Discovering the spectrum with M&Ms and colored lights

Lab Rules:

- Do not eat the candy until I give permission
- Be respectful to each other



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Step 1: Using the red filter light, try to sort the candies based on their color and the color labels on the paper.

Step 2: Now take off the filter, and observe how well you sorted the candies. Write down what you see on your lab paper.

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Step 3: Using the green filter light, try to sort the candies based on their color and the color labels on the paper.

Step 4: Now take off the filter, and observe how well you sorted the candies. Write down what you see on your lab paper.

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Step 3: Using the blue filter light, try to sort the candies based on their color and the color labels on the paper.

Step 4: Now take off the filter, and observe how well you sorted the candies. Write down what you see on your lab paper.

Specific Observations

- Which M&M colors were the most difficult to tell apart when viewed through the red filter?
- What about the blue filter?
- Did any M&M colors seem to disappear or turn black under a certain colored light? Which ones, and under what light?



Reasoning and Explanation

- Why do you think a red M&M still looked red when you shined red light on it, but might have looked very dark or black under green light?

- If a blue M&M looks blue in white light, what does that tell you about the colors of light it is absorbing and reflecting?

Prediction and Application



- If you had a yellow M&M, what do you predict it would look like if you shined blue light on it? Why?

- How is what we learned about colored filters similar to how a colored stained-glass window works?

Connecting to the Sun's Light

Our sun gives off white light. What does this experiment tell us about what white light is made of?



Further Inquiry



- What new questions do you have about light and color after doing this experiment?

- If you could do another experiment with colored lights and objects, what would you try next?

Light Exploration: Rainbows, Visible Spectrum, & Filters

Rainbow Day

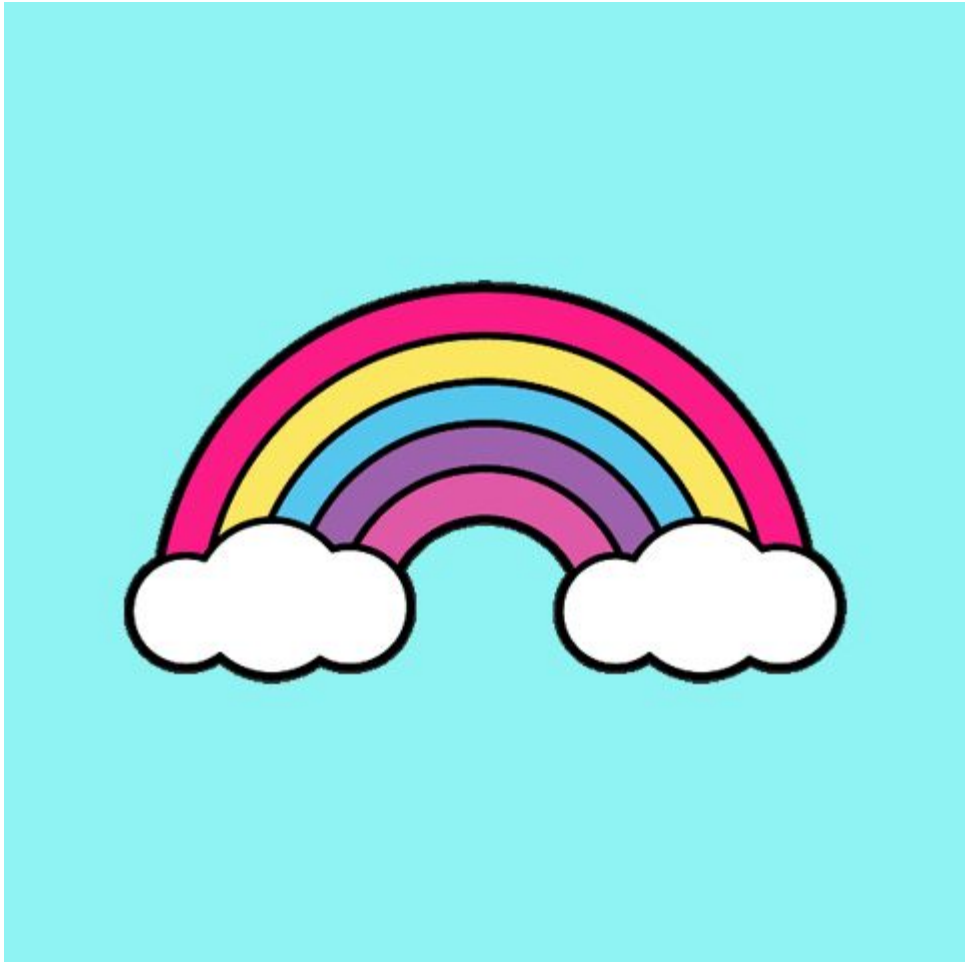
Vocabulary Review:

- **Visible Spectrum:** The rainbow of colors we can see.
- **Absorb:** To take in light.
- **Transmit:** To let light pass through.
- **Reflect:** To bounce light back.

Making a Rainbow!

- **Teacher Actions:**
  - Gather materials: Prism, glass of water, or old CD.
  - Find a darkened area in the classroom (or use a flashlight in a dark corner).
  - **Demonstrate:** Show how the prism/water/CD splits white light into a rainbow.

- **Guiding Questions for Students (to ask during demo):**
  - What colors do you see?
  - What order are the colors in? (Hint: ROYGBIV!)
  - Where do you think these colors came from?



- **Method:**
  - Darken the room as much as possible.
  - Hold the prism in front of the flashlight beam (or in a ray of sunlight coming through a window).
  - Slowly rotate the prism and adjust its angle until you see a spectrum (rainbow) of colors projected onto a white surface (like a wall or a piece of paper).
  - The light enters one side of the prism, bends, and then separates into its component colors as it exits the other side, creating the rainbow effect.





Using a Glass of Water (and a Mirror, optional):

- **Materials:** A clear glass of water, a strong flashlight (or direct sunlight), a white surface (paper or wall), and optionally, a small mirror.



- **Method (with flashlight):**
  - Darken the room.
  - Place the glass of water on a table.
  - Shine the flashlight beam through the glass of water.
  - Position a white piece of paper or point the light towards a white wall.
  - Adjust the angle of the flashlight and the position of the paper/wall until you see a faint rainbow. The water acts like a prism, bending and separating the light.



- **Method (with sunlight and mirror - "refraction rainbow"):**
  - Place a glass of water on a table in direct sunlight.
  - Submerge a small mirror at an angle inside the glass of water.
  - Position a white piece of paper or point the light towards a white wall.
  - Adjust the mirror's angle until the sunlight reflects off the mirror, passes through the water, and projects a rainbow onto the surface.





Using an Old CD/DVD:

- **Materials:** An old CD or DVD, a strong flashlight (or any light source).
- **Method:**
  - Hold the CD/DVD under a light source (like a bare light bulb, a flashlight, or sunlight).
  - Tilt the CD/DVD slightly.
  - You will see iridescent, rainbow-like colors appear on the surface of the CD/DVD itself. This happens because the tiny grooves on the disc act like a diffraction grating, splitting the light into its spectrum.





Wrap-up & Connecting to Our World

Light All Around Us!

- Great job exploring light and color today!
- Now you know that white light is made of all the colors of the rainbow.
- You also understand how filters can change the colors we see by absorbing and transmitting light.
- This understanding helps us explain amazing things like:
  - Why the sky is blue.
  - Why sunsets are red and orange.