Light and Color Activity

Some helpful websites include:

Wikipedia Visible Spectrum
http://en.wikipedia.org/wiki/Visible_spectrum
Wikipedia Polarization
http://en.wikipedia.org/wiki/Polarization_(waves)
Wikipedia Refraction
http://en.wikipedia.org/wiki/Refraction
Wikipedia Reflection
http://en.wikipedia.org/wiki/Reflection_(physics)
Wikipedia Fresnel Lens
http://en.wikipedia.org/wiki/Fresnel_lens
Wikipedia Pinhole Camera
http://en.wikipedia.org/wiki/Pinhole_camera
Wikipedia Radiometer
http://en.wikipedia.org/wiki/Radiometer
Wikipedia Color
http://en.wikipedia.org/wiki/Color
Wikipedia Color Mixing
http://en.wikipedia.org/wiki/Color_mixing
Wikipedia Complementary Color
http://en.wikipedia.org/wiki/Complementary_color

In this activity you and your team members will investigate some of the properties of light and color using prisms, polarizing filters, water and a plastic cup, a laser and optical calcite, a Fresnel lens, a pinhole viewer, a radiometer, a color mixer, and some colored filters. You may complete the parts of this activity in any order, but you are required to do all of them together, as a team.

Part 1 Prisms

1. Describe the visible spectrum.

2. Describe what happens to sunlight when it passes through a prism.

3. Pass light through one prism, then pass that light through a second prism. Describe the light that passes through the second prism.

4. Pass laser light through a prism and describe what you see.

Part 2 Polarizing Filters

5. What is polarization?

6. Stack two of the polarizing filters horizontally on top of each other so that light from one of the classroom ceiling lights passes through them. Do **NOT** do this with sunlight! How much light passes through the filters?

7. Now rotate one of them so that it is vertical. Describe what happened

Part 3 Refraction

8. Define refraction.

9. Stick a pen, pencil, or dowel in a cup of water and observe the side of the cup. Describe what you see. Why does this happen?

Part 4 Internal Reflection

10. Define reflection.

11. Shine a laser into the optical calcite. Describe what you see.

Part 5 Fresnel Lens

12. Explain how a Fresnel lens differs from a traditional lens.

13. Experiment with the Fresnel lens. Do **NOT** shine sunlight through the lens! The Fresnel lens can be used **ONLY** in the classroom. Describe how objects appear as seen through it.

Part 6 Pinhole Viewer

14. Describe how a pinhole camera works.

15. Experiment with the pinhole viewer. Treat it **CAREFULLY**! You may use either lens, by sliding the lens gently on the popsicle stick, so that the two plastic tabs are against the black cover. Do **NOT** use it to observe the sun or shine direct sunlight through the pinhole viewer! You may use it outside or in the classroom. Be sure that there is a lot of light falling on the objects you observe, otherwise they will not be visible. Describe how objects appear as seen through it.

Part 7 Radiometer

16. What is a radiometer?

17. Experiment with the radiometer. Treat it **CAREFULLY**! How does the radiometer respond when in direct sunlight?

18. How does the radiometer respond when in the shade?

Part 8 Color Mixing

19. What is color?

20. What are the three additive primary colors on the color mixing box?

21. What are the three subtractive primary colors?

22. What do complementary colors produce?

23. Turn on only the red and green lights. Describe the colors that you see.

24. Turn on only the green and blue lights. Describe the colors that you see.

25. Turn on only the blue and red lights. Describe the colors that you see.

26. Turn on all three colors. Describe the colors that you see.

Part 9 Color Filters

27. Using the color filters, your text book, posters on the walls, describe how different filters affect what can colors can be seen and which cannot.