# RAA04 – Checklist of things to know/review

**RAA03 contains all information from lectures up to and including lecture 37: Ray model of light and Snell's law. Below is a short list of important concepts to understand. The goal of this list is to help you organize your thoughts as you study. This sheet does not contain everything that we covered, just the highlights to help point you in the right direction.*

- All of RAA01, RAA02, and RAA03 checklist items.
- Interference:
    - Symmetry:
        - All interference patterns maintain the symmetry of the object the wave(s) scattered off of.
    - Beat frequency:
        - What is it?
        - How to calculate it.
        - How beat frequency due to sound from strings change with the force of tension in the strings.
    - General 2 source interference:
        - 3 important questions to ask before calculating anything?
        - In phase vs 180 degrees out of phase.
        - Solving equations with parameters (e.g. the m value). Make a table of the m value and the unknown quantity, list all possible m-values and find the unknown quantity for each case.
    - Young's double slit
        - Diffraction vs interference
        - Construct physical representation; label L, $y_m$, $\theta_m$, d etc…)
        - Conditions for bright or dark fringes…think about relative phase first.
    - Diffraction grating
        - How is the interference pattern different from double slit?
        - Construct physical representation; label L, $y_m$, $\theta_m$, d etc…)
        - Conditions for bright.
        - Spectroscopy:
            - How can we use diffraction gratings to help infer composition of distant objects.
            - Why do we use diffraction gratings rather than double slit?
        - Crystallography:
            - Atomic structure determined based off of symmetry of interference pattern.
    - Thin film interference:
        - Index of refraction:
            - Speed of light in a vacuum?
            - Effective speed of light in a transparent medium?
            - Frequency across boundaries remains constant, speed and wavelength change.
            - Incident light at boundary partially reflects and partially transmits… what happens to energy of incident light? What does this mean about amplitude…intensity?
            - Phase shits at boundaries?

        - Physical representation of thin film showing phase shifts at boundaries.
        - Constructive/destructive conditions…think about relative phase first.
- Ray model of light:
    - Law of reflection
    - Snell's law
        - Basic geometry.
        - Find index of refraction or incident/transmitted angle.
        - Total internal reflection:
            - Find critical angle.
- Lab skills:
    - Graphing linear lines and matching plot with a physical mathematical model to extract relevant quantities.
    - Estimating uncertainty with graphs and data