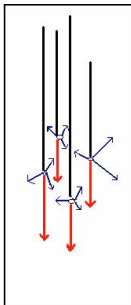


PHY385-H1F Introductory Optics

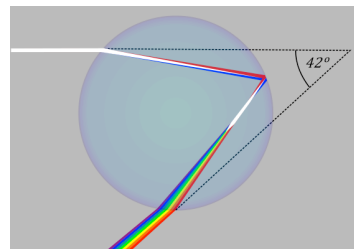
Class 6 – Outline: Sec. 4.1, 4.2, 4.3

- Handing back Problem Set 1 (marks are on portal)
- Rayleigh Scattering
- Phase lag
- Huygen's Principle
- Reflection of Wave Fronts
- Phase shift upon reflection



In-Class Task from Last time.. I asked:

You see a big rainbow, arcing over the Northern horizon. The sun is behind you, to the South. Is red on TOP or on the BOTTOM of the rainbow arc?



In-Class Task from Last time.. I asked:

You see a big rainbow, arcing over the Northern horizon. The sun is behind you, to the South. **Red is on TOP of the arc.**



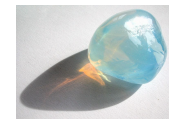
Radius of circle is 42°

"Daddy, why is the sky blue?"

- Rayleigh scattering is elastic scattering of light by particles much smaller than the wavelength of light.
- Scattering intensity is proportional to λ^{-4}
- So, shorter blue wavelengths are scattered much more readily than longer red wavelengths.
- You see blue light coming from all directions in the sky, as long as there is sunlight passing through the air above you.



John William Strutt, 3rd Baron Rayleigh



5-minute In-Class Task

- Please take out a piece of paper that you don't mind handing to me at the end
- WRITE YOUR NAME at the top of the piece of paper
- Discussion with your friends or me during this task is **encouraged!**

For any wave, it is true that $v = \lambda f$.

Light starts in air, where $n = 1$, and enters glass, where $n = 5$.

1. Does the speed, v , of the light increase, decrease, or stay the same when it enters the glass?
2. Does the wavelength, λ , of the light increase, decrease, or stay the same when it enters the glass?
3. Does the frequency, f , of the light increase, decrease, or stay the same when it enters the glass?

External Reflection



- Animation shows a pulse traveling to the right on a light string attached to a heavier string
- Speed suddenly decreases
- Analogous to light in air reflecting off glass surface
- Phase shift = π

Internal Reflection

- Animation shows a pulse traveling to the right on a heavy string attached to a lighter string
- Speed suddenly increases
- Analogous to light in glass reflecting off the boundary to air
- Phase shift = 0

