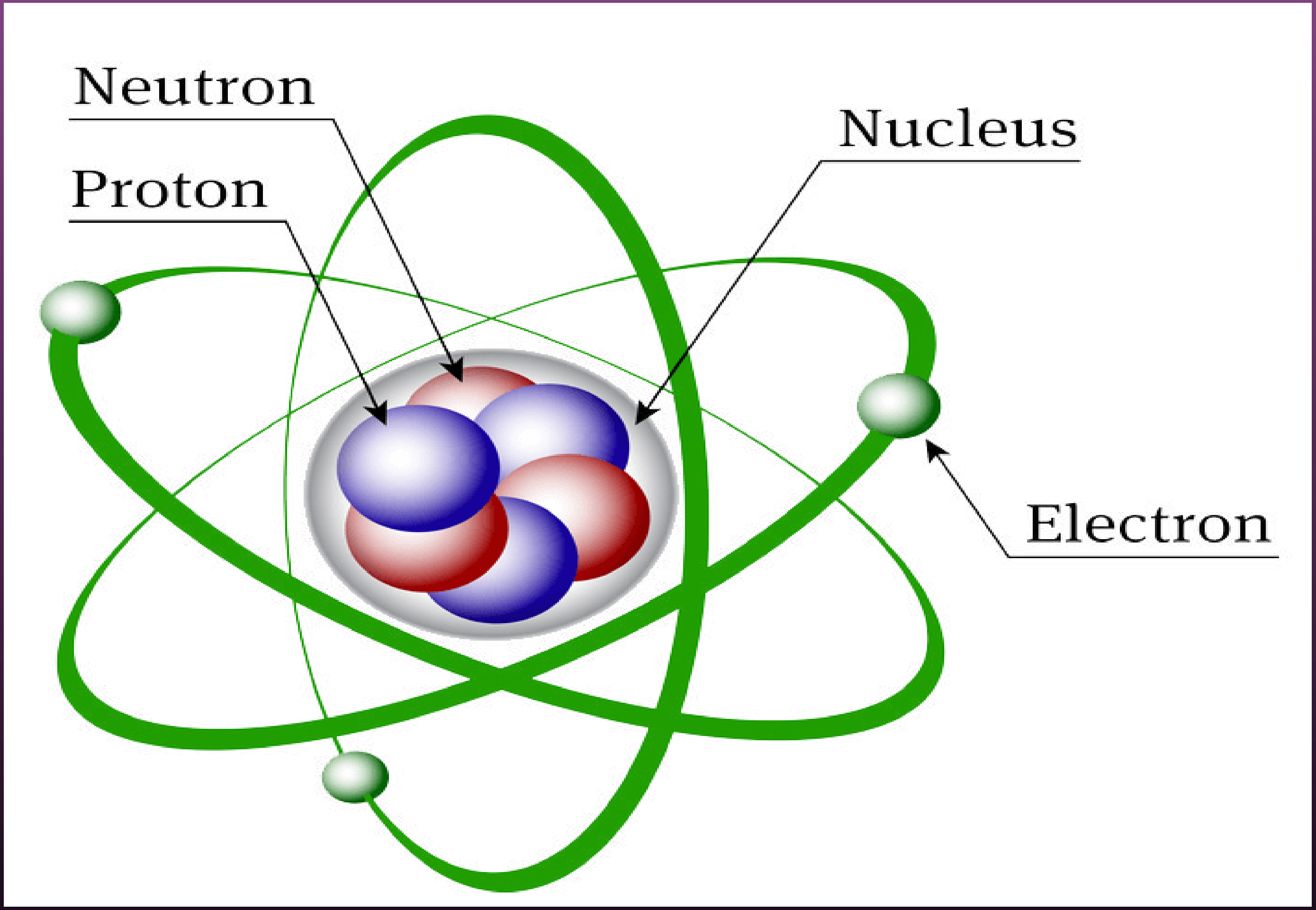
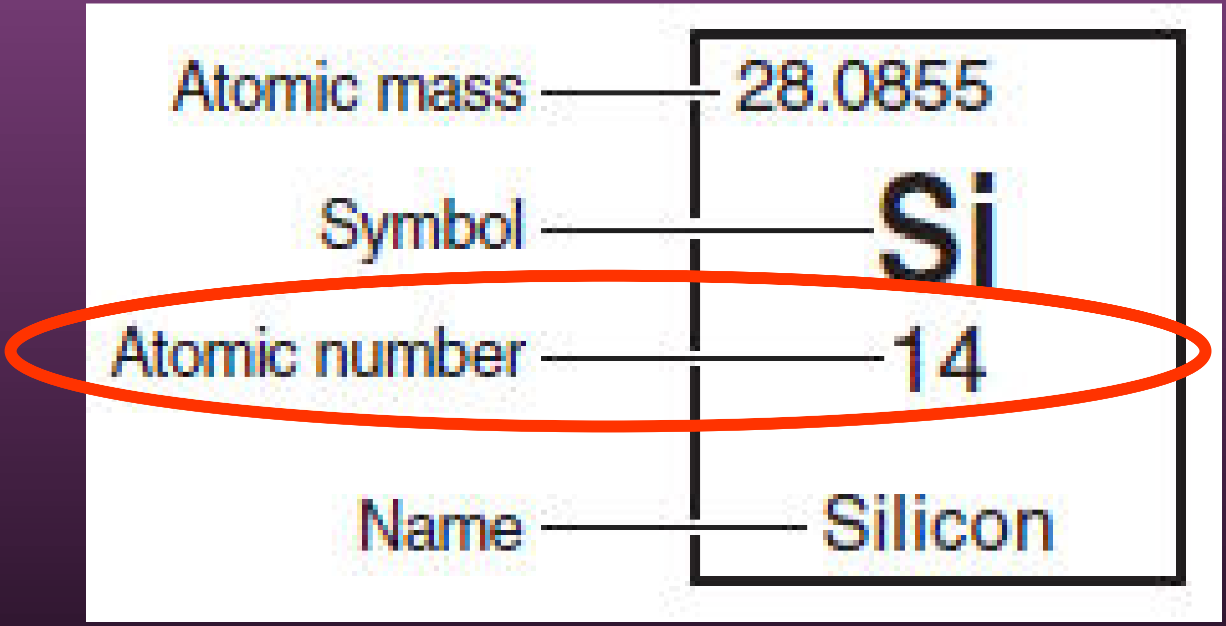
Atomic Structure

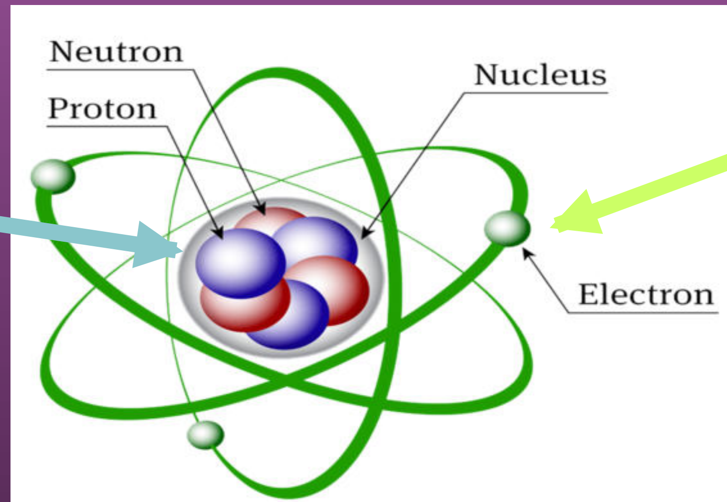


Every element has a different **atomic number.**



Atomic # = number of protons

3 protons

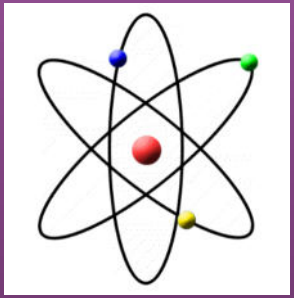


3 electrons

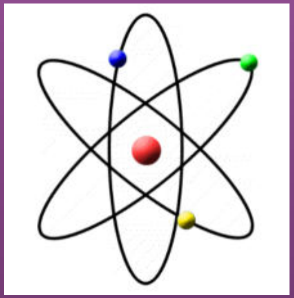
The atom is **Neutral** because the amount of

positive **Protons** equals the amount of

negative **Electrons**.



Subatomic Particles



Particle	Charge	Mass	Location
Proton (p^+)	+ charge	1	nucleus
Neutron(n^o)	No charge	1	nucleus
Electron (e^-)	- charge	0	Orbital Cloud

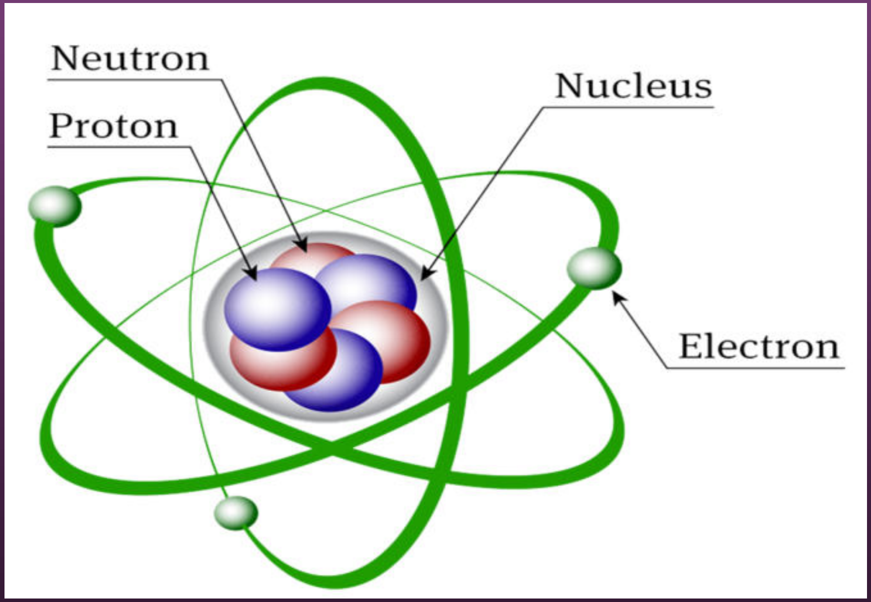
Size Matters

Neutrons are only a tiny bit larger than protons, so relatively speaking they have about the same mass.

But electrons are so small, they are like fleas on the butt of an elephant.

n > p > e

The total number of particles in the nucleus is called the **Mass Number.**



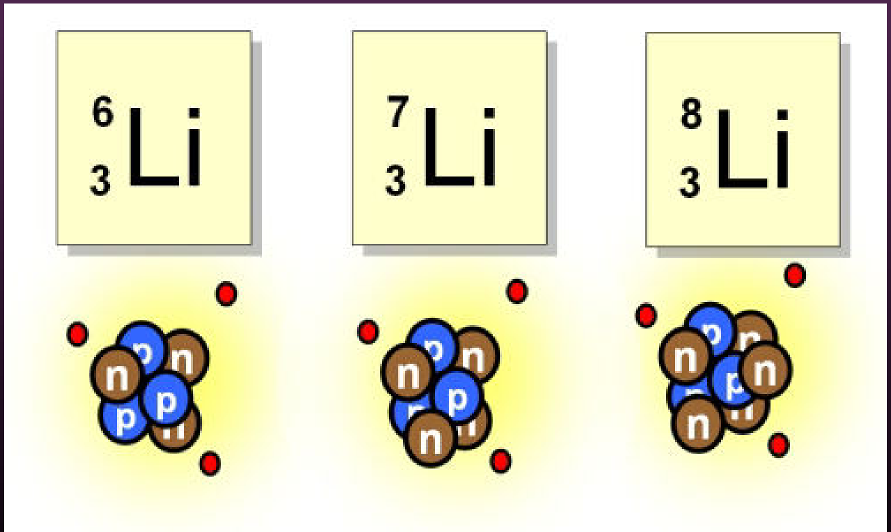
Mass Number = # of protons + # of neutrons

Was John Dalton correct when he thought all atoms for a given element were the same? **NO!**

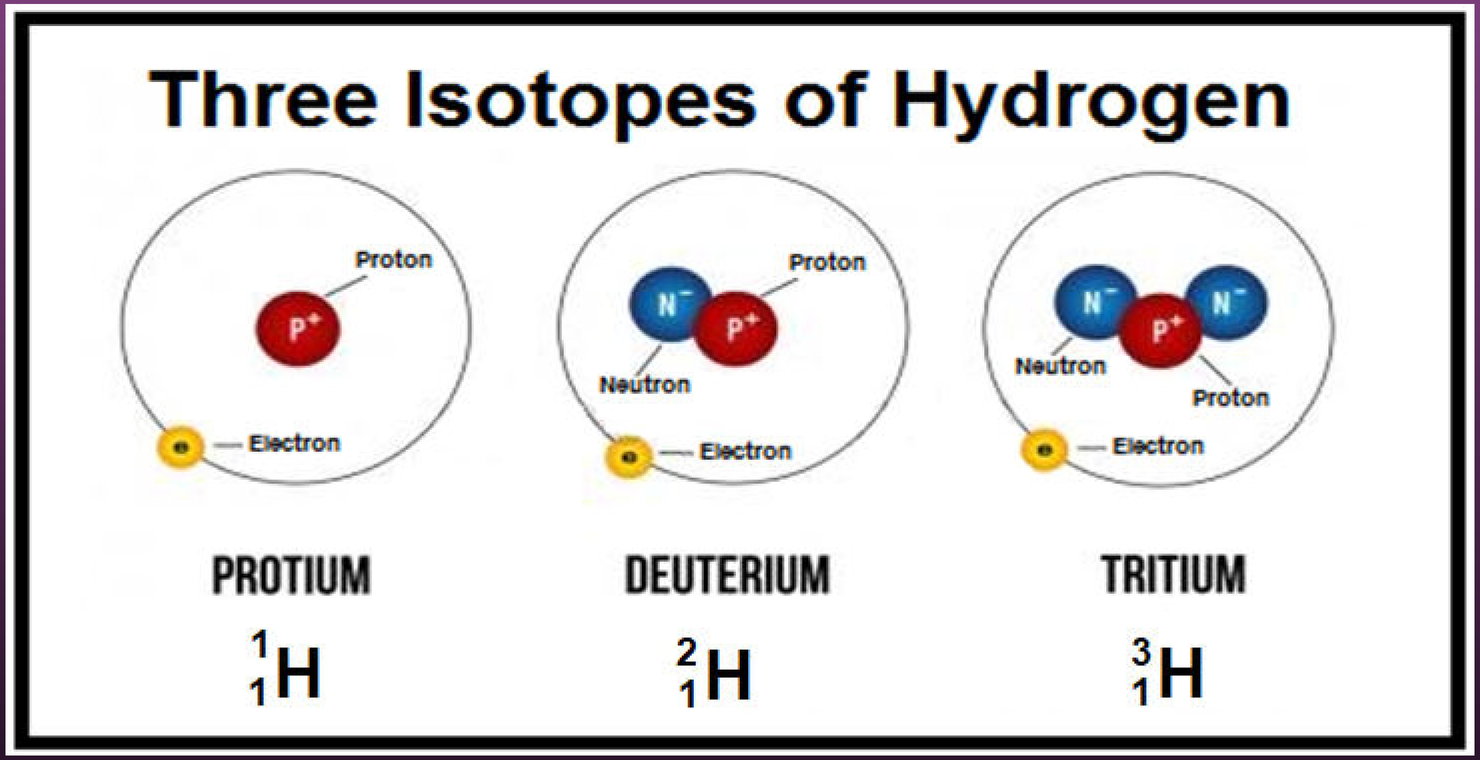
Isotopes

are **different atoms** of the **same element** that have

- The same number of __**protons**__
- A different number of __**neutrons**__
- And different __**mass**__ numbers

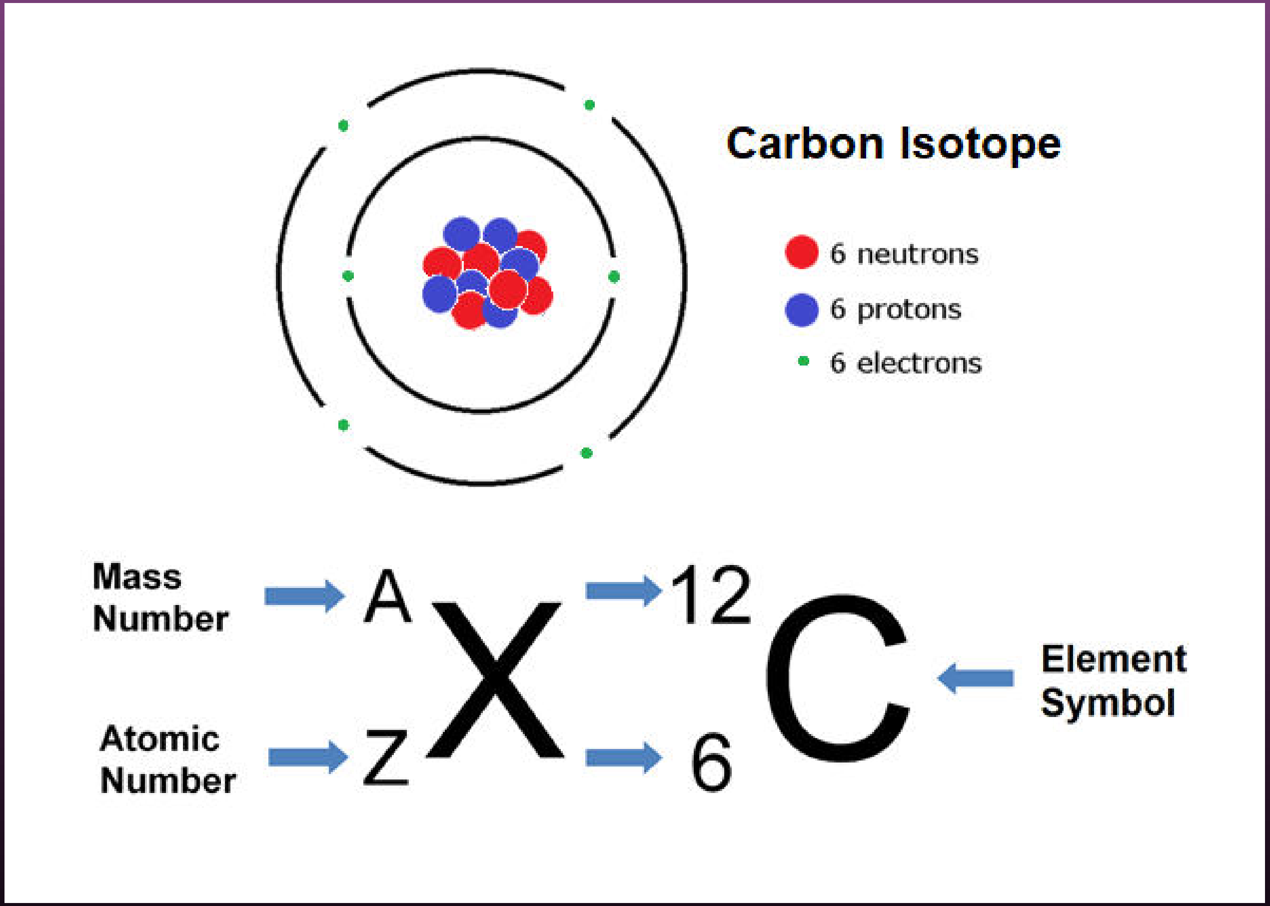


Isotopic Notation for Hydrogen



All hydrogen isotopes have 1 proton, so the bottom # is always 1.
The top # is the mass number. Mass # = protons + neutrons.

Isotopic Notation for Carbon



What's the difference?

Atomic Mass

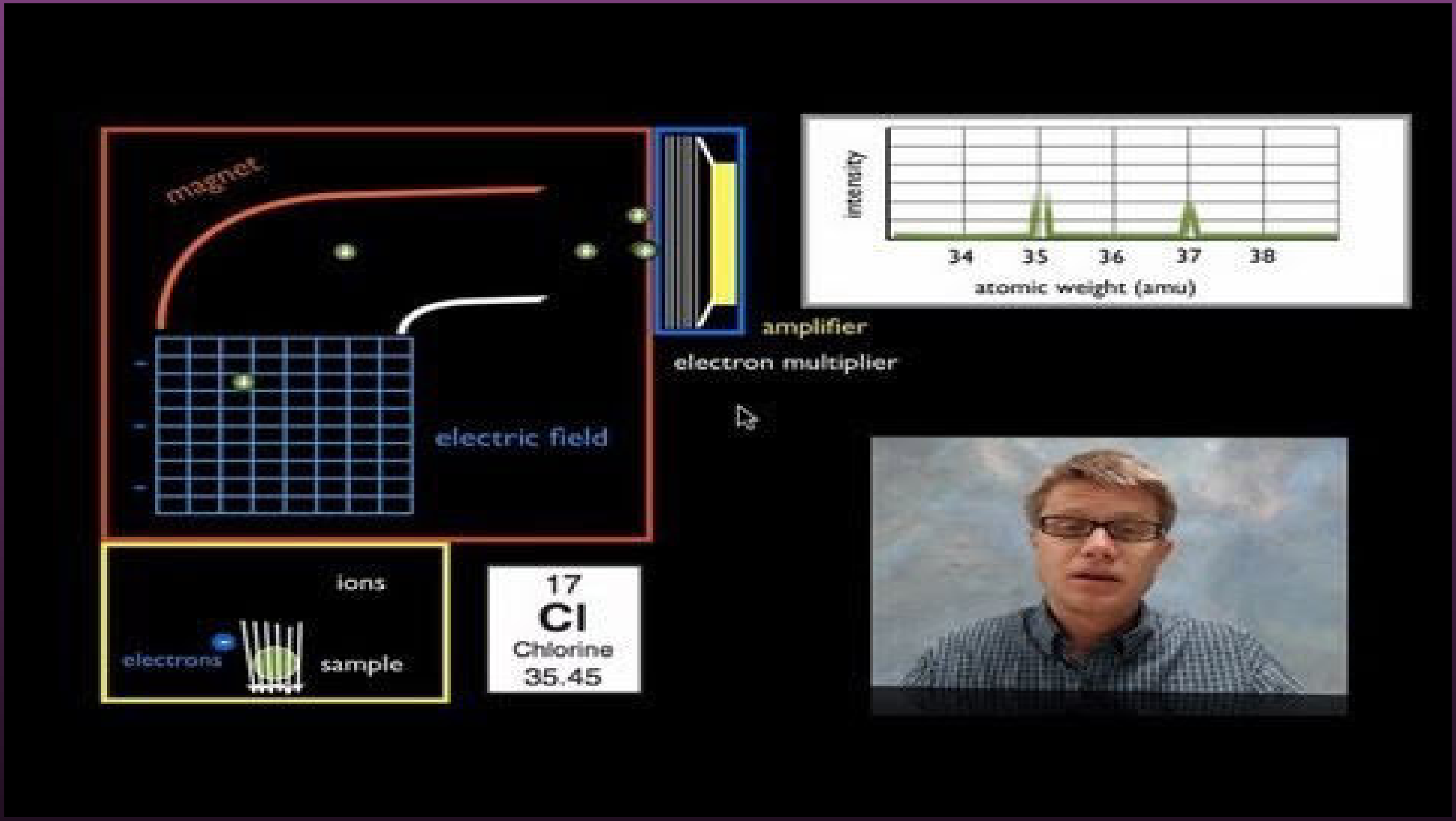
- Shown on periodic table
- Always has a decimal
- Based on all known isotopes
- Example:

Mass Number

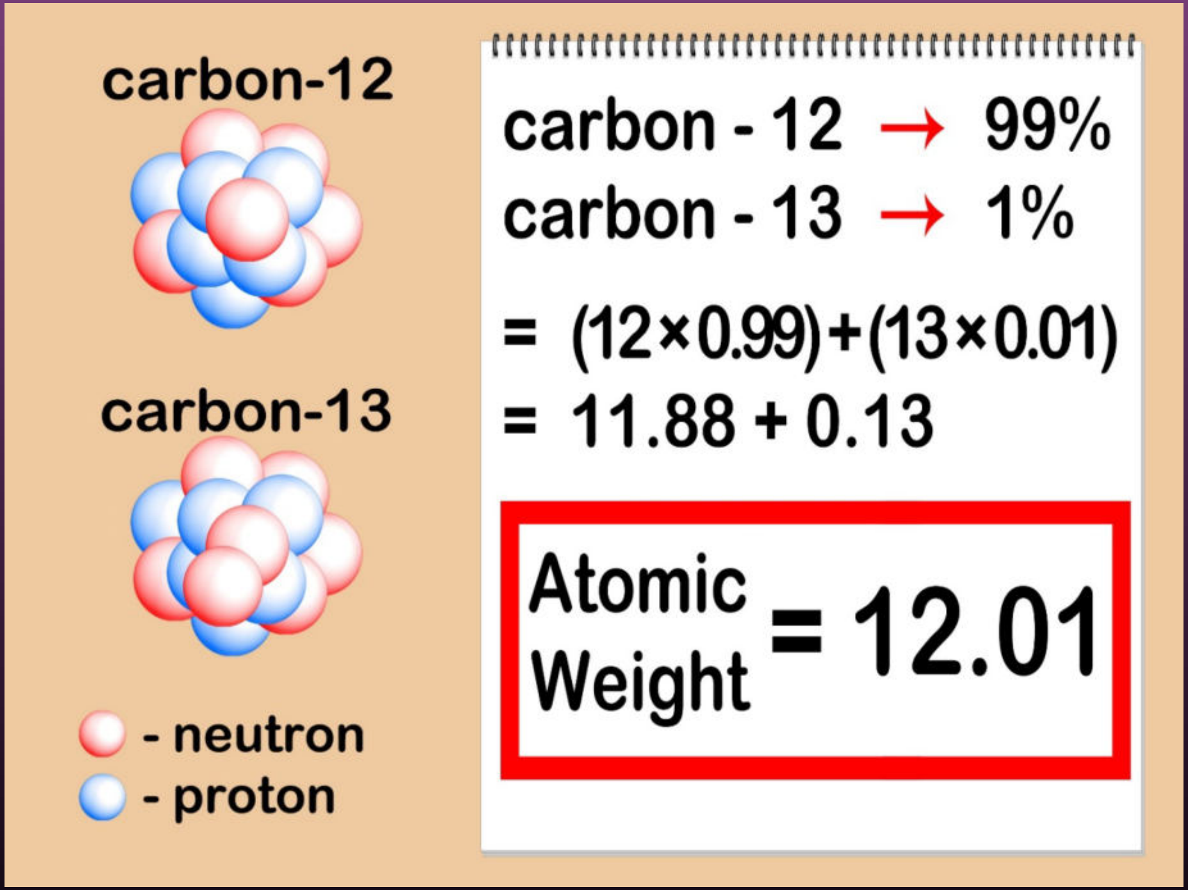
- Given in word problem
- Always has a whole number
- Based on one isotope
- Example:

How many neutrons are in an isotope that has 5 protons and a mass number of 11?

Mass Spectroscopy



Average Atomic Mass of Carbon Isotopes



Calculating Average Atomic Mass

$$\mathbf{AMU = Average\ Atomic\ Mass\ Units}$$

$$\mathbf{AMU = \frac{(Mass_1 \times Percent_1) + (Mass_2 \times Percent_2)}{100}}$$

$$\mathbf{AMU = (Mass_1 \times Decimal_1) + (Mass_1 \times Decimal_1)}$$

If you record the abundance as a percent, you must divide by 100!

If you record the abundance as a decimal, then you DO NOT divide by 100.