Physics 221

Exam 2 - Light

Learning Goals

Students will be able to:

- Define Diffraction, Interference, Refraction, Reflection and explain how these concepts are similar and different from one another.
- Apply the wave model or ray model of light to a situation to explain the phenomena such as the colors of a peacocks feathers or shadows created by a doorway.
- Calculate and explain how the index of refraction of light depends on the speed of light in a medium.
- Explain why the wavelength of light changes when the speed changes but the frequency does not.
- Calculate any unknown feature about a double slit interference situation using the double slit equation.
- Calculate any unknown feature of a physical situation where light is shone through a diffraction grating using the equations for a diffraction grating.
- Explain how a pinhole aperture can create an image.
- Use the ray model of light to determine the location of an image in a plane mirror and why the location of the image does not change for different observers.
- Use the ray model of light to describe refraction including internal reflection.
- Use the ray model of light to locate an image with converging or diverging lenses.
- Use the ray model of light to locate an image with converging or diverging mirrors.
- Identify and draw the three special rays for either type of lens and either type of mirror.
- Identify if a lens is a converging or diverging lens depending on its shape and the indices of refraction of the lens and the material it is surrounded by.
- Identify if a mirror is converging or diverging depending on its shape and why the indices of refraction of the mirror and the material it is surrounded by make no difference.
- Determine the focal point of a mirror based on its radius of curvature.
- Use the thin lens equation to calculate the location and magnification of an image for a plane mirror, converging lens, diverging lens, converging mirror or diverging mirror. Including correct application of the sign conventions which will be provided.
- Describe whether an image is virtual or real based on where the light actually is.
- Identify if a person is nearsighted or farsighted based on their near point and far point.
- Identify the type of lens needed to correct a given person's vision and explain why.
- Use the thin lens equation to find the refractive power of a prescriptive lens to correct a person's vision.
- Describe why chromatic aberration, foveal cone size and diffraction all affect our visual acuity (the finest detail we can see) and why spherical aberration does not affect our visual acuity.
- Explain, using diagrams, how rainbows are formed.