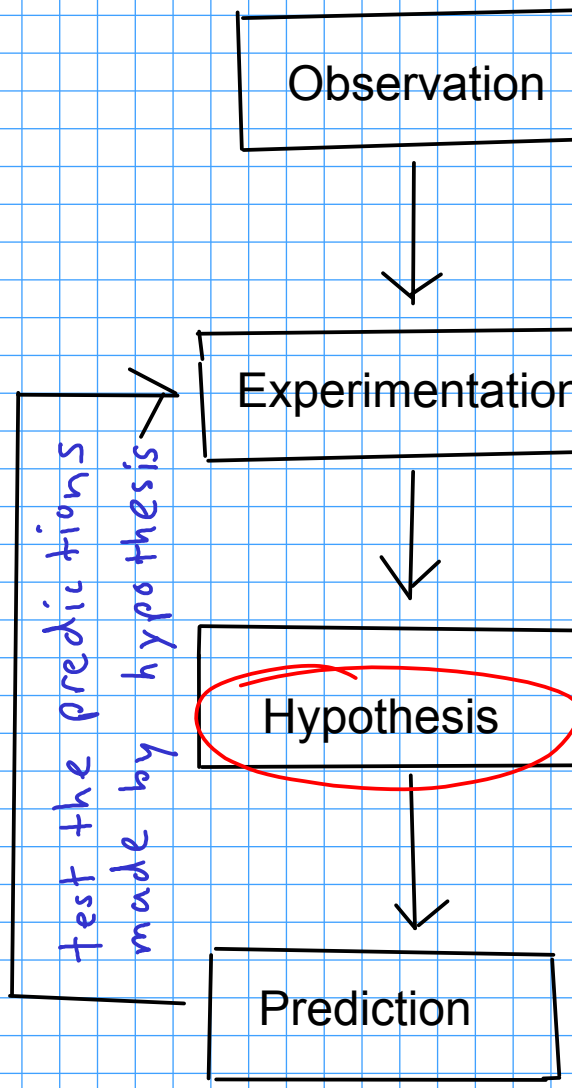
Some basic definitions:

Chemistry: systematic study of matter.

Matter: anything that takes up space and can be detected

What about "systematic study"?

Systematic study? The scientific method



controlled conditions

vary one condition while keeping others the same

initial explanation of observations "WHY?"

Scientific laws

- SUMMARY of observation often in equation form.
- DOES NOT EXPLAIN OBSERVATIONS

Scientific theories

- an EXPLANATION of observations confirmed by repeated experiments.
- accepted by most scientists

You flip the light switch in your den, but nothing happens. What is wrong?

observation/experiment: flip switch, no light.

hypothesis: ~~Bulb burned out?~~ Breaker?

prediction: flip breaker ~~change bulb~~, light works?

experiment: change bulb, flip switch. NO LIGHT.
flip breaker, LIGHTS ON
... supports hypothesis!

Some history: Prehistory

FIRE: Probably the first chemical change that man was able to control.

... led to the discovery of USEFUL metals.

BLUE ROCKS (copper ore) + CARBON (charcoal) $\xrightarrow{\text{HIGH TEMP}}$ COPPER METAL + CARBON DIOXIDE GAS

- OTHER metals may be isolated using very similar chemistry. The major difference in isolating copper vs other metals is TEMPERATURE.

Greeks

Aristotle

- ELEMENTS - All matter is made of combinations of the ELEMENTS. Aristotle thought there were FOUR elements:

1. Earth
2. Fire
3. Water
4. Air

- Properties of matter were dictated by the amounts of each element present.
- Led to ALCHEMY!

Democritus / Leucippus

- matter is made of small, indivisible particles: ATOMS.
- Different kinds of matter contain different kinds of ATOMS!
- THOUGHT EXPERIMENT: If you repeatedly divide matter into smaller and smaller pieces, would you reach a point where you could no longer divide the matter? At this point, you would have reached the ATOM.