CARDINAL COMPASS - NO. 8 - HANDS-ON LEARNING - WITH CARL THE CARDINAL

Light & Color

VOL. 8

Science - Volume 8 - Version 10

White light is hiding a rainbow, shadows can wear colors, and two mirrors can peek around a corner. And three experiments you can do safely at home.

Light looks plain and white. But it is hiding colors, and this book spreads them out where you can see them.



Cover illustration: a flashlight beam passes through a prism on a table by a window and spreads into a rainbow on a white card.

Read together	Build together	Grown-up with you for every experiment



Meet Carl - Light Carl

Carl the Cardinal is your guide. For this project, he splits light with a prism and found the rainbow hiding inside it. His green neckerchief and gold compass medallion stay on. Color your own Carl on the last page.

How to use this book: Pages 2-3 tell the story. Page 4 is safety. Read it first, and read it well. The eye rules in this unit matter every single time. Then do the three experiments. Finish with the questions. Color Carl at the end.

Keep a notebook near you. Write what you guess. Write what you see.

You will need, for all three experiments: a clear prism, a white flashlight, card and tape for the slit card, white paper and card, two or three cool-running LED flashlights, red, green, and blue transparent covers, rubber bands, a small toy or block, one straight cardboard tube or tall carton, two acrylic mirrors, strong tape, scissors or a craft knife (grown-up only), crayons, a notebook, and a pencil. For the no-prism alternative in Experiment 1: a clear glass and water.

What does light do?

Light travels in straight lines. It goes straight and straight, until something gets in its way. Then one of three things can happen. Something can block it. Something clear can bend it. Or a smooth, shiny surface can bounce it. This whole unit is those three things, one at a time.

Shadow: a shadow is the dark shape made where something blocks light. Light cannot bend around the blocker, so the place behind it stays dark.

Refraction: refraction is the bending of light when it passes from air into water or glass, or back out again. Light bends a little each time it crosses into something new.

Prism: a prism is a clear solid with flat sides that bends light. A prism can spread white light out into its colors.

Spectrum: the spectrum is the rainbow band of colors hidden inside white light. The colors always fall in the same order: red, orange, yellow, green, blue, indigo, violet.

Reflection: reflection is light bouncing off a smooth, shiny surface, the way a ball bounces off a wall. A mirror gives the cleanest bounce of all.



The spectrum, in order: red, orange, yellow, green, blue, indigo, violet. Learn the order once, and you will see it every time.

White light is not plain

White light looks like no color at all. Really, it is many colors mixed together, all traveling at once. Your eyes see the mix and call it white.

So how do we know the colors are in there? We spread them out. When white light passes through a prism, the light bends. Each color bends by a slightly different amount. Red bends the least. Violet bends the most. The colors fan apart, and the hidden rainbow shows itself.

Three tools, three tricks

In this unit, a prism bends light and spreads its colors out. Colored flashlights show what a shadow really is. And two mirrors bounce light around a corner. Block, bend, bounce: you will do all three.

Block, bend, bounce: spot them at home

Watch for the three tricks this week, at home and outside. Block: hold your hand up in sunlight and look at the shadow it makes on the ground. Bend: stand a straw in a glass of water and look at it from the side. The straw looks bent where it goes into the water, because the light coming from it bends there. Bounce: let a mirror send a patch of sunlight onto a wall. Each time you spot one, ask: did something block the light, bend it, or bounce it?