K6.1.1 K6.1.1

K6.1.1 The Secret of Light, Life, and Beautiful Colors

Pigments can make things colorful. Colors have the principles of reflection and absorption in them. The color of an object is the color of the light that is reflected from it. If an object absorbs all the colors of light except red and only reflects red light, it looks red to our eyes.

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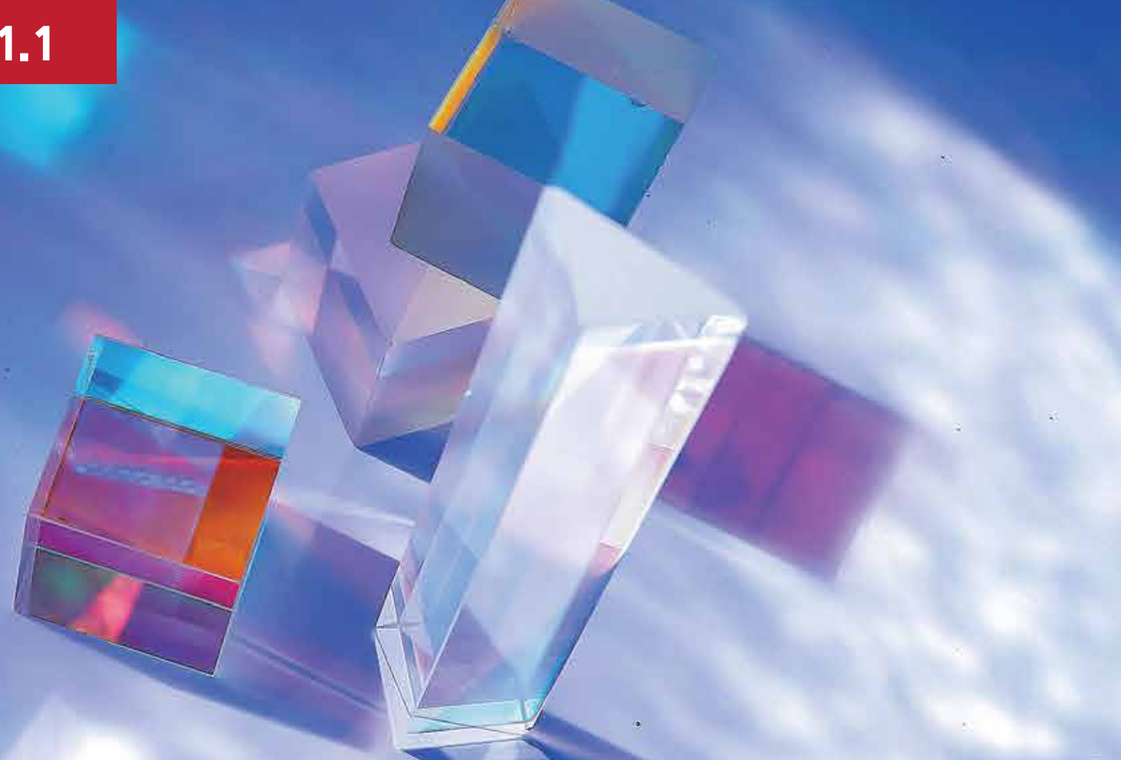

The Secret of Light, Life, and Beautiful Colors

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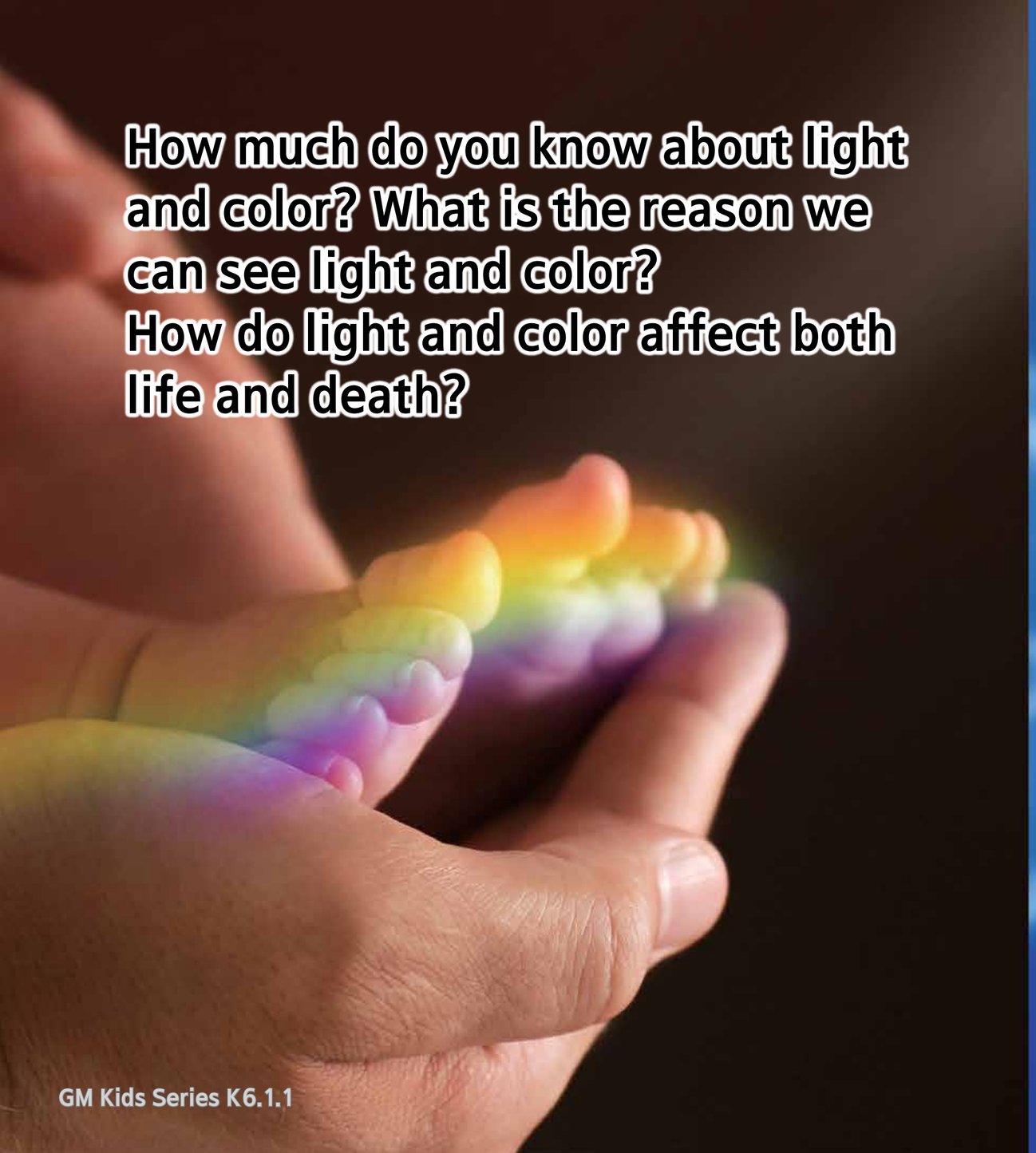
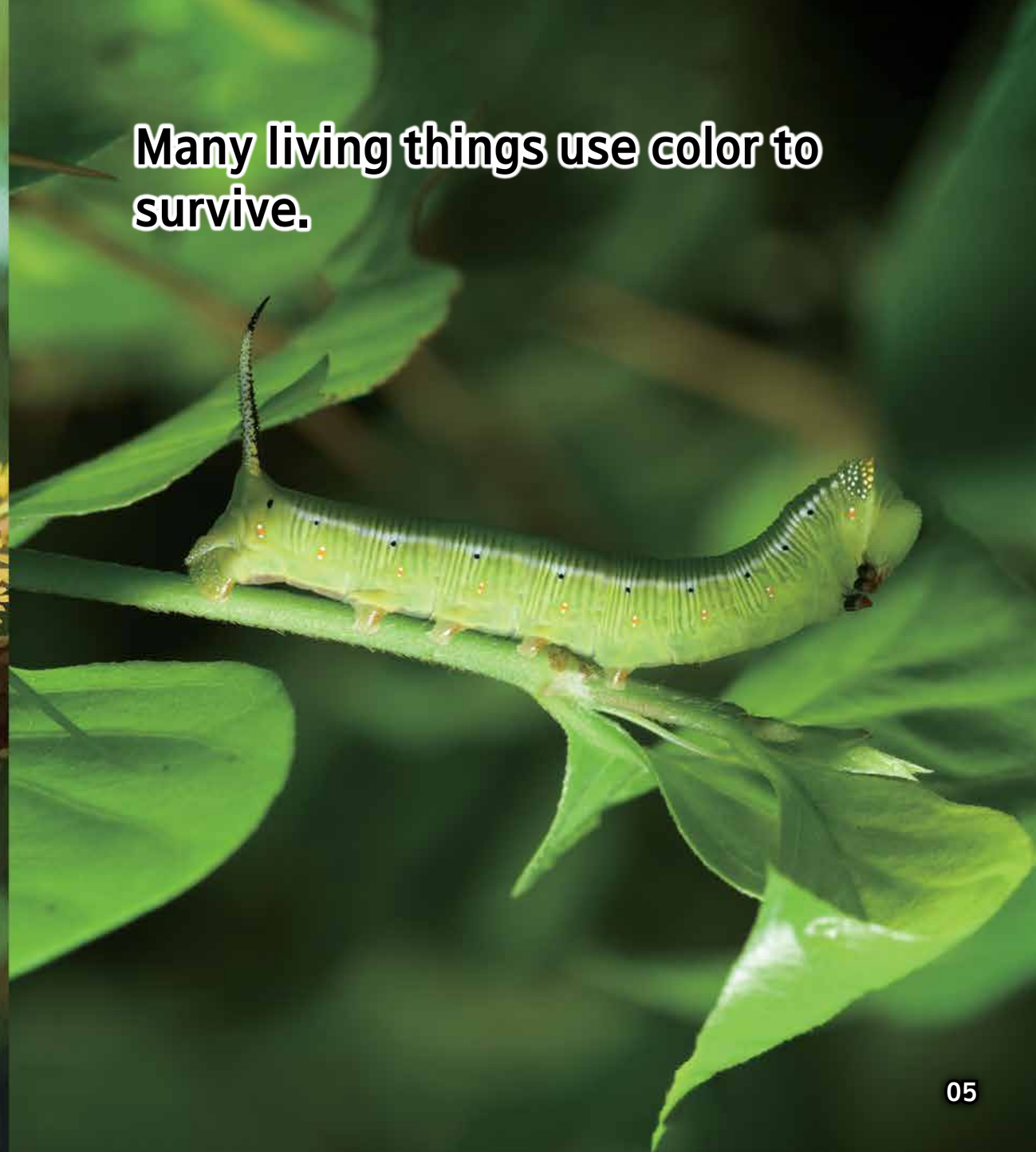
How much do you know about light and color? What is the reason we can see light and color?
How do light and color affect both life and death?



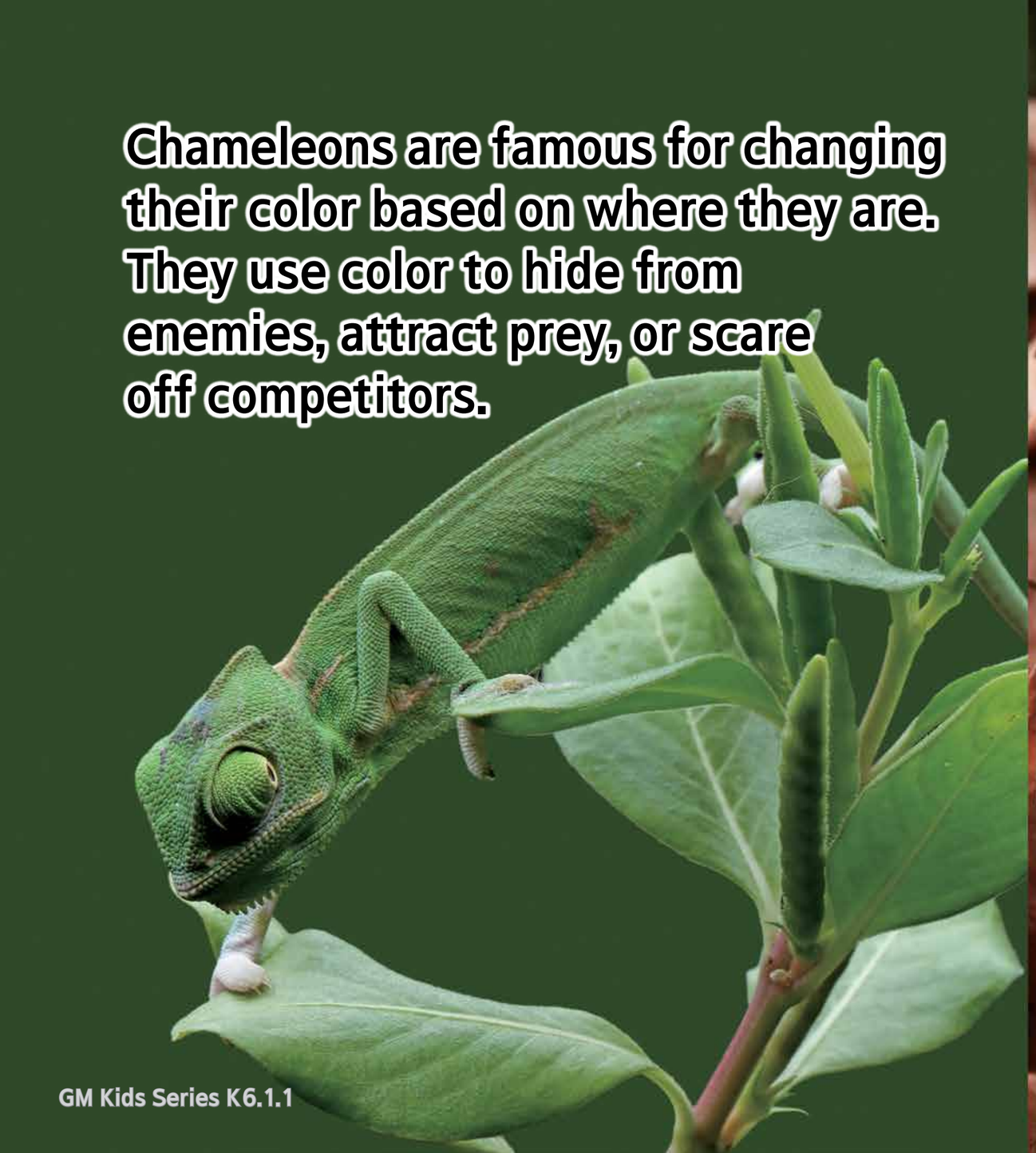
Light is the source of life.
Some living things move towards light to survive, while others produce light themselves.

Light interacts with the unique structures of living things to create their special colors.

Many living things use color to survive.



Chameleons are famous for changing their color based on where they are. They use color to hide from enemies, attract prey, or scare off competitors.

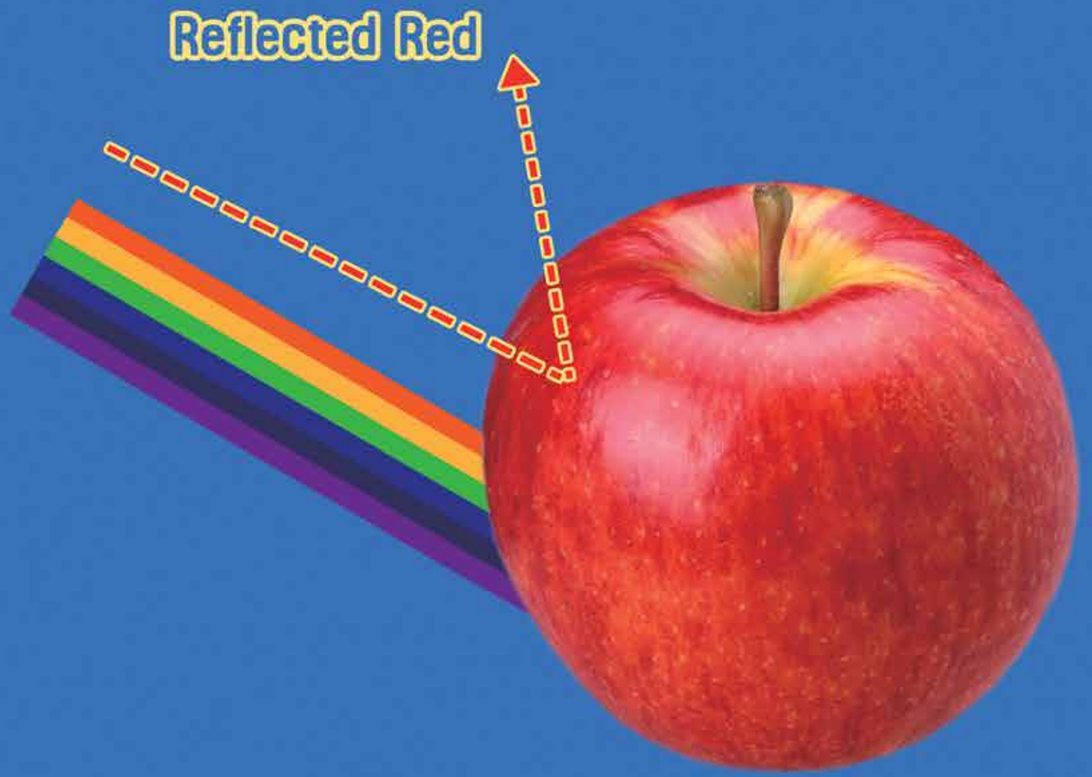


Not just chameleons, but all living things have colors that help them survive.

Pigments in living things can give them color.

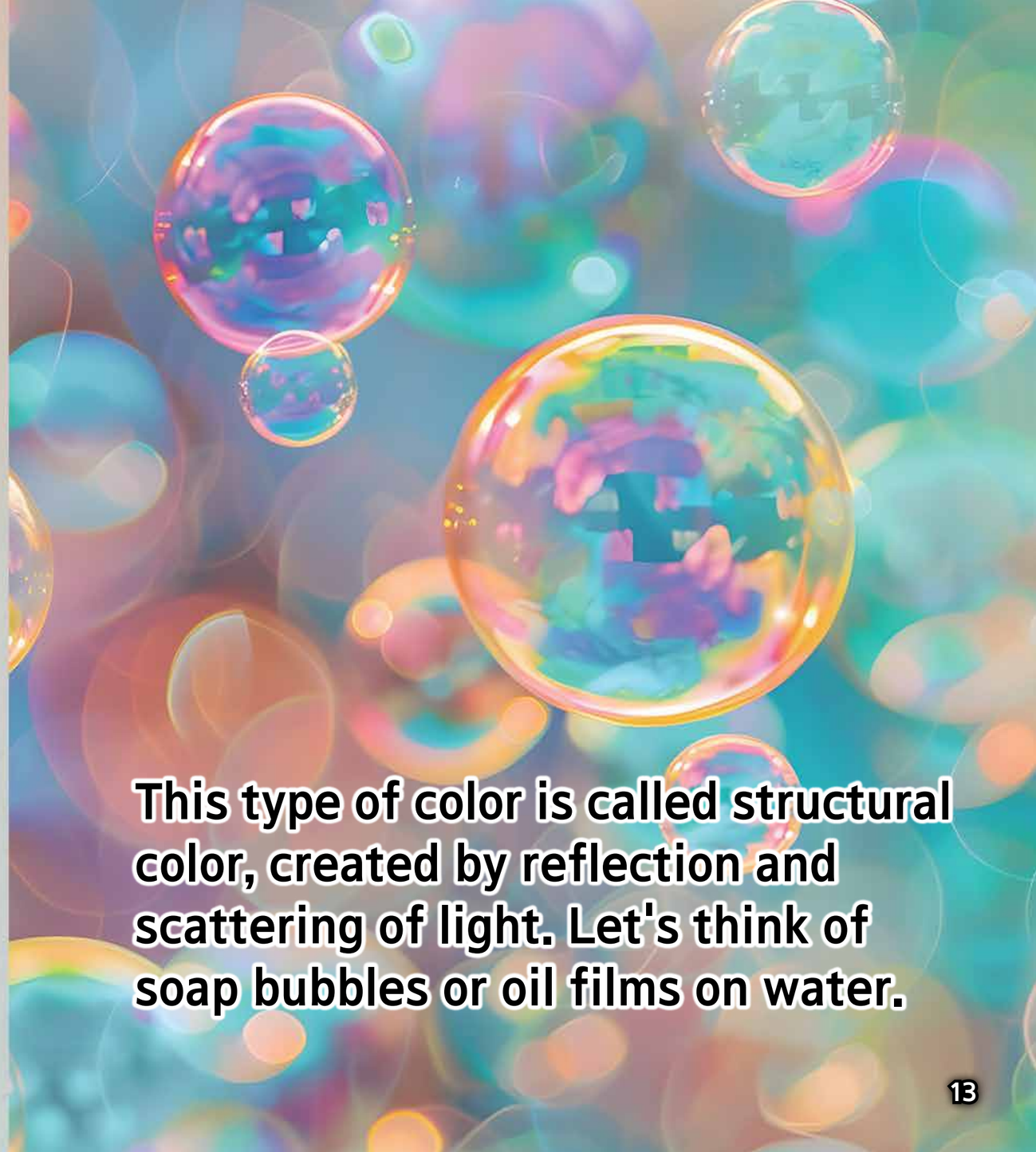
Colors involve the principles of reflection and absorption.
The color of an object is the color of the light reflected from it.

For example, white paper looks white because it reflects all the colors of light. Black paper looks black because it absorbs all the colors of light.



If an object absorbs all the colors of light except red and only reflects red light, it looks red to our eyes.

The substances that give objects color are called pigments. The color of an object is decided by which light the pigments reflect and absorb. However, some colors are created by the object's unique structure, even without pigments.



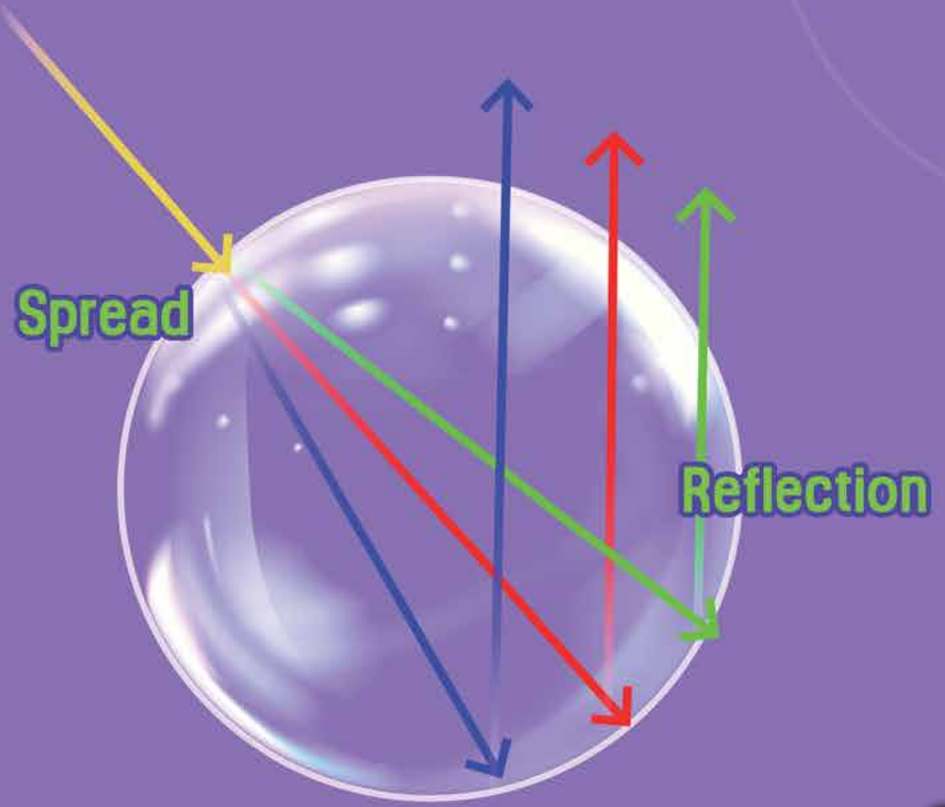
This type of color is called structural color, created by reflection and scattering of light. Let's think of soap bubbles or oil films on water.

Water or oil is transparent and does not absorb specific colors. However, soap bubbles or oil films on water show rainbow colors depending on the viewing angle. Do you know why?

The layers of soap bubbles or oil films are thin and uneven in thickness.

When light hits the film, some light is reflected and some passes through, depending on the thickness.

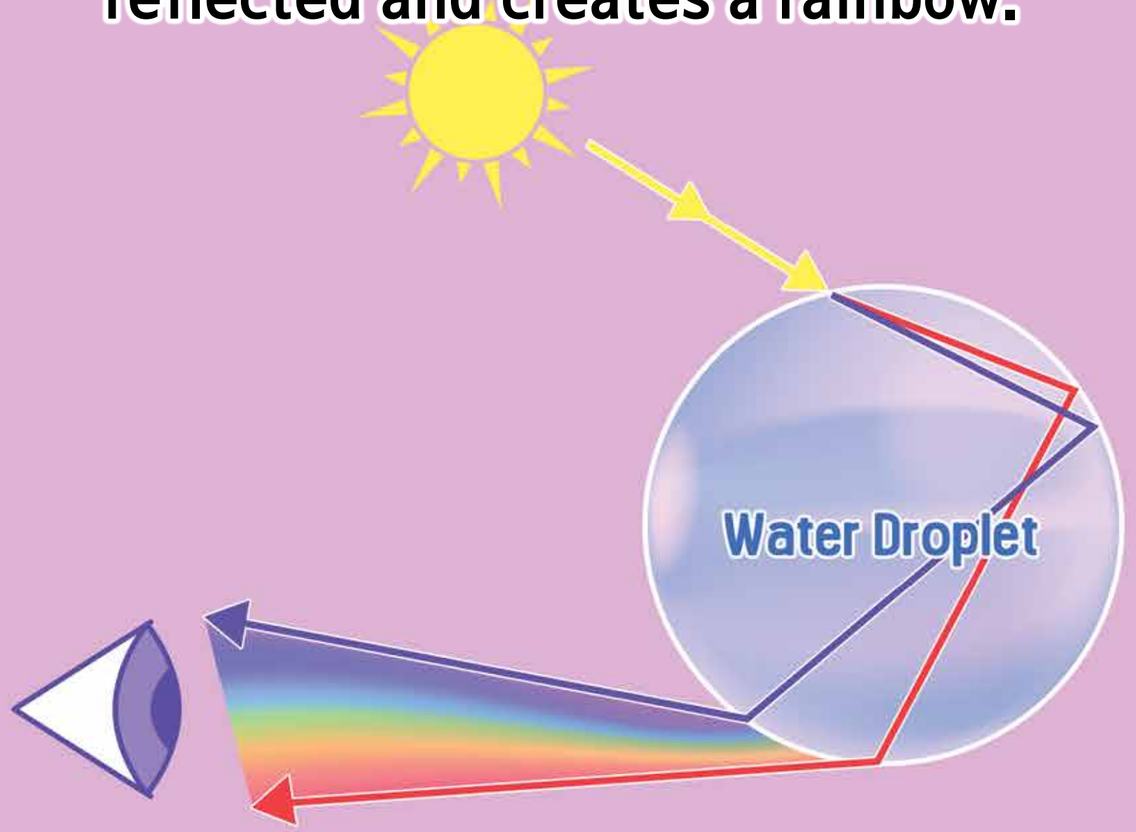
The light passing through the film spreads out into different colors. This dispersed light hits the inner walls of the soap bubble or oil film and is reflected back.



The reflected light waves combine to create rainbow colors.
So, why do we see rainbow colors?

After a summer shower, when the sun comes out, we can see a rainbow with seven colors in the sky. Do you know why the rainbow appears?

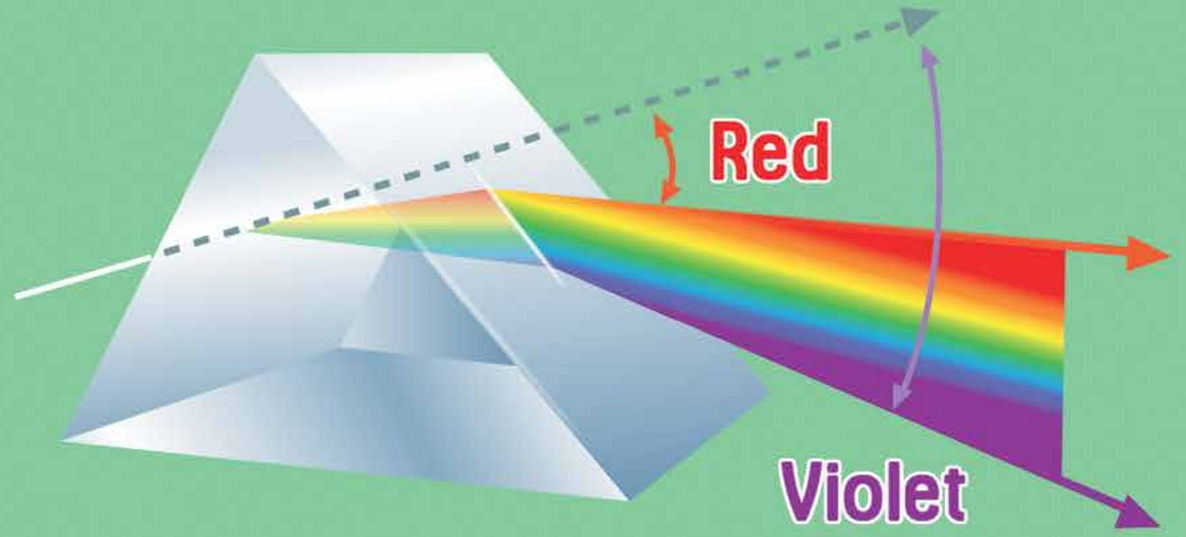
Rainbows are made by water droplets in the air and sunlight. When sunlight hits the tiny water droplets in the air, the light is reflected and creates a rainbow.



Sunlight looks colorless, but it actually contains many different colors.

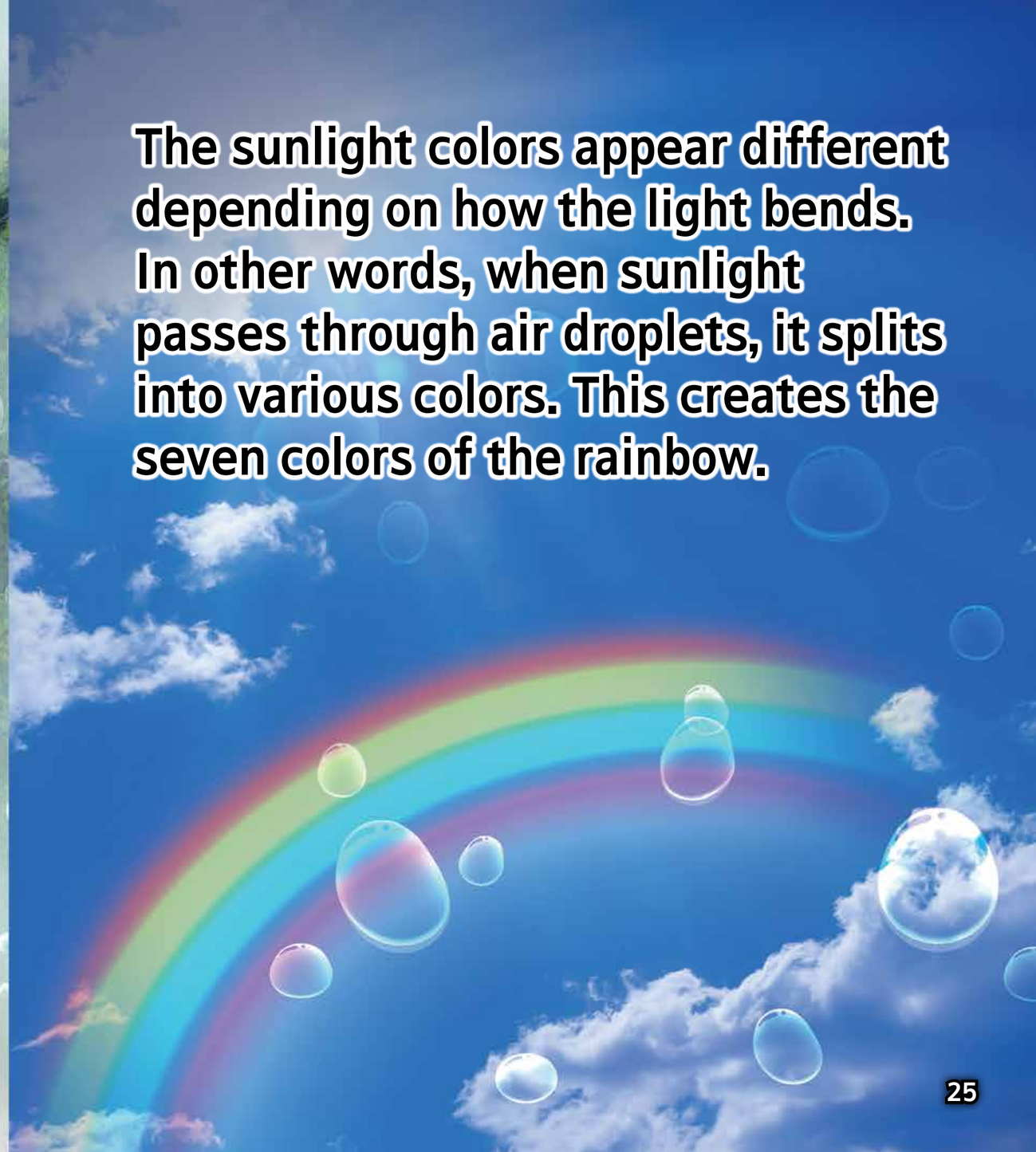
When light passes through a prism, which changes the direction of light, we can see it split into many colors. This happens because light bends differently for each color as it passes through the prism.

Each color of light has its own wavelength. Blue light has a short wavelength, and red light has a long wavelength. Red light bends a little when it passes through the prism, while violet light bends a lot.

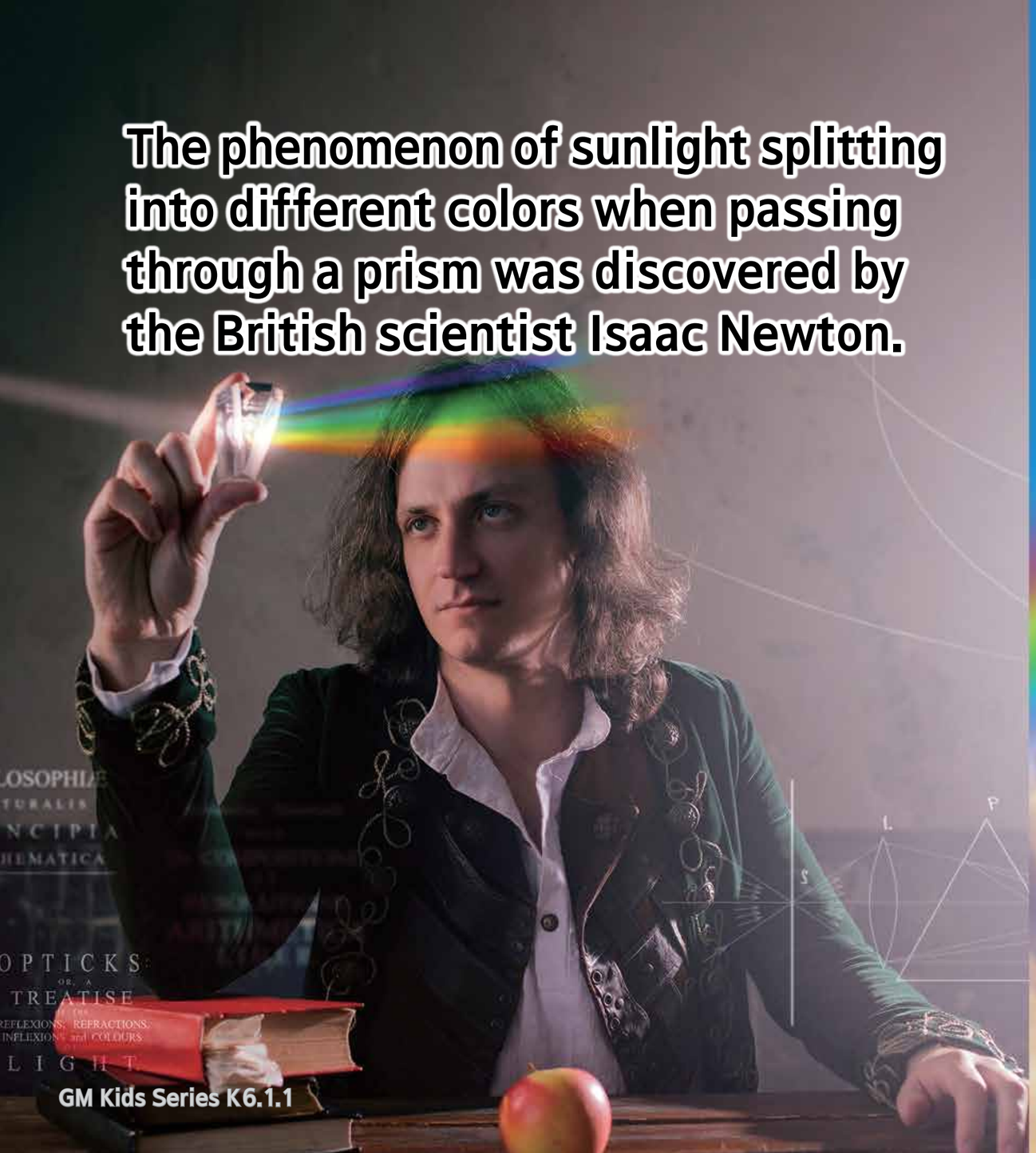


After heavy rain, there are many water droplets in the air. These droplets act like prisms. Sunlight passing through these droplets bends and scatters.

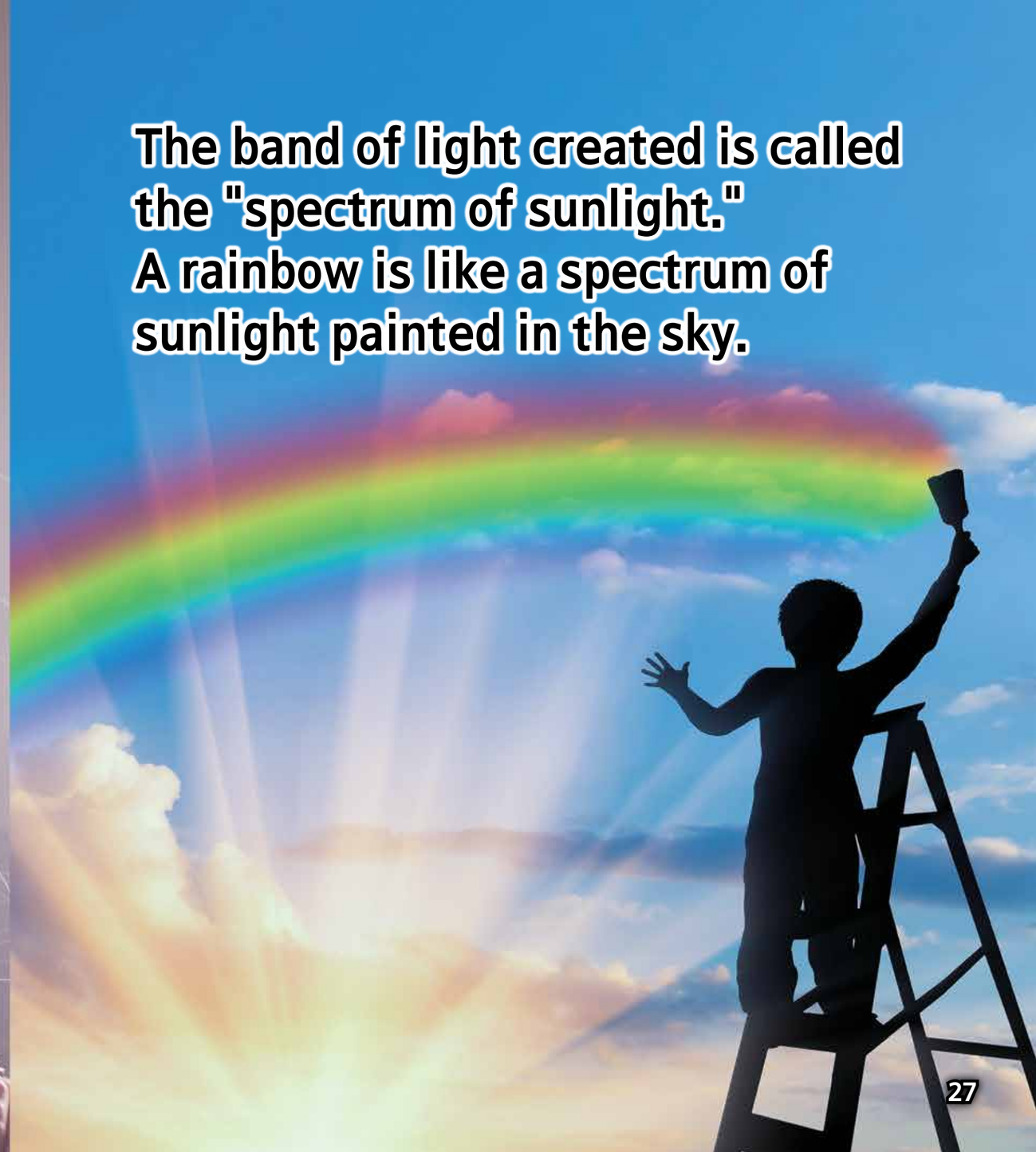
The sunlight colors appear different depending on how the light bends. In other words, when sunlight passes through air droplets, it splits into various colors. This creates the seven colors of the rainbow.



The phenomenon of sunlight splitting into different colors when passing through a prism was discovered by the British scientist Isaac Newton.



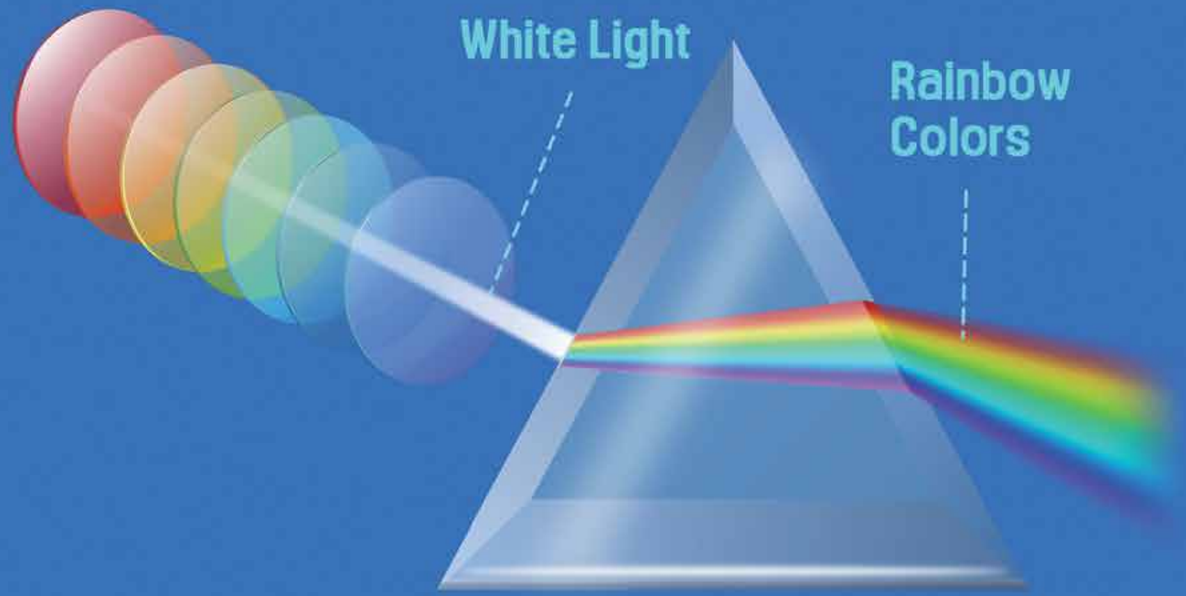
The band of light created is called the "spectrum of sunlight."
A rainbow is like a spectrum of sunlight painted in the sky.



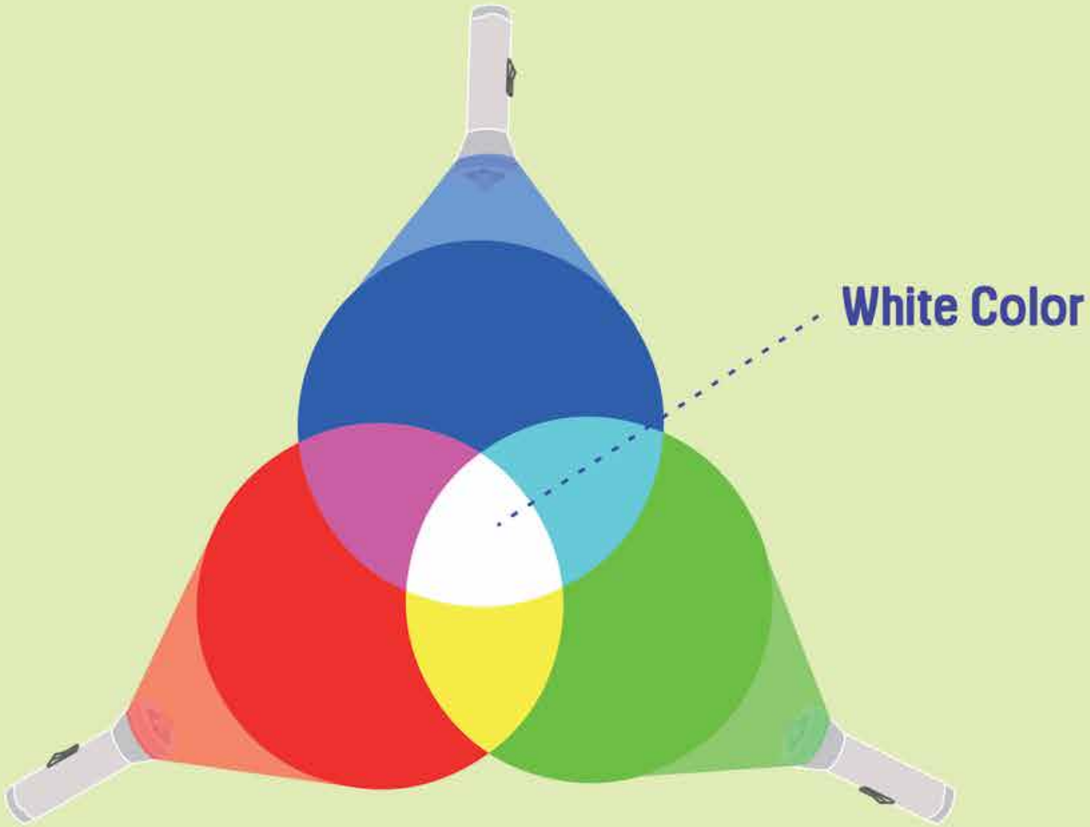
When we say "seven-colored rainbow," the number "seven" does not have a scientific meaning.

As we can see from the spectrum of sunlight, the colors do not have clear boundaries.
Some countries recognize only six colors in a rainbow.

Newton used a lens to combine colors from red to violet into one. This created white light.
When he passed this white light through a prism, it split into rainbow colors again.



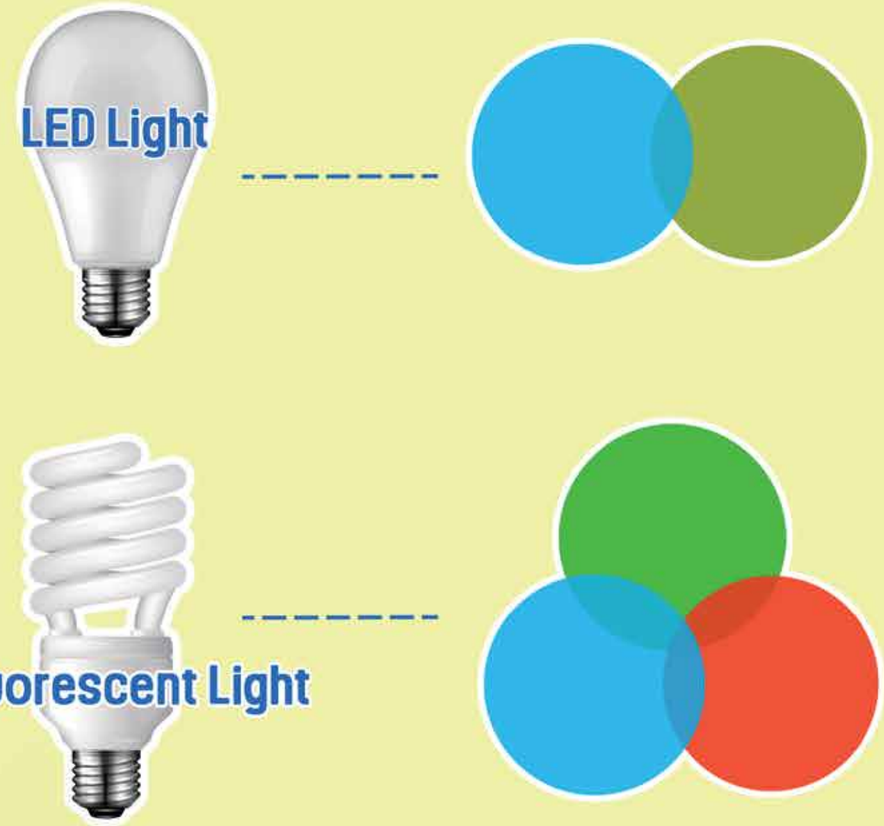
Newton proved that white light is made from different "primary colors" that cannot be separated any further.



Sometimes, clothes bought at a store might not look as good when tried on at home.
The color can often look different from how it appeared in the store.
The color of the clothes did not change on the way home.

Even if the color of the clothes is the same, the light sources might be different.
Fluorescent and LED lights are both white, but their color components are different.

LED light has a lot of blue and yellow-green light. On the other hand, fluorescent light has a lot of blue, green, and red light.



These differences in color components affect the color of the light that is reflected from objects and enters our eyes.