Grade 10-12
Distance Learning Module 4: Week of: 4/20th – 4/24th

Science: Honors Physics - *Modified from Unit #12 - Light & E-M Radiation*

Targeted Goals from Stage 1:

- The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing.
- Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.
- When light or longer wavelength electromagnetic radiation is absorbed in matter, it is generally converted into thermal energy (heat). Shorter wavelength electromagnetic radiation (ultraviolet, X-rays, gamma rays) can ionize atoms and cause damage to living cells.

Content Knowledge:

- The speed of light in a vacuum/air $3x10^8$m/s
- Light bends when it changes mediums.
- As a wave's frequency increases, its energy increases
- The smaller (wavelength) a wave, the more damaging it may be to cells, biological entities and biological molecules
- Different E-M waves have specific applications in society based on the wave's size and energy
- Visible light is a small portion of the E-M spectrum
- Light undergoes a Doppler shift and this can be used to understand celestial bodies
- Curved mirrors may make real or virtual images based on their geometry
- The refraction of light is responsible for visible phenomena such as mirages, rainbows and distortion or objects seen underwater
- Telescopes and microscopes are made by combining geometric optical devices (mirrors and lenses)
- Fiber optics and sparkling diamonds to name 2 make use of the total internal refraction of light
- Waves are diffracted when they pass through narrow openings; the Huygens principle explains the behavior of waves after they pass through these opening.

Vocabulary:

Snell's law, light, electromagnetic radiation, wavelength, frequency, mirrors, virtual images, real images, energy, refraction, reflection, diffraction, absorption, optics

Skills:

- Students will be able to apply the laws of reflection and refraction to calculate the position and size of images formed by lenses and mirrors.
- Calculate the *index of refraction* of a material when given the speed of light in that material.
- Apply *Snell's Law* to a light ray moving from one medium to another.
- Determining the critical angle for light in different media

Expectation:

Description of Task (s):	**Resources and Materials:**	**Daily Checks (Return to Google Classroom or snapshots from a cell phone)**
Monday: *Students are encouraged to meet online during Zoom session which will review circuits. Elsewise, they are to continue working on their UTexas Review*	*Crash Course Physics Videos:* • **Geometric Optics** • **Light is Waves** • **Optical Instruments** *Flipping Physics Videos:* • **Youtube playlist to Mirrors, refraction, and ray diagrams** • **Youtube playlist on refraction and lenses** • **Lecture Notes** *Khan Academy Physics Videos:* • **Electromagnetic Waves & interference unit** • **Geometric optics unit** *The Physics Classroom tutorials* • **Light waves and color** • **Reflection and mirrors** • **Refraction and lenses** *Students are encouraged to review past notes, posted materials in the finalsite/google classroom, and in class work as these are the material expected of them*	*Greater than 75 % earned on University of Texas on-line Homework and Assessment (accounts required)* *Quest Learning & Assessment Login* *Participation in Zoom classroom learning as available and needed*

Description of Task (s):	Resources and Materials:	Daily Checks (Return to Google Classroom or snapshots from a cell phone)
Tuesday: Same as above	Same as above	*Greater than 75 % earned on University of Texas on-line Homework and Assessment (accounts required)* *Quest Learning & Assessment Login* *Participation in Zoom classroom learning as available and needed*
Wednesday: Same as above	Same as above	*Participation in Zoom classroom learning as available and needed*
Thursday: Same as above	Same as above	*Participation in Zoom classroom learning as available and needed*
Friday: Same as above	Same as above	*Earning 75% or higher on second UTexas assignment of this week* *Participation in Zoom classroom learning as available and needed*

Week criteria for success (attach student checklists or rubrics):

- ❑ *Greater than 75 % on Assigned UTexas Assessments, 80% or higher on CCK lab*

Supportive resources and tutorials for the week (plans for re-teaching):

- ❑ *Textbook; Finalsite resources (PowerPoints, worksheets with answer keys, pdf notes); Khan Academy; Crash Physics videos; PHeT simulators from University of Colorado; Flipping Physics videos; Interactions with teacher using Zoom.*