



# Sunlight

## READING LESSON

### Featured Book

**The Rainbow and You** by E.C. Krupp.

ISBN: 0-688-1560-10

### Objective

The students will reveal the secrets of the rainbow with fascinating facts and dazzling illustrations. Roy G. Biv will guide them back in time to learn the importance of rainbows in ancient cultures. They'll also go inside a raindrop to discover how light bends to create the rainbows dazzling colors.

### Science Background

The primary colors of light are red, green and blue. When these three colors are mixed together they create white light. When you see a color, you are seeing one part of white light reflected off of the object. The object absorbs the rest of the white light. This is why you cannot see an object well if a colored light is shined on it, unless the light and object are the same color. For example, blue light on a blue object shines blue. But blue light on a red object is hard to see because there is no red light contained within the blue light.

### Reading Standards (see appendix A)

Standard 1 - Students read and understand a variety of materials.

Standard 6 - Students read and recognize literature as a record of human experience.

### Key Points

- Roy G. Biv is an easy way to remember the colors of the rainbow.



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## READING LESSON - Question Review

Answer the questions below to help you review what was read in The Rainbow and You by E.C. Krupp.

1. There is not really a pot of gold at the end of the rainbow. What is a rainbow's real treasure?
  - a. Its colors
  - b. The rain
  - c. A pot of food
  
2. Why can't you touch or walk under a rainbow?
  - a. Because rainbows are too far away.
  - b. Because rainbows are not real.
  - c. Because rainbows are not solid; they are actually light.
  
3. There are seven colors in the rainbow. Put a check next to all of the colors in a rainbow.

<input type="checkbox"/> Red	<input type="checkbox"/> Black
<input type="checkbox"/> Orange	<input type="checkbox"/> Blue
<input type="checkbox"/> Pink	<input type="checkbox"/> Indigo
<input type="checkbox"/> Yellow	<input type="checkbox"/> Purple
<input type="checkbox"/> Green	<input type="checkbox"/> Violet
  
4. What does "ROY G. BIV" and "Run Onto Your Gold Before It Vanishes" help you remember?
  - a. The days of the week
  - b. The colors of the rainbow
  - c. The primary colors of light



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## READING LESSON - Question Review (continued)

5. How did the rainbow get its name?
  - a. It's shaped like a bow and it only appears when it rains
  - b. From a man named Mr. Bow who first saw a rainbow
  - c. Unsure
  
6. How is a rainbow created?
  - a. Snow + Rain = Rainbow
  - b. Wind + Rain = Rainbow
  - c. Sunlight + Rain = Rainbow
  
7. The ancient Greeks believed that a messenger from the gods named Iris, flew along the rainbow's colorful bridge between heaven and earth and magically lifted water from the earth into the clouds causing it to fall as rain. Who believed that a rainbow bridge connected Asgard, the sky kingdom of the high gods, with Midgard, the earth below?
  - a. The Vikings
  - b. The Ancient Greeks
  - c. The Navajo
  
8. The Navajo of the American Southwest say that "Monster Slayer" and "Born for Water", the twin hero sons of the Sun, journeyed to their father's world by stepping onto the rainbow. Who said that the rainbow was the storm god's bow and with it he shot arrows of lightning through the sky?
  - a. The Europeans
  - b. The Spaniards
  - c. The people of Siberia



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## READING LESSON - Question Review (continued)

9. Is black a color?
  - a. Yes
  - b. No, because we see black when there is no light and when there is no light, there is no color.
  - c. Sometimes
  
10. What is the name of the scientist who explained the rainbow, showed that sunlight is really made of the rainbow's colors and discovered the law of gravity, which explains why raindrops fall?
  - a. Benjamin Franklin
  - b. George Washington
  - c. Isaac Newton
  
11. Newton bent the sunlight with a prism and made a rainbow out of sunlight in a darkened room. Then he sent that rainbow through another prism and combined the colors back into white light. What colors make up white light?
  - a. All the colors of the rainbow mixed together
  - b. Red, blue and Green
  - c. None
  
12. Which color of light bends the most?
  - a. Blue
  - b. Red
  - c. Violet
  
13. Which color of light bends the least?
  - a. Blue
  - b. Red
  - c. Violet



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## READING LESSON - Question Review (continued)

14. Each color in the rainbow bends differently. Because of this, each color heads in a slightly different direction. True or false?
15. The back of a raindrop works like a mirror. Inside the raindrop, most of the sunlight is bent and bounced back to the front of the drop where the light entered. The light is then aimed back toward the ground in the sun's direction. What does this create?
  - a. A rainbow
  - b. Bright light
  - c. More rain
16. What color is always on the outside of the arc when you see a single rainbow?
  - a. Red
  - b. Blue
  - c. Green
17. What color is always on the inside of the arc when you see a single rainbow?
  - a. Red
  - b. Blue
  - c. Violet
18. What happens when some of the sunlight in a raindrop bounces twice before it leaves the drop?
  - a. A single rainbow is created
  - b. A double rainbow is created
  - c. A triple rainbow is created



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## READING LESSON - Question Review (continued)

19. The name of the world's largest natural arch is Rainbow Bridge National Monument. In which state is it located?
- Colorado
  - Nebraska
  - Utah
20. Where can you view a rainbow as a complete circle?
- From an airplane or a very high mountain.
  - From a valley
  - From the roof of a house
21. What can you see if you spray a hose in front of you with your back to the sun?
- Water drops
  - A rainbow
  - Light
22. Put a check next to the other places you can see rainbow colors:
- |  |                                    |
|--|------------------------------------|
| <input type="checkbox"/> Oil on a puddle | <input type="checkbox"/> Pearls    |
| <input type="checkbox"/> CD's            | <input type="checkbox"/> Tree      |
| <input type="checkbox"/> Couch           | <input type="checkbox"/> Seashells |
| <input type="checkbox"/> Soap Bubbles    |                                    |
23. Why is our world the only planet in the solar system where rainbows are possible?
- Sunlight only shines on the Earth.
  - Earth is the only planet with oxygen.
  - Earth is the only planet with water on it.



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## READING LESSON - VOCABULARY

Below are several words that may be new to your vocabulary that you read in The Rainbow and You, by E.C. Krupp. Make a line from the word to the correct definition.

<u>Word</u>	<u>Definition</u>
1. ancient	a) Deep blue color
2. bow	b) Result/influence
3. effect	c) Arch
4. eyewitness	d) Very old
5. gravity	e) Color
6. hue	f) V-shaped piece of wood or metal, used for splitting wood.
7. indigo	g) Glass block which splits white light up into the colors of the rainbow.
8. prism	h) Beam of light or heat.
9. rays	i) Person who has seen something happen.
10. wedge	j) Force attracting all objects to the earth's center, causing objects to fall to the ground if dropped.



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## ACTIVITY LESSON

### Featured Science Activity

#### Making a UV Bracelet

#### Objective

The students will make a solar powered UV bracelet to detect the ultraviolet light of the Sun.

#### Science Background

Sunlight is comprised of light energy that occurs at many different wavelengths. We are most familiar with light in the visible light part of the solar spectrum - visible light enables us to see the colors of the world. The visible light spectrum has wavelengths that allow us to see red, orange, yellow, green, blue, indigo, and violet (we use ROY G. BIV to remember these colors in order). Of this group, red has the longest wavelength and violet has the shortest. Light that has wavelengths that are a little shorter than violet light wavelengths is called ultraviolet light. We can't "see" ultraviolet light, but there are ways to determine if it is present.

#### Science Standards (see appendix A for detailed overview)

Standard 2.2 - Students know that energy appears in different forms, and can move (be transferred) and change (be transformed).

#### Materials



- ❑ 12 Ultraviolet Light Detecting Beads (variety)
- ❑ 13" Rawhide string (15" for adults)
- ❑ Ruler
- ❑ Sunscreen




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## ACTIVITY LESSON (continued)

### Procedure

1. Take the rawhide string and tie a knot about 5 inches from one end of the string.
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2. Slip 11 of the beads through the long end of the rawhide until they meet the knot.
  3. Tie another knot at the end of the last bead. This will keep the beads in place.
- 

4. Now slip the last bead through one end of the bracelet.
  5. Take the other end of the bracelet and slip it through this same bead.
  6. Once each end of the string has been slipped through the bead, tie a knot at the end of each string.
  7. Slip the bracelet over your wrist and ask your tutor to pull the end of each string to fit the bracelet to your wrist.
  8. You now have an adjustable bracelet! Go outside to see what the ultraviolet rays from the sunlight will do to your beads.
  9. Now dab a little sunscreen on the beads. What happens? The sunscreen will block out the UV lights and the beads will gradually turn white again. UV light can be very harmful to your skin and eyes so that's why it is important to wear sunscreen and sunglasses with UV protection before going out into the sun. You can test how well your sunglasses block out UV by placing your solar bracelet underneath the lenses. If the beads under the sunglasses stay white when you place them in the sunlight, then they are blocking out the UV!
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### Why do the beads change colors?

The UV sensitive beads contain a pigment that changes color when exposed to ultraviolet light. When you bring them out into sunlight and the ultraviolet rays of the sun hit the beads, they change color.

