

### Answers from the Rainbows, Rainbows, Everywhere activity

- The visible light spectrum is: red, orange, yellow, green, blue, indigo, and violet. However, in rainbows what is usually seen is red, orange, yellow, green, blue, and purple. These colors will always be seen when light waves are bent to show their parts
- The order of colors will always be the same when light waves are bent—red, orange, yellow, green, blue, indigo and violet.
- Light!

### Vocabulary for young students

- **indigo** - in the light spectrum, a deep blue in between blue and violet
- **prism** - a piece of glass or clear plastic that has triangular bases
- **rainbow** - the visible light spectrum split by wavelength. We see this as the colors: red, orange, yellow, green, blue, indigo, violet

### Background information about rainbows

A rainbow is one of the most spectacular light shows observed on earth. Long ago, people believed that rainbows were magic. Some people believed that a rainbow was a bridge that appeared in the sky when the gods wanted to leave heaven and come to earth. Some believed that there was a pot of gold at the end of the rainbow.

We now know that a rainbow is caused by sunlight shining on raindrops. To see a rainbow, the sun must be behind you and the rain must be falling in front of you. Sunlight in its natural state looks clear (or transparent), but it is really made up of many wavelengths that we see as different colors. When sunlight enters a raindrop, the raindrop bends (refracts) the light which divides it into the various wavelengths (colors) that we see: red, orange, yellow, green, blue, indigo, violet. Many rays of sunlight, being refracted into their colors and reflecting off many other drops of falling rain, make the curved, colored rainbow that we see.

The ‘bow’ shape of the rainbow is caused by the spherical shape of the raindrop. The raindrop shape is symmetrical around the axis that the light source enters, so the light is refracted out at 42° all around the axis of light entry. A rainbow is actually a circle of light being refracted out of the droplets of water; however we don't see a full circle because the earth gets in the way. The lower the sun is to the horizon, the more of the circle we can see; the higher the sun is in the sky, the smaller is the arch of the rainbow.

Sir Isaac Newton was the first scientist to discover (in 1666) that white light could be split into different colors using a piece of glass with triangular sides (now called a prism). He then carried on more experiments and found that the process also works in reverse; when the colors of light are mixed together the result is regular ‘white’ light.

### Related books for young students

*A Rainbow of My Own* by Don Freeman (Puffin, 1978)

*All the Colors of the Rainbow* by Allan Fowler (Children’s Press, 1999)

*Chasing Rainbows (Dr. Seuss/Cat in the Hat)* by Tish Rabe (Random House, 2012)

*Light and Color* by Lawrence Lowery (NSTA Kids, 2014)

