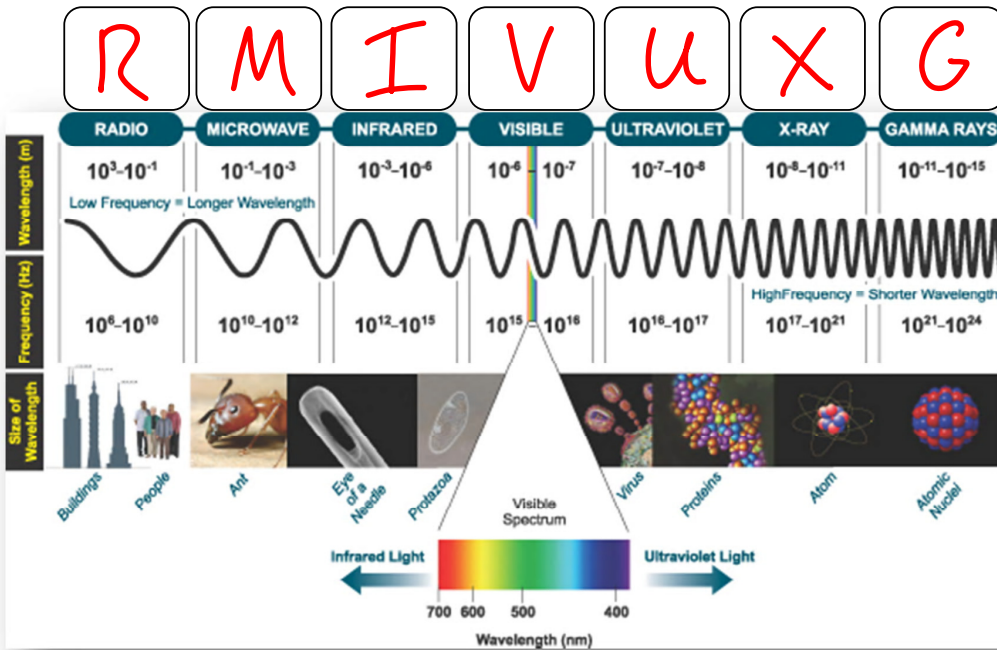


Unit 8: Waves  
2 – Light and Sound



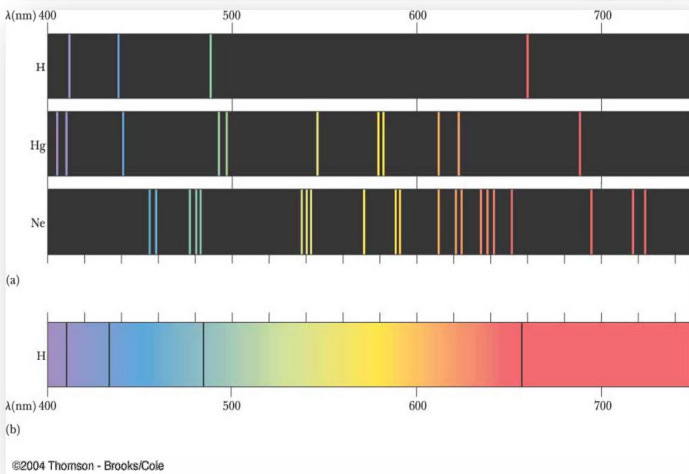
EM Radiation  
- Transverse waves of energy  
- The speed of light depends on the medium (denser → slower)  
- The speed of light in a vacuum is:  
 $c = 3.00 \times 10^8 \text{ m/s}$   
The Universal Speed Limit!

1) The Sun is  $1.50 \times 10^8 \text{ km}$  from Earth. How long does it take for the light from the Sun to reach us?  
 $v = \frac{d}{t} \quad t = \frac{d}{v} = \frac{1.50 \times 10^{11} \text{ m}}{3.00 \times 10^8 \text{ m/s}} = 500. \text{ s}$   
 $\approx \underline{8.3 \text{ min}}$

2) Alpha Centauri is the nearest solar system to ours, at  $4.07 \times 10^{13} \text{ km}$  away. How long does it take for light to travel from Alpha Centauri to us?  
 $t = \frac{d}{v} = \frac{4.07 \times 10^{16} \text{ m}}{3.00 \times 10^8 \text{ m/s}} = 136\,000\,000 \text{ s}$   
 $= \underline{4.30 \text{ years}}$

- White light is actually a mixture of many different colours (R O Y G B I V)  
- Different colours of light have different frequency and wavelength.  
Red has the longest  $\lambda$  and violet the shortest  $\lambda$

- EM radiation is emitted from energized matter.
- After energy is absorbed by matter is emitted as EM radiation.
- Each element emits very specific frequencies (\_\_\_\_\_ ) of light known as atomic spectra.



How We See ...