Numbers in Biology

**Reading numbers and measurements:**

**31% k3 y2 -70°F x**

**1,203.4 10°C 3a4 :**

**0.002**

**3.14 0.631 = 30.7°**

**6.7x10-9km 2376.69 0.735µm 42.9 kmh-1**

**How Many Carbon Atoms Are in a Cell? A cell with a volume of 1 µm3 and a density of about 1 g/ml has a total mass of 10−12 grams. From the formula C4H7O2N1 and the weights of the elements, we derive a carbon content of about 12 × 4/(12 × 4 + 7 + 2 × 16 + 14) = 48/101 or about one half of the dry mass. With 30% dry mass (70% water), we obtain ?10−13 gm of carbon. Next we transformed the number of molecules using Avogadro’s constant: 6 × 1023 × 10−13/12 = 5 × 109 carbon atoms per cell. To verify this, we have done the calculation in a different way: assuming there are about 3 × 106 proteins, each one consisting of about 300 amino acids, we get a total of ?109 amino acids. An amino acid has about five carbon atoms, so we arrive at a similar value. Both estimates depend linearly on the cell volume, which can vary significantly based on growth conditions.**



