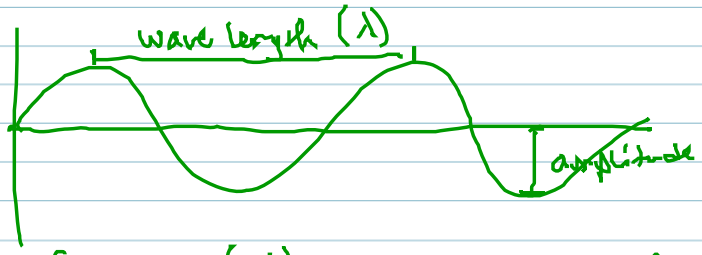
LIGHT → waves



frequency (ν) = number of waves passing a point in a given amount of time

speed $\boxed{c = \nu\lambda}$

Units

λ → length — m, nanometers — $1m = 1 \times 10^9 nm$

ν → #/sec — $\frac{1}{s}$ (s^{-1}) Hz (Hertz)

speed = $\left(\frac{1}{s}\right)(nm) \Rightarrow \frac{nm}{sec}$ $\frac{m}{sec}$

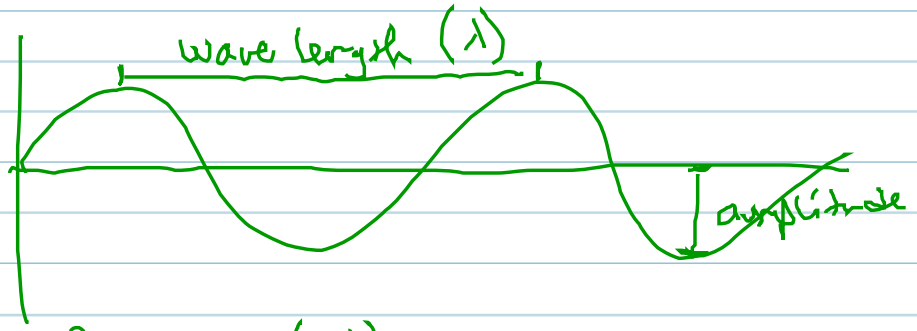
light = electromagnetic wave → electric field, → magnetic field

em radiation → E in the form of em waves

1600's Newton classical mechanics
→ MACROSCOPIC OBJECTS
→ failed to describe the behavior of atoms

1900 Max Planck → the energy of our atom is quantized

LIGHT → waves



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speed of light = $c = 3.00 \times 10^8$ m/s $= 3.00 \times 10^{17}$ nm/s

$c = \lambda \nu$

red → orange → white

the amount of E given off at a certain T depends on λ

$E = h\nu$ ← Planck's constant 6.63×10^{-34} J·s

Einstein Photoelectric effect

→ electrons are ejected from the surface of a piece of metal by light of a certain frequency (ν)

~~min~~ minimum E = threshold energy

CAN'T BE EXPLAINED BY WAVES

Beam of light acts like a stream of particles photons

$E = h\nu$ calculate the E of a photon

$E \rightarrow h\nu, 2h\nu, 3h\nu \ldots$ E is quantized

94.1 MHz $c = 3.00 \times 10^8$ m/s $c = \lambda \nu$

$\lambda = \frac{c}{\nu}$ $94.1\ \text{MHz} = 94.1 \times 10^6\ \text{Hz} = 94.1 \times 10^6\ s^{-1}$

$\lambda = \frac{3.00 \times 10^8\ \text{m/s}}{94.1 \times 10^6\ s^{-1}} = 3.19\ \text{m}$