Kuwait Bilingual School

Fourth Quarter syllabus 2016-2017 **March 23th –April 22nd, 2017**

Subject: physics **Grade: 11**

Cycle #	Cycle of	NGSS Standards	Concept & Knowledge	Skills	Resources
22	23/3 To 30/3	➢ **Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** ➢ **Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** ➢ **Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.** ➢ **Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. Have when absorbed by matter.**	• Production of Electromagnetic Waves • Light as an Electromagnetic Wave and the Electromagnetic Spectrum • Measuring the Speed of Light	○ Identify the conditions of simple harmonic motion. ○ Explain how force, velocity, and acceleration change as an object vibrates with simple harmonic motion. ○ Calculate the spring force using Hooke's law. ○ Identify the amplitude of vibration. ○ Recognize the relationship between period and frequency. ○ Calculate the period and frequency of an object vibrating with simple harmonic motion. ○ Distinguish local particle vibrations from overall wave motion. ○ Differentiate between pulse waves and periodic waves. ○ Interpret waveforms of transverse and longitudinal waves. ○ Apply the relationship among wave speed, frequency, and wavelength to solve problems. ○ The student should be able to recognize the characteristics of an electromagnetic wave. ○ The student should be able to recognize the ordering of the electromagnetic and visible light spectrum in terms of both frequency and wavelength.	***Chapter 22*** **Electromagnetic Waves**

23 24 25	2/4 To 10/5	➢ **Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** ➢ **Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** ➢ **Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.** ➢ **Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.**	• The Ray Model of Light • Reflection; Image Formed by a Plane Mirror • Formation of Images by Spherical Mirrors • Index of Refraction Refraction: Snell's Law • Total Internal Reflection; Fiber Optics • Thin Lenses; Ray Tracing • The Thin Lens Equation • The Thin Lens Equation • Combinations of Lenses • Lensmaker's Equation	○ The student should be able to recognize the characteristics of an electromagnetic wave. ○ The student should be able to recognize the ordering of the electromagnetic and visible light spectrum in terms of both frequency and wavelength. ○ The student should be able to explain what an image is and describe how it is formed as a result of reflected light. ○ The student should be able to identify image characteristics such as location and orientation. ○ The student should be able to identify where an eye must sight to view an image of an object and to trace the path of light from the object to the eye. ○ The student should be able to use the line of sight method to determine what objects an eye can see when sighting in a mirror. ○ The student should be able to identify the distinction between regular and diffuse reflection in terms of both the cause and the effect. ○ The student should be able to identify the basic rules of reflection for concave mirrors and describe the usefulness of such rules in determining the image location for an object. ○ The student should be able to recognize and distinguish between correct and incorrect ray diagrams ○ The student should be able to identify the characteristics of the images (size, location, orientation,	***Chapter 23*** **Light: Geometric Optics**

				and type) which are produced by concave mirrors. ○ The student should be able to use an understanding of image characteristics to match an image with a given object based on the image size, location and orientation. ○ The student should be able to use the mirror equation to predict the image distance if the object distance and focal length are known (or to predict the focal length which is required to produce a known image and object distance). (For concave mirrors) ○ The student should be able to combine the mirror equation and magnification ratio to predict either the image distance or image height and magnification for a known object distance and focal length. (For concave mirrors) ○ The student should be able to identify the basic rules of reflection for convex mirrors and to describe the usefulness of such rules in determining the image location. ○ The student should be able to recognize and distinguish between correct and incorrect ray diagrams. ○ The student should be able to identify the characteristics of images formed by convex mirrors and contrast such images to those formed by concave mirrors. ○ The student should be able to recognize the approximate location, orientation and size of a	

				convex mirror image if given a diagram with the object position. ○ The student should be able to use the mirror equation to predict the image distance if the object distance and focal length are known (or to predict the focal length which is required to produce a known image and object distance). (For convex mirrors.) ○ The student should be able to combine the mirror equation and magnification ratio to predict either the image distance or image height and magnification for a known object distance and focal length. (For convex mirrors.) ○ The student should know what an image is and be able to recognize the distinction between real and virtual images. ○ The student should be able to compare and contrast various mirror systems (plane, concave, convex) in terms of their ability or tendency to produce real and/or virtual images of objects. ○ Students should be able to identify what refraction is. ○ Students should be able to identify the cause of refraction and should understand the sole exception to light changing speed without changing direction. ○ The student should be able to identify the angle of incidence and the angle of refraction. ○ The student should be able to relate the direction which light bends (towards or away from the	

				normal) if given the relative speed of light in the two medium. ○ Students should be able to relate the index of refraction to the tentative optical density of a material and to the relative speed at which light travels through the material. ○ Students should be able to relate the direction which light refracts (either towards or away from the normal) to the relative index of refraction and optical density of the two media ○ The student should be able to identify the angle of incidence and the angle of refraction. ○ The student should be able to use Snell's law to algebraically solve for an unknown quantity (such as the index of refraction or the angle of refraction). ○ The student should be able to use an understanding of boundary behavior of light to predict the effect of changing incident angle upon the brightness and relative amount of energy in the reflected and refracted light. ○ The student should be able to identify the two prerequisites for the occurrence of total internal reflection and apply these to determine whether or not it could occur in any given situation. ○ The student should be able to define critical angle and use the concept to determine whether a light ray would undergo total	

				internal reflection in any given situation. ○ The student should be able to combine a conceptual and mathematical understanding of critical angle in order to compare critical angles for different boundaries if given a diagram or index of refraction values. ○ The student should be able to identify a lens as being converging or diverging (based on its shape) and relate the shape of the lens to the manner in which light rays refract. ○ The student should be able to apply the basic rules of refraction to converging and diverging lenses by predicting the manner in which light will refract. The student should be able to identify the correct incident and refracted rays in ray diagram for a converging lens. ○ The student should be able to identify correctly drawn ray diagrams for converging lenses. ○ The student should be able to identify the characteristics of images (size, location, orientation, and type) produced by converging lenses for a variety of object locations. ○ The student should be able to use an understanding of image characteristics to match a converging lens image with a given object based n the image size, location and orientation.	

				○ The student should be able to identify the correct incident and refracted rays in ray diagram for a diverging lens. ○ The student should be able to identify correctly drawn ray diagrams for diverging lenses. ○ The student should be able to identify the characteristics of images (size, location, orientation, and type) produced by diverging lenses for a variety of object locations. ○ The student should be able to use an understanding of image characteristics to match a diverging lens image with a given object based n the image size, location and orientation.	
26 27	11/5 To 28/5	**Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** **Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** **Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.** ➢ **Use tools and materials to design and build a device that uses light or sound to solve the**	• Waves Versus Particles; Huygens' Principle and Diffraction • Huygens' Principle and the Law of Refraction • Interference—Young's Double-Slit Experiment • The Visible Spectrum and Dispersion • Diffraction by a Single Slit or Disk	○ The student should be able to recognize the characteristics of an electromagnetic wave. ○ The student should be able to recognize the ordering of the electromagnetic and visible light spectrum in terms of both frequency and wavelength. ○ The student should be able to distinguish between polarized and polarized light. ○ The student should be able to predict the effect of a Polaroid filter or combination of filters upon the vibrational habits of light.	***Chapter 24*** **The Wave Nature of Light**

		problem of communicating over a distance.	• Diffraction Grating • The Spectrometer and Spectroscopy • Interference in Thin Films • Michelson Interferometer • Polarization • Liquid Crystal Displays (LCD) • Scattering of Light by the Atmosphere	○ The student should be able to explain the meaning of a primary light color and identify the three primary colors of light. ○ The student should be able to predict the result of mixing primary colors of light. ○ The student should be able to explain the significance of complementary colors of light and identify sets of complementary colors. ○ The student should be able to use complementary colors and principles of color subtraction to explain the appearance of an object when viewed under white light. ○ The student should be able to predict the effect which filters have on the appearance (color) of an object of various colors when viewed through the filter. The student should be able to use the principles of color addition and subtraction to predict and explain the color of shadows when a combination of light colors are used to create them.	