Teacher: Mr. R. Perpignand	Grade/Content: 7th Grade Science	08 – 22 - 2013

Unit/Theme (Bigger Picture): **Physical Science**

Standards and Objectives: **Optics**

All Materials, Resources **Text: Life Science** **Supplemental: Ten Principles of Ethno-Biology** **adapted: Native American Students** **visuals: Ppt.** **technology: Lap top**

Key Vocabulary: **opti**cs, optical engineer, optician, laser, infrared, visible light, optical illusions, pupil, retina, optic nerve.

Learning Goal(s)	Success Criteria (What the students do, make, say or write):
• **Observe the basic nature of light through understanding Optics.** • **Uses of optics in everyday life** • **Who the scientists are that study Optics**	• **At the end of the lesson students will be able to:** **Make a list of 10 devices we use every day that operate with the study of optics.** • **Indicate scientist who work in the discipline involving optics.** • **Technology found in the field of Optics**

Procedure

Time	1. Focused Student Learning (Building Background)
5min.	• ***Connect to Prior Learning (Bell work)*** **Sketch the Electromagnetic Spectrum** • ***Connect to Experience:*** **Why do you see what you see? How do you see what you see?** • ***District-wide Vocabulary Routine:*** **use Frayer's model to complete vocabulary list from above.**

Time	2. Direct Instruction – Explicit and Systematic, I DO:	Grouping	Student Engagement Strategies:	Assessments and Discussion Questions Checking for Understanding	Differentiation
15-20 min	**Introduction to Optics/Optical science** **Optics is basically the**	Small Groups	**None of these devices would exist without an understanding of optics. Explain:**	**Oral Discussion:** **Explain why some animals have eyes that see different types of light than we humans can see?**	**The electromagnetic spectrum has been essential**

	study of light. **What is Light?** **Optics is the study of light in all of its forms.**		***Cell phones** ***Cameras** ***Internet** ***Television** ***Computers.**	**Animals see differently insects and other animals can see light that humans cannot. In fact, only a small percentage of the total light that occurs all around us can be seen by humans.**	**to understanding the current climate of the earth, including the problem of global climate change and its solutions**

Time	3. Guided Practice, WE DO	Grouping	Student Engagement Strategies:	Assessments and Discussion Questions Checking for Understanding	Differentiation
20-30 min.	**People who study optics include:** • **Optical scientists** • **Artists** • **Astronomers** • **Doctors** • **Engineers** • **Chemists** • **Photographers** • **Special effects editors** • **Computer game producers** • **Movie directors** • **Meteorologists**	Small Groups	**Research:** **Using technology – groups of 3 students will research these people and share with the class why they had to study optics.** **Rank your top five jobs in order from your most favorite (1) to your least favorite (5) and explain why you choose them the way you did.**	**Discussion:** **What makes some surfaces reflect and others not?** **How fast does light really travel?** **What fundamental particles make up the energy we see around us?**	**Infrared Goggles: Otherwise known as night vision goggles can detect infrared wavelengths which are light waves that are have longer wavelengths than what we see in the visible spectrum**
Time	**4. Closure**	**Grouping**	**Student Engagement Strategies:**	**Assessments and Discussion Questions Checking for Understanding**	**Differentiation**
5 – 7		Individual	**Written Assignment:**	**Traditional Ecological Knowledge**	**Which item do**

min.	**What do you think optics is?** **a)** **The study of light.** **b)** **The study of nature**		What is meant by the following? **"About light I am in the dark"** **Benjamin Franklin**	**Many ancients have strong sun figures in their** **Mythology - what is the** **Apache story behind the sun?**	**you think optical engineers helped design?** ***Lenses,** ***microscopes,** ***telescopes,** ***internet,** ***toasters,** ***cell phones,** ***video game** *** computers** ***solar panels.**
Time	**5. Independent Practice, YOU DO**	**Grouping**	**Student Engagement Strategies:**	**Assessments and Discussion Questions Checking for Understanding**	**Differentiation**
20 - 30 min.	**Investigate:** **Optics Technology:** **Lasers - used in sending and receiving data:** ***cut out metal for cars,** ***computer chips.** ***created CD and DVD** ***players,** ***printers,** ***barcode scanner** **Fiber Demo:** **Can't shoot a laser at a**	**Small Group**	**Lasers are super concentrated beams of light that have a huge amount of energy in them. Lasers have become part of everyday life in thousands of different ways. Lasers have created a revolution in the ways that medicine is conducted. Lasers can make delicate eye repair possible, and can even create the possibility of bloodless surgeries.**	**Reflection Question:** **Which of the following occupations do you think are the most directly related to optics?** **Pick the top five:** **Optical scientists ,** **_____artists,** **_____astronomers,** **_____doctors,** **_____engineers,** **_____veterinarians,** **_____chemists** **_____photographers,** **_____special effects editors,**	**Technology Lab:** **Lasers:** **Mixing colors with lasers** **Materials:** **Lasers: red, green blue Skittles** **Objective: Can you separare the colors under these laser lights?**

	great distance, ie: Tuscon to Phoenix, however, with fiber optics, it can travel around the world.		**Explain Fiber Optics** **Explain Grooves on a Disc**	**___computer game producers,** **_____movie directors,** **_____cinematographers,** **_____meteorologists**	

Throughout the delivery of the lesson, the teacher:	**Lesson Reflections**
…will observe and use formative assessments to modify the lesson or provide modifications and adjustments in the daily or weekly plan to best suit the needs of the students. Accommodations and limitations to assignments as directed by individual education plans will be followed accordingly.	What went well? What needs improvement? How did I measure student mastery (80% @ 80%)? What success criteria, if needed, need further review?

Teacher: Mr. R. Perpignand	**Grade/Content: 8th. Grade Science**	**08 – 27 – 2013**

Unit/Theme (Bigger Picture): **Physical Science**

Standards and Objectives: **Optics - The Basics of Light**

All Materials, Resources Text: Life Science Supplemental: Ten Principles of Ethno-Biology adapted: Native American Students visuals: Ppt. technology: Lap top

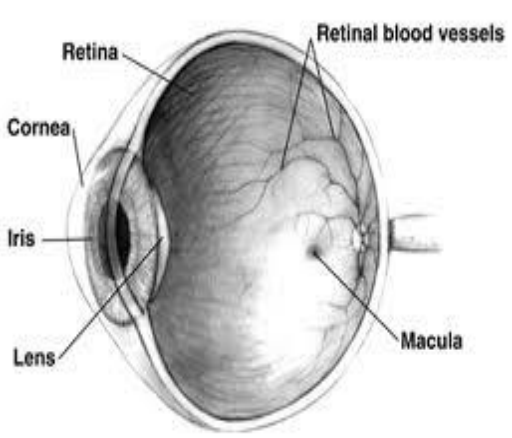
Key Vocabulary: **opti**cs, optical engineer, optician, laser, infrared, visible light, optical illusions, pupil, retina, optic nerve.

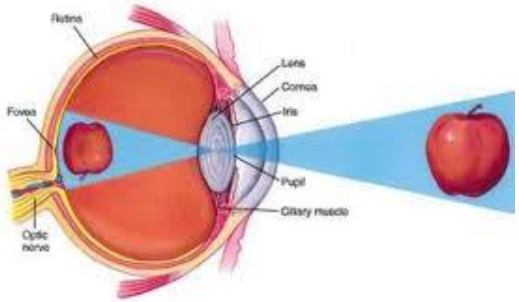
Learning Goal(s)	**Success Criteria (What the students do, make, say or write):**

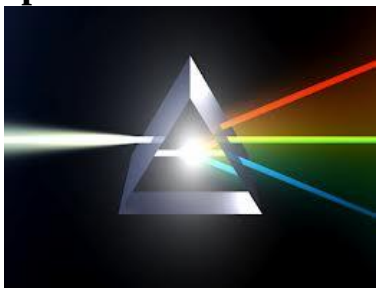
Observe the basic nature of light through understanding Optics. Understanding the nature of the Electromagnetic Spectrum What the parts of the eye	**At the end of the lesson students will be able to:** • **Make a sketch and list parts of the human eye** • **Investigate the Electromagnetic Spectrum** • **Begin to design a solar panel**

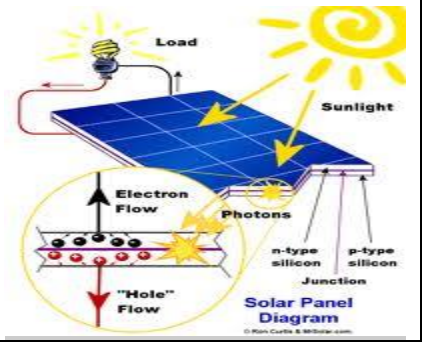
Procedure

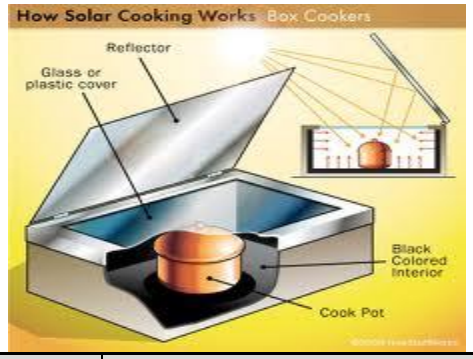
Time	1. Focused Student Learning (Building Background)
5min.	• ***Connect to Prior Learning (Bell work)*** **Sketch the Electromagnetic Spectrum (must be completed today)** • ***Connect to Experience:*** **Use Venn Diagram to compare and contrast Light Vs. Dark** ***District-wide Vocabulary Routine:*** **use Frayer's model to complete vocabulary list:** Wavelength, frequency, infrared, x-ray, microwave, gamma ray, ultraviolet light, radiation, hertz

Time	2. Direct Instruction – Explicit and Systematic, I DO:	Grouping	Student Engagement Strategies:	Assessments and Discussion Questions Checking for Understanding	Differentiation
	The Science of Seeing: ***Light reflected off objects** ***Projected onto the retina** ***Conversion into a chemical signal** ***Optic nerve to the brain** ***Pupils dilate** ***Visible light.** ***ROY G. BIV.**	Small Groups	**Sketch the parts of the eye:**  	**Which spectrum represents the seven main colors in visible light?** **How do we see color?** **When we see a color in an object, we are actually seeing the wavelength color that the object is not absorbing and instead reflects back at us.**	**Light:** **not an object** **does not behave like sound waves** **NOT electricity** **transverse wave** **A Particle**

	Explain how we see the apple.			**How is it similar to camera lenses?**	

Time	3. Guided Practice, WE DO	Grouping	Student Engagement Strategies:	Assessments and Discussion Questions Checking for Understanding	Differentiation
20-30 min.	***Visible Light** **Human sees this** ***Ultraviolet wavelengths** **used to kill bacteria in drinking water** ***Black Light** ***Infrared light** ***Colors some other creatures, like insects, can see** **mosquitoes see infrared vision allows them to find warm blooded animals to feed from**	Small Groups	**Unit of Light:** **-photon** **doesn't have mass or a charge** **can interact with other matter: an example is the solar photovoltaic panel that converts sunlight into electricity.** **Review The Atom:** **-basic building block of matter.** **-too small to see** **consist of a nucleus of protons and neutrons.** **This center has a cloud of orbiting electrons that are small, negatively charged**	**Ultraviolet radiation and the Sun:** ***skin cancer** ***triggers a process in our bodies that creates vitamin D,** ***blocked by the layer of gas in the atmosphere called the ozone layer.** **An X-ray:** ***electromagnetic radiation that is used to take a picture of what is inside of something,** **Frequency :** **the amount of waves that pass a point in a specific**	**Optics** **studies all of the electromagnetic spectrum**  **What does an atom look like?** **Show the frequency of a transverse wave.**

			particles. Electrons are really important because they determine how different atoms react with one another and produce the matter we see all around us. Sketch an atom:	unit of time	
Time	**4. Closure**	**Grouping**	**Student Engagement Strategies:**	**Assessments and Discussion Questions Checking for Understanding**	**Differentiation**
5 – 7 min.	What speed approximately represents the speed of light?	Individual	What are the dangers of UV radiation?	What is a sun block?	The units of frequency are called Hertz. A Hertz is the number of waves per second of a specific electromagnetic wave.
Time	**5. Independent Practice, YOU DO**	**Grouping**	**Student Engagement Strategies:**	**Assessments and Discussion Questions Checking for Understanding**	**Differentiation**
20 - 30 min.	Microwaves: *cell phone towers receive and send out signals in the form of microwaves *example of microwaves used in everyday life is the microwaves that carry information to	Small Group	Lab: Design a Solar Oven 2wk. projects: Project 1 - Solar Oven Or Project 2 – Dissecting a Cow's Eye See Hand – Out sheet for procedures and scoring rubric. Project must be displayed in	Gamma Rays: *smallest wavelength of the electromagnetic spectrum * wavelengths are about the size of a nucleus of an atom, which is many times smaller than a single human cell. *comes mostly from radioactive materials like radium, uranium and	Technology Focus: Solar Panels How does it work? 

	computers in wireless network. **Radio waves:** ***largest waves on the electromagnetic spectrum belong to radio wave**		**Science fair preview.**  	**plutonium.** **Such elements have been used in nuclear power as well as nuclear weapons.**	

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…will observe and use formative assessments to modify the lesson or provide modifications and adjustments in the daily or weekly plan to best suit the needs of the students. Accommodations and limitations to assignments as directed by individual education plans will be followed accordingly.	What went well? What needs improvement? How did I measure student mastery (80% @ 80%)? What success criteria, if needed, need further review?