

How do Rainbows Form?

Seeing a rainbow is always a delightful surprise. Perhaps you have seen one this spring – and wondered how it came to be. Let's find out.

When the sun shines onto droplets of moisture in the Earth's atmosphere, a spectrum of light appears in the sky. So, when there is rain or moisture in the air, and sunlight shines from behind it, a lucky viewer might see a rainbow. Rainbows often appear after it has rained and the sun is coming out. Rainbows can be caused from other sorts of mists, including water from a hose, a waterfall, or any other sort of spray.



A rainbow features seven colors: Red, orange, yellow, green, blue, indigo and violet. Many people remember this color sequence by the mnemonic "Roy G. Biv." A mnemonic is a memory or learning aid, often in the form of a rhyme or an acronym.

Where do these colors come from? Sunlight is composed of light of varying wavelengths. Short wavelength light appears blue, violet and indigo when we look at it. Longer wavelengths appear red, orange and yellow. Since the amount light bends depends on the light's wavelength, or color, we see that red light bends the most, orange and yellow a little less, and so on – right until violet, which bends the least. This explains why the colors always appear in the same order. So, when sunlight enters a droplet of water in the air, the light splits into an array of colors. The light is refracted (meaning that it bends) off the surface of a raindrop, and some of it is reflected off the back of the drop; and refracted again as it leaves the drop. When it emerges, we see the color spectrum.

A double rainbow appears if the beam is reflected twice inside of the water drop, and the colors of the second rainbow will be reversed in order.

The reason that we don't see rainbows very often is because they are quite rare. The different variables needs to be perfect: you will only see a rainbow if the rain is in front of you and at a bit of a distance, and the sun is behind you and low on the horizon.

Rainbows have always been seen as a symbol of good fortune and luck, and have a place in the mythology and legends of most cultures. Because of their beauty and how difficult they would have been to understand before science, people have long been in awe of the rainbow. According to Irish legend, the leprechaun hides his pot of gold at the end of the rainbow.

Name: _____ Date: _____

Multiple Choice Questions

Circle the correct answer.

1. Which is the correct sequence of the colors in a rainbow?
 - a. Blue, indigo, violet, yellow, green, orange, red
 - b. Red, orange, yellow, green, blue, indigo and violet
 - c. Red, orange, green, blue, yellow, indigo, violet
 - d. Violet, orange, red, blue, yellow, indigo, green

2. On what type of day is it most likely for us to see a rainbow?
 - a. A sunny day with clear blue skies
 - b. A very rainy, dark day
 - c. A snowy day
 - d. A day that is a mix of rain and sun

3. True or False: Rainbows can be caused from nearly any sort of water spray or mist, combined with the right sunlight.
 - a. True
 - b. False

4. Which color bends the least?
 - a. Red
 - b. Orange
 - c. Indigo
 - d. Violet

5. In the case of a Double Rainbow, which color is on top of the arch?
 - a. Red
 - b. Orange
 - c. Green
 - d. Violet

6. Which of the following statements is true:
 - a. Mary will only see a rainbow if the rain is falling in front of her.
 - b. Mary will only see a rainbow if the rain is falling behind her.
 - c. Mary will only see a rainbow if it rains, then the sun comes out, then it rains again and the rain freezes.
 - d. Mary will only see a rainbow if she lives on the southern hemisphere of earth.

Name: _____ Date: _____

Short Answer Questions

1. What is a mnemonic?
2. Provide an example of another mnemonic you are familiar with.
3. Have you ever seen a rainbow?
4. Draw a rainbow using the correct colors (in the correct order) on the back of this sheet. Label each color.
5. Explain where you must be standing in relation to the sun and the rain in order to see a rainbow.
6. Define "refraction."
7. Why might people have been in awe of rainbows in the past?

ANSWER KEY:

Multiple Choice:

1. B
2. D
3. A
4. D
5. D
6. A

Short Answer:

1. A mnemonic is a memory or learning aid, often in the form of a rhyme or an acronym.
2. Individual Response. Example: "I before E, except after C."
3. Individual Response.
4. Individual Response.
5. You will only see a rainbow if the rain is in front of you and at a bit of a distance, and the sun is behind you and low on the horizon.
6. Refraction is the change in direction of a wave due to a change in its speed.
7. People did not understand rainbows, so they are often found in myths and legends.