



Smithsonian

Helping People See

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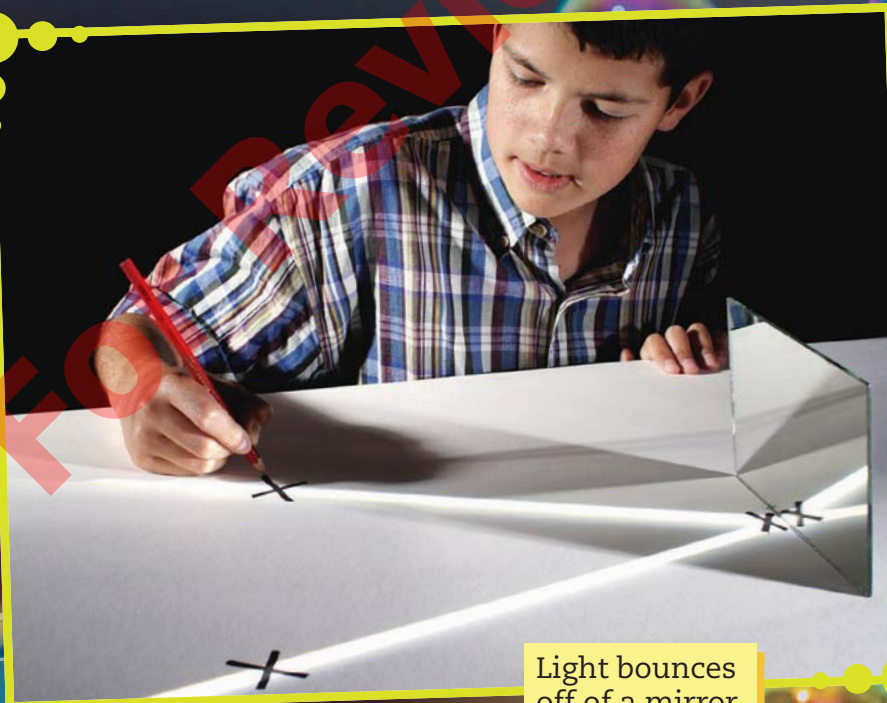
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Seeing the Light

Our eyes let us see the world. Yet human eyes are far from perfect. Only some people have 20/20, or normal, vision. And it's tough for our eyes to catch tiny details, such as stars way up in the night sky.

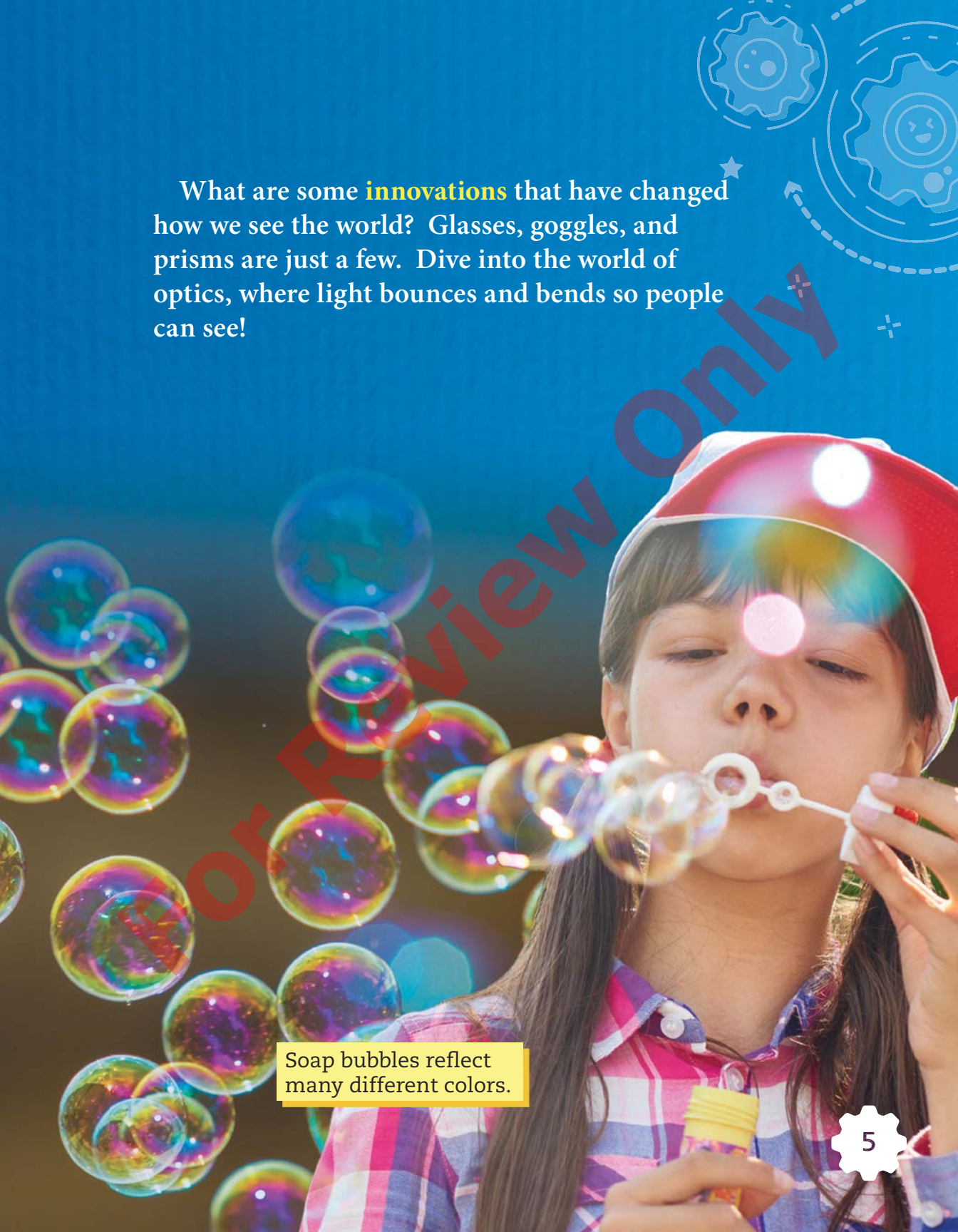
Over the years, people have tried to improve sight. This has led to the world of optics. Optics is the study of light and how it travels. Light is the key to sight. When we see an object, we see light bouncing off that object.



Light bounces
off of a mirror.



What are some **innovations** that have changed how we see the world? Glasses, goggles, and prisms are just a few. Dive into the world of optics, where light bounces and bends so people can see!



Soap bubbles reflect many different colors.

Vivid Vision

Vision has its limits. These limits are different for each person. For some people, faraway objects are blurry. Others can't read fine print. And no one can see in complete darkness.

But these limits are no match for **engineers**! Over the years, engineers have found ways to sharpen eyesight. They found solutions to fix the limits of vision. They have helped people see the world more clearly.

Eyeglasses

Today, eyeglasses come in many colors and shapes. But they all have one main goal—to correct vision.

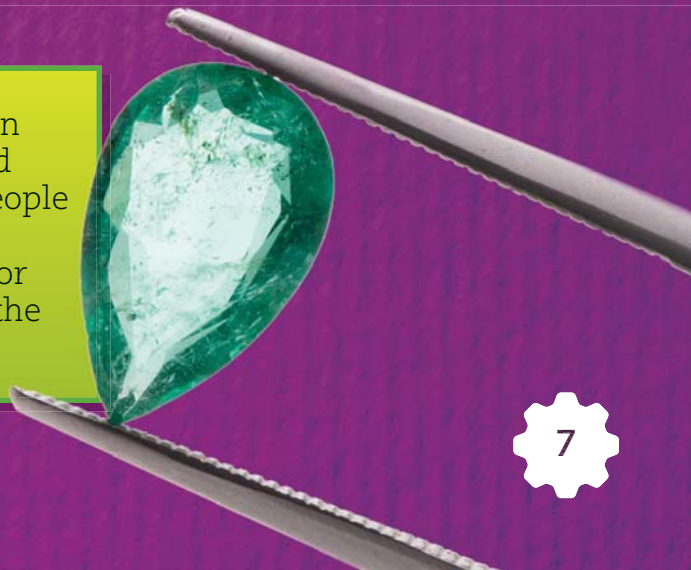
Every day, millions of people look out at a blurry world. Then, they pick up their glasses. In a flash, the world

comes into focus. Their sight becomes clear. This is the “magic” of eyeglasses. This is all thanks to the **inventive** minds of engineers!



A girl gets new glasses.

Nero (NEE-roh), a Roman Emperor, may have used the first “lens.” Some people say he held an emerald to his eye at the gladiator games to help him see the games from far away.



Some inventions start with small discoveries. For example, when a jar of water was placed on a sheet of paper, something interesting happened to the text. The water made the words look bigger! People wondered why this was the case. They began researching. Soon, they found that crystals could do the same thing. This led to the first magnifying glass and then to glasses.

The first glasses were simple. People held them up to their faces. The lenses were very heavy. But they worked!

No one knows who invented glasses. But, in Europe, **monks** were the first to wear them. In the late thirteenth century, Italian monks read texts for hours at a time. As they aged, their eyesight got worse. Words began to blur. The monks needed something to help them see the words clearly. Glasses helped correct their vision.

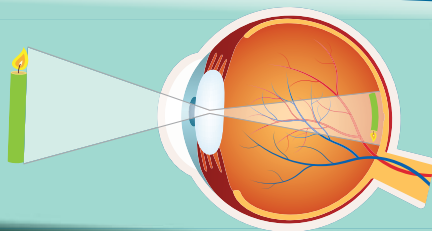


text placed behind
a glass of water will
look noticeably larger

Water magnifies text
and other objects.

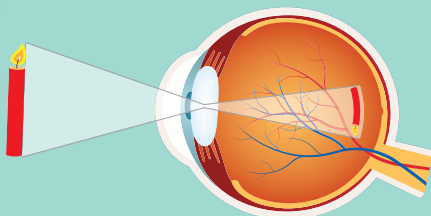


calcite crystal

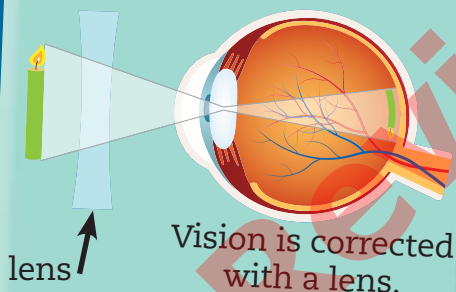


Normal Vision
Light focuses on the back of the eye.

Nearsighted

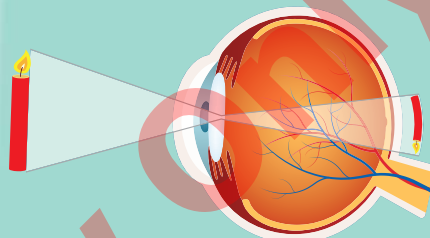


Light focuses in front of the back of the eye.

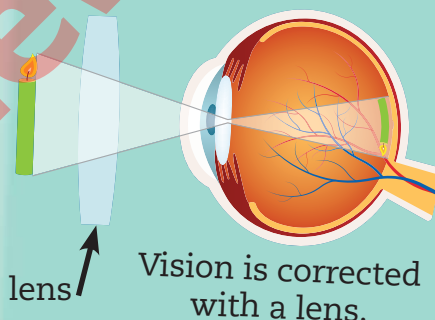


Vision is corrected with a lens.

Farsighted



Light focuses behind the back of the eye.



Vision is corrected with a lens.

SCIENCE

Spectacle Science

If you are nearsighted (unable to clearly see things far away) or farsighted (unable to clearly see things up close), light is not focusing on the back of the eye. To correct this, different lenses are used. The lenses bend the light so that it focuses where it should.

STEAM CHALLENGE

Define the Problem

A sporting company wants to make a new model of eyeglasses for triathlons. During a triathlon, athletes swim, run, and bike. It is important that the glasses are comfortable and stay in place. This way, athletes can focus on the race! The company has asked you to design and build a model.



Constraints: You must use all flexible materials that can be stored in a small space.



Criteria: A successful design will stay in place while the wearer runs in place for one minute.





Research and Brainstorm

Why do people use eyeglasses? In what ways have engineers changed the design of eyeglasses to serve special purposes? Why might an athlete need to use eyeglasses?



Design and Build

Sketch your glasses design. What purpose will each part serve? What materials will work best? Build the model.



Test and Improve

Wear the glasses. Then, run in place for one minute. Did the glasses stay in place? How can you improve them? Modify your design, and try again.



Reflect and Share

What other ways can you test the design? Will your design work in water? What can you add to make the glasses more attractive to athletes?

