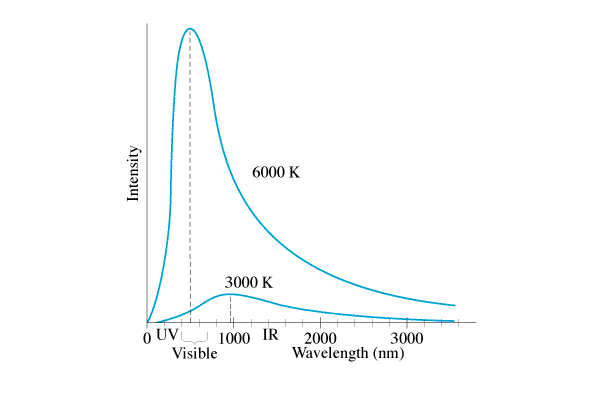
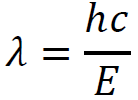
**Noteguide for Photons - Videos 27BCD Name**

**27B: Planck**

**27C: Photon Theory:** Light is made of particles.

E = Photon energy (Joules)

h = Planck’s constant = 6.626 x 10-34 Js

f = frequency of oscillations (Hz, s-1)

c = speed of light = 3.00x108 m/s

λ = Wavelength in m

Example 1: What is the energy (in eV) of a 460. nm photon?

Example 2: A photon has an energy of 13.6 eV. What is its wavelength?

Whiteboards:

|  |  |
| --- | --- |
| 1. What is the energy (in J) of a photon with a frequency of 6.58 x 1014 Hz? (4.36 x 10-19 J) | 2. What is the wavelength of a photon with an energy of 5.45 x 10-18 J? (36.5 nm or 3.65E-8 m) |
| 3. What is the energy (in eV) of a 314 nm photon?  (3.95 eV) | 4. A photon has an energy of 6.02 eV. What is its wavelength? (206 nm) |

**27D: Photon vs. Wave theory:**

|  |  |  |
| --- | --- | --- |
|  | **Wave Model** | **Photon Model** |
| **Color:** | **Wavelength changes**  FG11_26  Small λ = Blue  FG11_26  Big λ = Red | **Energy per photon changes** (E = hf = hc/λ)  High E = Blue/UV/X-rays  Low E = Red/Microwaves/radio |
| **Brightness:** | **Amplitude Changes**  Bright = big  FG11_26FG11_26Dim = small | **# of Photons changes**  Bright = many  Dim = few |