

LEVELED BOOK • M

# Rainbows

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Written by Sean McCollum

[www.readinga-z.com](http://www.readinga-z.com)

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## Focus Question

How does a rainbow form?

## Words to Know

angle  
experiment  
globe

illusions  
indigo  
reflects

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# Introduction

When the Sun shines after it rains, run outside. You may see a giant rainbow sweeping across the sky. Sometimes you may even spot small rainbows indoors when sunlight shines through a window.



A rainbow appears near storm clouds.



Rainbows can be seen in a splash of water, but these rainbows usually don't last long.

Rainbows are **illusions** made by light. We can see them, but we can't touch them or walk around them. Outdoor rainbows seem to move away when we go toward them.

Rainbows appear when light shines through something clear like water. They are beautiful tricks of light. Science, though, can explain the tricks.



Rainbows caused by sunlight always appear in the part of the sky that is directly opposite the Sun.

## Where and When Rainbows Appear

Look around the next time you see a rainbow. The Sun will be shining from behind you, and there will be rain in front of you. That is where you will see the rainbow.

Rainbows need water drops and sunshine to form. Rainbows most often appear in the morning or late afternoon. That's when the Sun is in the best places to create one. You might even see a double rainbow.



Double rainbows are special. The colors of the outer rainbow are in the opposite order to the colors of the inner rainbow.

You may see rainbows in the mist of a waterfall, too. A splashing fountain can also create a small rainbow. Rainbows can even form under a bright moon. These are called *moonbows*.



Moonbows are dimmer and much less common than rainbows.



Cameras were flown high above one of the world's biggest waterfalls to capture a full-circle rainbow.

We usually see a rainbow as a half circle. It actually forms a full circle, but from the ground we can only see the top half. Sometimes, a lucky airplane pilot may see the complete circle of a rainbow from the sky.

## Rainbows in Myths and Tales

- Vikings said a rainbow bridge linked their gods to Earth.
- In Ireland, people tell fairy tales about gold hidden at the ends of rainbows. Elves guard these pots of gold.
- The Hindu god Indra is shown using a rainbow as an archer's bow to shoot lightning arrows.

## How Rainbows Form

Years ago, a French scientist decided to study rainbows. He used sunlight and a big **globe** of water to **experiment**. He found that to see a rainbow, a person must be looking at light from the right position.



People study and build on many of Descartes's (day-KARTS) ideas to this day.

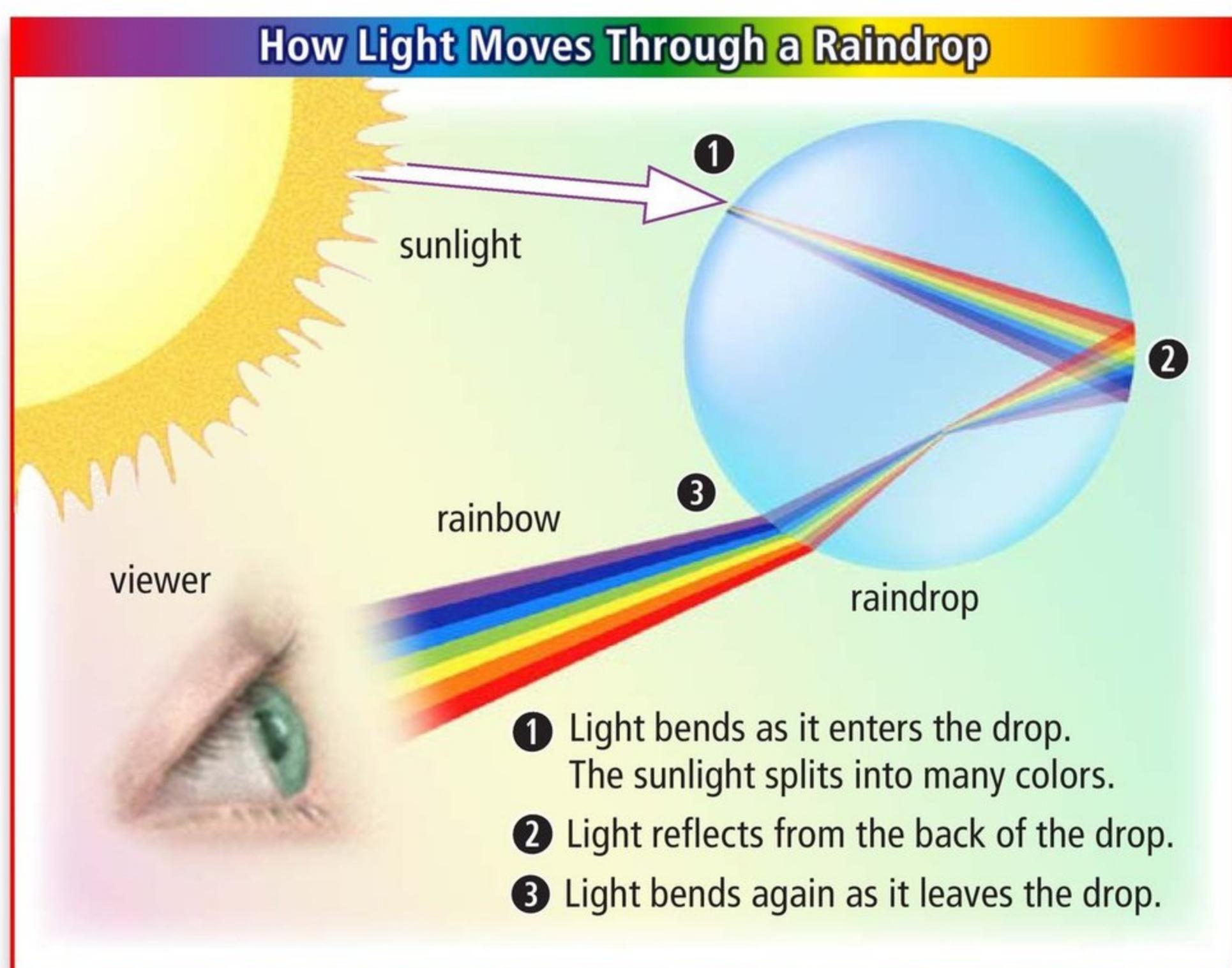
Understanding how light travels helps explain rainbows. Think of running on land. Now imagine trying to run through knee-deep water. You will move more slowly through water because it is denser, or thicker, than air.



This pencil appears to bend where it enters the water.

In the same way, light moves faster through air than through water. Light bends when it moves between water and air. That's why a pencil sitting in a clear glass of water looks bent.

Outdoor rainbows form when water drops meet sunlight. The light bends as it enters each drop. The light then **reflects**, or bounces, off the back of each drop, like light off a mirror. The light bends again as it leaves the drop. Light bends and bounces in millions of water drops at once. This process makes all the colors of a rainbow.





## The Colors of the Rainbow

Sunlight is made up of many colors. We can see them when water drops split the light into different colors.

To see a rainbow, you have to be in the right place. Each water drop reflects colored light at a slightly different **angle**. We can only see red light shining from the drops at the rainbow's top. Those drops are in the right place to shine the color red back at us. In the same way, we can only see violet shining from drops at the rainbow's bottom.



Sometimes a rainbow's colors blend together, but all seven colors can be seen clearly in bright rainbows.

The colors of a rainbow always appear in the same order. The name ROY G. BIV can help you remember the seven main colors: red, orange, yellow, green, blue, indigo, and violet.

## Make Your Own Rainbow

1. Fill a clear glass about three-quarters full of water.
2. Place the glass where sunlight can pass through it.
3. Hold a white piece of paper so the light shines through the water onto the paper. Move the paper around until a rainbow appears.
4. Use colored pencils to mark the different colors on the paper. How many can you see? What order are they in?



Tourists admire a rainbow at the bottom of a waterfall in Iceland.

## Conclusion

For a long time, rainbows have been featured in art and stories from all over the world. Most people find it hard not to stop and stare when a rainbow appears.

Science explains how these colorful displays happen. Water drops bend, split, and reflect light. Then we are able to see the many colors of a rainbow. Still, the beauty of a rainbow is a magical sight to see.

## Glossary

<b>angle</b> ( <i>n.</i> )	the position from which something is viewed; the direction from which something is approached (p. 13)
<b>experiment</b> ( <i>v.</i> )	to conduct a scientific test (p. 10)
<b>globe</b> ( <i>n.</i> )	an object that is round (p. 10)
<b>illusions</b> ( <i>n.</i> )	false things that trick you into thinking they are real or that they really happened (p. 5)
<b>indigo</b> ( <i>n.</i> )	the color of light between blue and violet (p. 14)
<b>reflects</b> ( <i>v.</i> )	sends light, sound, or heat back toward where it came from (p. 12)

# Rainbows

A Reading A-Z Level M Leveled Book

Word Count: 588

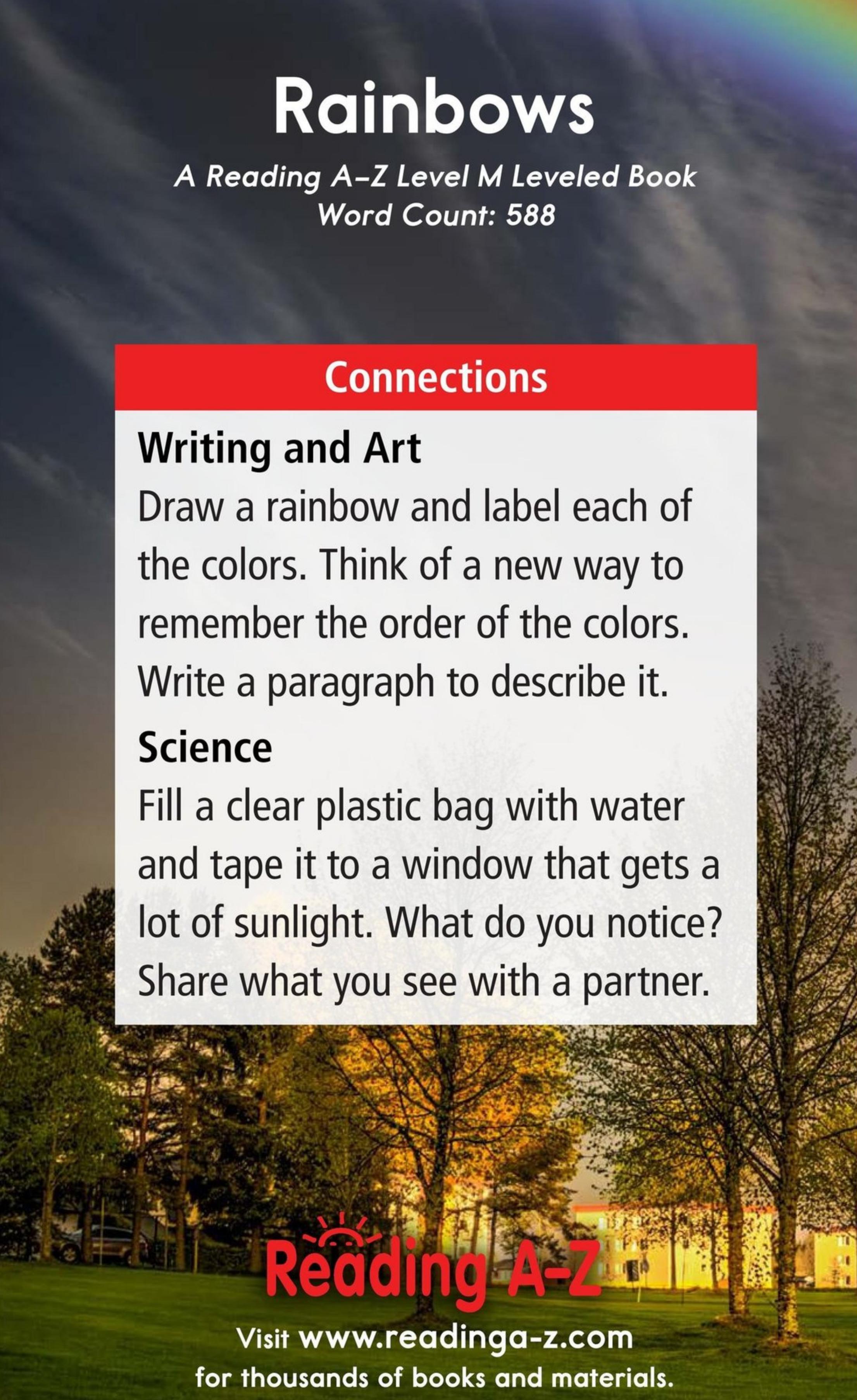
## Connections

### Writing and Art

Draw a rainbow and label each of the colors. Think of a new way to remember the order of the colors. Write a paragraph to describe it.

### Science

Fill a clear plastic bag with water and tape it to a window that gets a lot of sunlight. What do you notice? Share what you see with a partner.



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