Modern Physics

Frequency is flavor. A different key on a piano, a different sound. They can be pressed with the same strength, but they're still different sounds. For light, the frequency is color. Green isn't *stronger* than yellow, but they are different.
Frequency goes up as it goes up the rainbow. Infrared is the weakest, then red, then orange, going up to ultraviolet.
Amplitude is strength. If you press harder or lighter on a key, the sound can be strengthened or weakened. For light, amplitude is brighter or dimmer.

Q; What is going on inside a magnet?
Electrons are vibrating at a high frequency. They generate magnetism.

Energy depends on frequency.
We learnt the opposite, that frequency is just a characteristic
This means that light is a particle. But we know that light is a wave. So which one is it?
Light is a photon. A photon is something whose energy depends on its frequency.

According to these theories, an electron with rapid vibration emits energy. Rutherford's theory, which says that electrons surround the nucleus which is mostly empty space. This means that electrons are accelerating, and accelerating electrons would give off radiation. If they're radiating, they're losing energy. If they lose energy then they will lose their speed and they will get sucked into the middle of the circle. So how does this make sense?
Boar says that the electron going around in the circle does not radiate. They radiate when they absorb energy and jump into subshells SPDF and go back down.
This is when electrons go into subshells, attain energy from that, and since they need to go back to where they came from, they release that energy and that's the radiation they release.

Q; What color of light is emitted if a hydrogen electron drops from level 6 to level 2?
It takes a little bit more energy than the electron has to get it to move according to the idea of inertia. Because when an electron goes down, it releases energy.
The eV of 6 is 0.38
The eV of 2 is 3.4

There are mini units to Joules, they're called eV's. It's the same idea as there are electrons and a lot of electrons make up a coulomb. A lot of eV's make up a joule.

Q; What is the frequency and color of the photon emitted when a hydrogen ion drops from levels n=4 to n=2?

Find the energy that they have because you want to know how much energy is emitted.
The energy of the higher one is 0.85 and the energy of the lower one is 3.4. Find the difference and it's 2.55 eVs (baby joules). So that's how much energy is emitted.
Now we have to convert it into joules.
One eV is 1.6×10^{-19} joules.
That is 4.08×10^{-19} joules.
Now we have to find out what the frequency is so that we can figure out the color.
Use the formula of □ = □□. Plug in the joules as E, plug in the constant for h and solve for the frequency. The frequency is 6.15×10^{14} Hz.
Look at the frequency chart and you find that it is blue.

Q; A hydrogen drops from level 2 to level 1. What is the frequency and color of the photon that it emits?
The difference between level 1 and 2 is 10.2. Then you turn that into joules and using the formula of E=Hf, divide the joules by the constant, and the answer is 2.46×10^{15}. On the frequency chart, it wouldn't make sense because it doesn't have a 14th power.
The power of 15 is not light, it's ultraviolet, it doesn't have a color.

Q; How many photons can hydrogen produce if going from n=5 to n=3?
Difference from level 5 to 3? 1.51 - .54 = .97
You multiply the number by 1 elementary charge (e)
(.97) x (1.6 x 10^-19) = 1.552 x 10^-19
You then divide by Planck's constant (h) to get frequency
1.55 x 10^-19 / 6.63 x 10^-34
F = 2.34 x 10^14 Hz
Below red, so no color, so infrared

On reference table:
For each particle, there is a corresponding antiparticle with a charge opposite that of its associated particle:

1. Electron and electron neutrino
2. Muon and muon neutrino
3. Tau and Tau neutrino

Electron neutrino - an electron without a charge, not a neutron because it's very very light
Quark - a number of subatomic particles carrying a fractional electric charge, postulated as building blocks of the hadrons.
Hadrons - a subatomic particle of a type including the baryons and mesons that can take part in the strong interaction.
Strongest matter is proton, neutrons and electrons
Protons and neutrons are under baryon.
If you want a proton you need 3 quarks.
Proton - 2 ups (+) and 1 down (-), because ⅔ + ⅔ - ⅓ = 3/3 which is +1
Neutron - up, down, down which is charge of 0.

If the earth slowed down, we would get sucked into the sun. We need speed to keep us in orbit.
Basically, the idea of electrons vibrating doesn't make sense because that means that it's accelerating and decelerating meaning that it's giving off energy by doing so, slowing down, and getting sucked into the nucleus. So this doesn't make sense.
If a hydrogen drops from one level to another, it gives off a color. (excited to ground state) This means that when something is giving off energy, it's not giving up all, but very specific amount of energy.

Electromagnetic Spectrum:
The electrons have very specific levels that it can go up to so that it doesn't lose all of it's energy and get sucked into the nucleus.
Each atom has very specific energy levels it can go up to.
For example, the hydrogen had the entire spectrum, while mercury only had blue, green and orange.
If you agitate electrons, they will heat up.
Light was looked at as being a more agitated form of heat, because it glows.
Incandescent- heating a metal until it glows

When there is a collision between a photon and a

Derivation;

$$\square = \square\square^2$$
$$\square = \square\square$$
$$\square\square^2 = \square\square$$
$$\square\square = \frac{\square\square}{\square}$$

When we can see that because frequency is on top, momentum and frequency depend on each other.
Momentum is dependant on frequency, so when you lose momentum, you lose frequency, meaning you lose some brightness in the color.
Bright line spectrum- not a rainbow, but very specific thin lines of colors.

Q; You have a container of sodium vapor. You shine white light through it through the container and look at it through a prism. What would you see?
You would see the whole spectrum minus the sodium. The lines that sodium would normally give off in a bright line spectrum are black.
This is because sodium gives off the bright line spectrum, the certain lines, so when the light goes through it, it absorbs those lines that the sodium is giving off. Therefore, every other color that's not on the sodium bright line spectrum is seen.
This is known as absorption spectrum.

The black lines that aren't included in the spectrum of a vapor are called the bright line spectrum.
IF you looked at sunlight through a prism. Some of them are lines given off by oxygen, some by nitrogen. But we're getting hydrogen and helium lines as well, =but those aren't near us, so that means that they need to be around the sun.

Q; There is a full spectrum and in that spectrum there are dark lines, and that's exactly where the lines of nitrogen would be, what vapor did it go through?
Oxygen.

Mass of electron = 9.11 x 10^-31 Kg
Multiply this mass by 2
It equals 1.822 x 10^-30
Multiply this by 9 x 10^16
E = hf = hc / landa

Make a baryon with a negative one charge;