- Calculate the number of aluminium atoms in a block of pure aluminium that measures 2.0 cm × 2.0 cm × 3.0 cm. The density of aluminium is 2.7 g cm^{-3}.

2

The volume of the block is:

V **= length × width × height = (2.0 × 2.0 × 3.0) cm^3 = 12 cm^3**

The mass can then be calculated from the density:

density = mass / volume or mass = density × volume

mass = (2.7 g cm^{-3}) × (12.0 cm^3) = 32.4 g

1 mol of Al has a mass equal to its atomic mass, 26.98 g mol^{-1} and contains 6.022 × 10^{23} mol^{-1}. Hence, the number of atoms in 32.4 g is:

number of atoms = number of moles × Avogadro's number
= (32.4 g / 26.98 g mol^{-1}) × (6.022 × 10^{23} mol^{-1}) = 7.2 × 10^{23}

Answer: **7.2 × 10^{23}**