

MONDAY MORNING SCIENCE BLAST

REFLECTING RAINBOWS - Physical Science - Light

What is light? Throughout mankind's history, this phenomenon is something which most of us have taken for granted. Light is always present, and we assume it will always be present in the familiar patterns we know from our youth. However, in the past, even in many countries around the world today, events such as solar eclipses have caused people fear. Why is this? Because these events are different from those familiar patterns, cutting off the Sun's light for just a bit, and who could be sure the Sun would come back? Even in those countries where these events are understood, solar eclipses are still cause for awe and excitement!

But the question remains: what is light? A very technical definition would be "The form of radiant energy [from the Sun] that stimulates the organs of sight." An easier way to understand it is that light is an electro-magnetic wave; not a physical substance that we can touch, but instead a varying electric and magnetic field, spreading out from one place to another. A rainbow is just a large band of parallel stripes which are blended at their rims and which display the full spectrum of colors that make up the Sun's white light. When light hits a surface, some of it bounces off or is reflected. Take mirrors, for example, with their very shiny surfaces designed to reflect almost all of the light that hits them. When you look into a flat mirror, what you see is a reflection of you, only reversed. Now, remember funhouse mirrors and how you laughed at the odd reflection seen there? When looking into a curved mirror (either concave or convex), what you see is still you, just a stretched out, long and thin version, or a short, squatty version. When visible light hits a prism, the various wavelengths that make up the colors we see are reflected at different angles, separating them into the bands of color we see.

In this lab, using a blank compact disk, a flashlight (or bright natural light), and a sheet of white paper, your students will see how light reacts and breaks up into its component colors when bounced off the surface of a CD. First have your students look at the blank side of the CD (the side with no writing) to see the bands of shimmering colors. Have them lay their CD flat and look at the colors reflected. Then instruct them to color Circle A so it looks like their CD when it is set flat. Next have the students tilt their CD up a little and look at how the reflected colors change, then color Circle B so it looks like their CD when it is tilted slightly. Now have your students tilt their CD up more and look at how the reflected colors change, then color Circle C so it looks like their CD when it is tilted more.

Instruct your students to take their CDs out into the bright sunlight (or alternatively have them shine a flashlight at the CD in a darkened room). Have them hold the white paper so the light reflecting off their CD shines onto the paper, and ask them to describe what they see. Now have your students tip their CDs and describe how the reflections change, then have them change the distance from their CD to the paper and describe how the reflections change. Lastly, using a magnifying lens to look at the surface of their CDs, have your students describe what they see.

Reflecting Rainbows

QUESTION: What colors make up light?

MATERIALS:

CD
flashlight

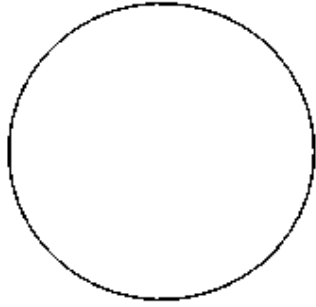
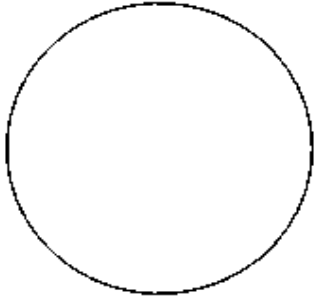
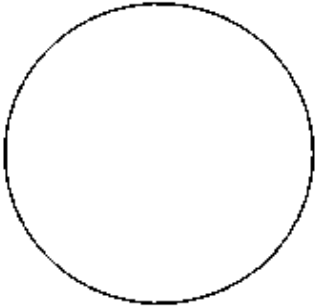
white paper

PROCEDURE:

1. Look at the blank side of the CD (the side that doesn't have any writing on it) and you will see bands of shimmering colors. Lay the CD flat and look at the colors reflected. Color Circle A so it looks like your CD when it is set flat.
2. Next tilt your CD up a little and look at how the reflected colors change. Color Circle B so it looks like your CD when you tilt it slightly.
3. Tilt your CD up more and look at how the reflected colors change. Color Circle C so it looks like your CD when you tilt it more.
4. Take your CD out into the bright sunlight (or shine a flashlight at the CD in a darkened room). Hold the white paper so that the light reflecting off the CD shines onto the paper. Describe what you see.
5. Tip the CD and describe how the reflections change.
6. Change the distance from the CD to the paper. Describe how the reflections change.
7. Use a magnifying lens to look at the surface of the CD. Describe what you see.

DATA:

CONDITION	OBSERVATION
The reflection of the CD onto the white paper	
The reflection of the CD onto the white paper when you tip the CD around	
The reflection of the CD onto the white paper when you change the distance from the CD to the paper	

A	B	C
		

QUESTIONS:

1. What colors can you see on your CD?
2. What feature on the surface of your CD makes the light behave the way it does?
3. Are the colors you see reflected or refracted light?
4. How would the colors you see on your CD be different if you were to shine a red light onto its surface?