Dimensional Analysis
A Chemical Problem

Carbon atoms weigh 12.01 g/mol. A mol is 6.022 x 10^{23} atoms. How many atoms of carbon are present in a 0.5 karat diamond? (A karat is 200 mg exactly.)

Want:

N (= number of carbon atoms) in 0.5 karat diamond (100% C atoms)

Have:

12.01 g C = 1 mol C
1 mol = 6.022 x 10^{23} atoms
1 karat = 200 mg

Work it out:

$$N = 0.5\ \text{k} \times \frac{200\ \text{mg}}{1\ \text{k}} \times \frac{1\ \text{g}}{1000\ \text{mg}} \times \frac{1\ \text{mol C}}{12.01\ \text{g C}} \times 6.022 \times 10^{23}\ \frac{\text{atoms C}}{\text{mol C}}$$

$$N = 5.01 \times 10^{21}\ \text{atoms C} = \boxed{5 \times 10^{21}\ \text{atoms C}}\ \text{(to 1 SF)}$$