

DHHS

Distance Learning Module 9: Week of: June 1st – June 5th

Honors Physics - *Modified from* [Unit #13 - Modern Physics/Optics](#)

Targeted Goals from Stage 1: Desired Results

Content Knowledge:

- Einstein's Theory of Relativity: How is it Mass and Energy can be interchanged
- Wave / Particle duality: How do small particles of matter act as both solid particles and as waves?
- Standard Model: The currently accepted scheme explaining the most fundamental particles in nature and how they interact with each other to form the world we live in.
- Energy is quantized
- Materials can absorb and emit energy as determined by their sub atomic structure
- When objects move close to the speed of light with respect to a reference frame, relative measurements of time, mass and size are all effected
- The speed of light in a vacuum is a constant; objects cannot exceed 3×10^8 m/s
- There is a world beyond the bohr model; the fundamental building blocks of the atom involve a newly discovered set of sub-atomic particles
- Radioactive decay of unstable elements results in new elements and the emission of energy
- An atom's nucleus is held together by binding energy, equal to the mass defect of the nucleus.

Optics:

- The speed of light in a vacuum/air 3×10^8 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 of 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:

- Length contraction
- Time dilation
- Postulate
- Snell's law
- Refraction
- Diffraction

Skills:

- Apply understanding of various principles of physics studied during this course to investigate application of these principles to modern physics.
- 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 will be logging on to the Google Meets meeting and attending class on special relativity	Google Classroom Notes posted on Google Classroom Crash Course Relativity Video Physics Girl Relativity Video TED-Ed video on particles Textbook, posted on classroom	Attendance of meeting
Tuesday: Students will attend meeting on elementary particles	Same as above	Same as above
Wednesday: Students will watch videos on special relativity & elementary particles	Same as above	Same as above
Thursday: Students will log on to the optional zoom meeting, where we work out problems and work on conceptual understanding	Same as above	Attendance of meeting Completion of UTexas/Assignment in general of 75% or higher
Friday: Students will attend online meeting on optics	Same as above	Same as above

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; Finals site 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.*