

Name: \_\_\_\_\_

## Unit Conversions

One mole is a quantity of  $6.022\ 140\ 76 \times 10^{23}$  items. It is used to describe quantities of very small things, like atoms and molecules.

1. How many significant figures are in that number?
2. How many molecules of water make up 2.5 moles of water?
3. One mole of carbon has a mass of 12.011 g. What is the mass of 2.5 moles of carbon?
4. How many moles of carbon are in a sample of carbon with a mass of 100. g?
5. Diamond is a particular structural arrangement of carbon atoms. A 1-carat diamond has a mass of 0.200 grams. How many atoms of carbon are contained in a 1-carat diamond?

In chemistry, we are often concerned with the pressure of gases. Pressure is defined as an amount of force per unit of area over which it is applied.

6. The SI unit of force is the newton, N. One English unit of force is the pound-force, which is approximately equal to the weight of a pound-mass. A pound-mass is defined as a mass of 0.453 592 37 kg. The weight of an object depends on the strength of gravity, which varies from point to point on Earth's surface. A defined average value of the gravitational strength is 9.806 65 N/kg, meaning that a mass of 1 kg has a weight of 9.806 65 N. What is the weight in newtons of 1 pound-mass? This weight is the pound-force.

7. The SI unit of pressure is the newton per square meter,  $\text{N/m}^2$ , which is given the name of 1 pascal. The average air pressure at sea level is 101,325 pascal. What is this pressure in pound-force per square inch?