BEN: Scientific Inquiry (BUEI)		
Expedition- 4		January 28, 29, 30
Cambridge Objectives:		**PHYSICS** **Unit 5.5 How We See Things** **5Pl 8** We see light sources because light from the source enters our eyes. **5Pl 9** Beams/rays of light can be reflected by a mirror, the reflected light enters our eyes and we see the object. **5Pl 10** When a beam of light is reflected from a surface it changes direction. **Unit 5.3 Light and Shadows** **5Pl1** Shadows are formed when light travelling from a source is blocked **5Pl2** Size of a shadow is affected by the position of the object **5Pl3** Shadows change in length and position throughout the day **5Pl7** Opaque objects/materials do not let light through and transparent objects/materials let lots of light through
(AM Group) 9:30 (PM Group) 1:00	Arrival	1. Welcome 2. Housekeeping (bathrooms, bags…) 3. Introduction of BUEI teachers and staff 4. Organize students into 2 groups.

9:30- 11:45 1:05- 2:50	Light Labs	**Group 1:** **(45 Minutes)** **Lesson Hook:** • Shadow play with projector - Notice and Wonder- Light **Inquiry Stations:** • Students will work in groups of 4 in a light inquiry activity. • Light travels so quickly that sometimes we can forget it even travels at all. Learn all about light travel and direction **Materials Needed:** 1. Large pieces of paper taped to stations. Students are able to write observations, draw illustrations, ask questions. 2. Flashlights 3. A variety of shadow makers: opaque, transparent, translucent 4. Mirrors 5. Pencils, markers 6. Vocabulary words and marks on wall for reflections • 20 minutes: making shadows with various objects to build vocabulary: **shadows, opaque, transparent, translucent** ***"A shadow is formed where the path of light is blocked."*** Some questions or prompts as groups play with light: Where is the light coming from? How can we play with light? What happens when you move the light? Does the spot of light always look the same? Can you make it bigger or smaller? What happens if you put an object in the path of light? What is creating the shadow? Are the shadows the same shape and size? Trace the shadow on the paper on the table. How are shadows made? Does the light come through the objects? Does it make a shadow on the wall? • 20 minutes: new material – mirrors and a mark on the wall Can you get the light to the mark without pointing directly at the wall? Play with the mirrors and see if you can change the path to do something interesting. You may use the pencils, paper to draw paths, make predictions, trace the path of light from source to mark or object. • 5 minutes: Each group will share some of their findings at the end and see if they make connections to vocabulary.

Group 2 :
(45 Minutes)
Lesson Hook:

- **Look into a partner's eyes. Turn lights off and look carefully at their pupil to see what happens when light turns on.**

"Light is information. Everyone here has a very useful information gatherer – your eyes. The iris is a muscle around your eye that controls how much light goes into it. Many creatures have eyes to gather information and light, even in the ocean."

20 min:Presentation and videos: Creatures in the ocean and adaptations for light

- Sunlight Zone and coral reefs, look at corals, sponges, algae, reef fish characteristics
- Twilight Zone – angler fish, barrel eye fish, bioluminescence, cockeye squid
- Deeper/Midnight zone – darkness and cold

Video: Students will have a card/ post- it. During the film they will record one thing that stood out to you.

Inquiry Stations:

- Students will work in groups of 4 as they rotate between 2 stations.
- Station 1- Refraction
- Station 2- Dispersion of light, diminishing through the medium
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Teaching Points:

1. Have you ever put a drinking straw in a cup of water? If your answer is yes, you may have noticed that the straw seems to bend in the water. The vision of the straw in the air doesn't perfectly line up with the way you see the straw in the water. Why is this? The answer is in a physics principle called refraction. During refraction, light bends as it enters different mediums.
2. As light enters a medium like water, certain wavelengths can pass through more easily than others. Sea creatures will start to lose the ability to see red light in deeper water, and so bioluminescence is often blue or green

Materials Needed:

1. Large pieces of paper taped to stations. Students are able to write observations, draw illustrations, ask questions.
2. Question prompts will be located at each station for refraction and dispersion
3. Dispersion: Clear containers, water, eye dropper or beaker, milk, flashlight
4. Refraction: clear containers, pencil or object to "break"

Before rotating to opposite station, pair share what they saw and what they understand about light through water.

11:45-12:00 2:45- 3:00	Closure Social Emotional	*Synthesis of concepts:* **Demonstration of light through prism: all colors added together make white light** **Whole Group in Butterfield Gallery :** **(10 Minutes)** Colored Shadows We have been playing with light and what happens as light passes through space and fluids like water. Here is a brain teaser using colored light ***(Think-pair-Share)*** 1. The thing that made the most sense to me today was... 2. One thing that I just don't understand is... 3. When someone asks me what I did in math today, I can say... 4. One thing I would like more information about is... 5. I need more examples of... *6.* I enjoyed...
		At School Task: *1. Packets given to classes from BUEI (Eco Awareness)* *2. Shadow Puppet Theatre*
12:00 3:00	Dismissal	Mr. Degraff- Will collect and drop-off from the front of BUEI.