see if it goes into 101 (it doesn't), then 3 (it doesn't either), etc. We don't need to try 4 because 2 didn't go in, so we only need to try dividing in primes. We quickly see that 2, 3, 5, and 7 don't go into 101. The next prime is 11; but \(11 \times 11 = 121\), more than 101. If anything goes into 101, it must be less than 11. But we tried all that stuff before. So **101 is prime!**