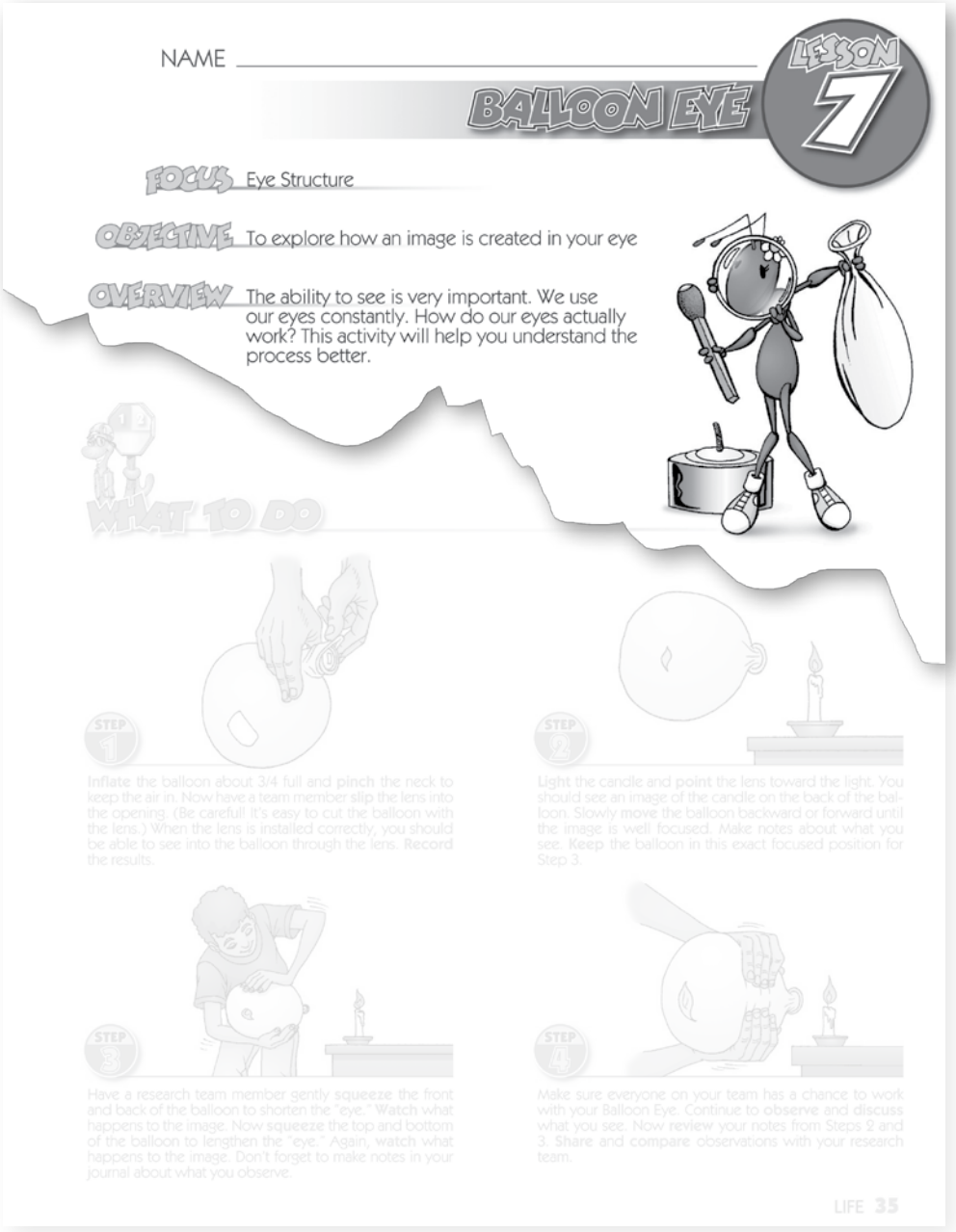


Category

Life Science

Focus

Eye Structure

Objective

To explore how an image is created in your eye

National Standards

A1, A2, B1, B2, B3, C1, C3, D1, E3, F1, F4, G1

Materials Needed

balloon, large size
lens
candle
match

Safety Concerns

1. Goggles
Goggles are a useful precaution in case of an exploding balloon.

2. Open Flame
Remind students to exercise caution around open flame (loose clothing, long hair, etc.).

Additional Comments

You can avoid students using matches by lighting the candles yourself. When every team is ready to test their balloon eye, darken the room as much as possible. Remind students to be careful moving around! Also, avoid burns and popping balloons by keeping students a safe distance from candles.

Overview

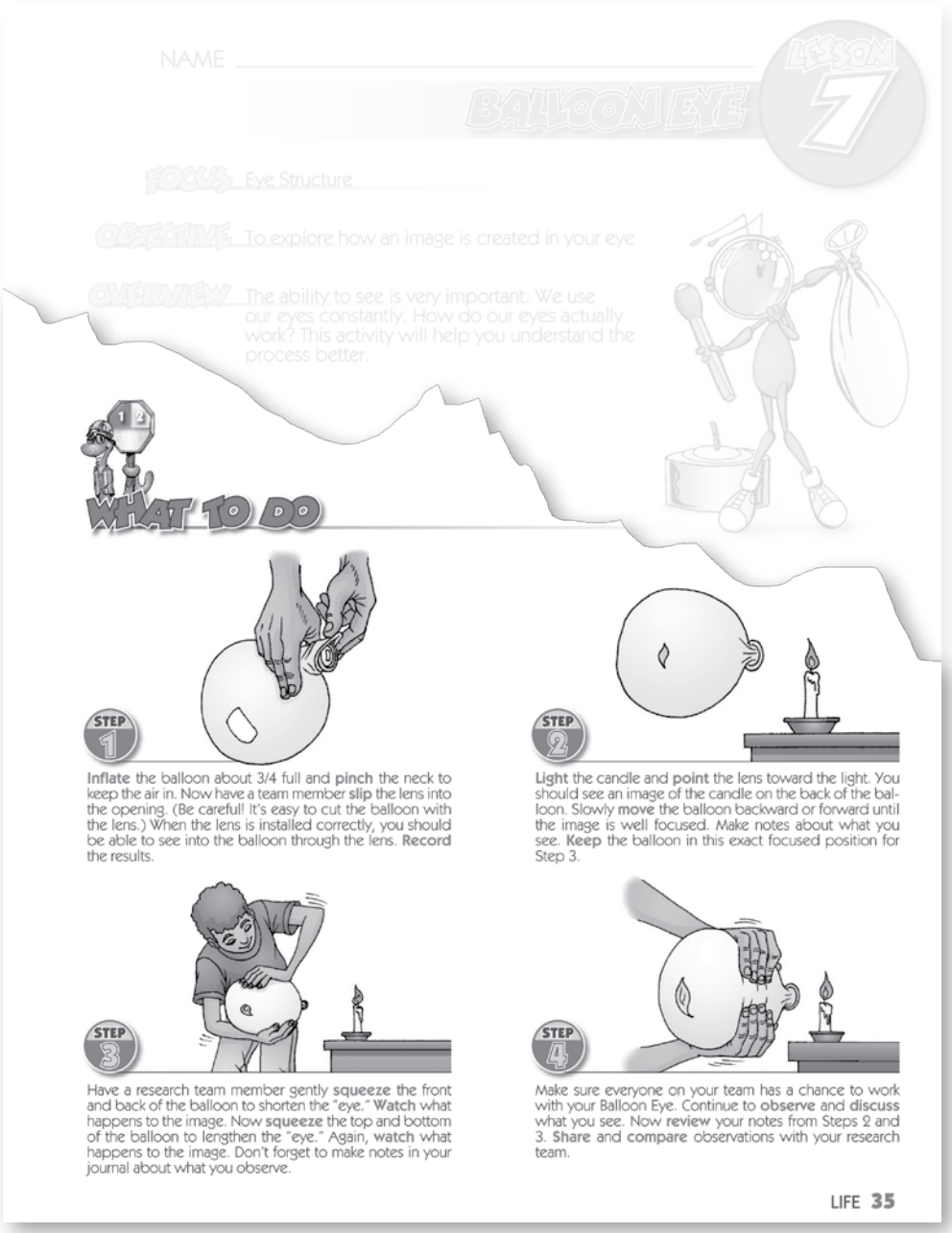
Read the overview aloud to your students. The goal is to create an atmosphere of curiosity and inquiry.

WHAT TO DO

Monitor student research teams as they complete each step.

Step 3

Remind students to squeeze *gently*, using only enough pressure to distort the balloon. Too much pressure could cause the balloon to pop.



NAME _____

LESSON 7

BALLOON EYE

FOCUS Eye Structure

OBJECTIVE To explore how an image is created in your eye

OVERVIEW The ability to see is very important. We use our eyes constantly. How do our eyes actually work? This activity will help you understand the process better.

WHAT TO DO

STEP 1

Inflate the balloon about 3/4 full and **pinch** the neck to keep the air in. Now have a team member **slip** the lens into the opening. (Be careful! It's easy to cut the balloon with the lens.) When the lens is installed correctly, you should be able to see into the balloon through the lens. **Record** the results.

STEP 2

Light the candle and **point** the lens toward the light. You should see an image of the candle on the back of the balloon. Slowly **move** the balloon backward or forward until the image is well focused. Make notes about what you see. **Keep** the balloon in this exact focused position for Step 3.

STEP 3

Have a research team member gently **squeeze** the front and back of the balloon to shorten the "eye." **Watch** what happens to the image. Now **squeeze** the top and bottom of the balloon to lengthen the "eye." Again, **watch** what happens to the image. Don't forget to make notes in your journal about what you observe.

STEP 4

Make sure everyone on your team has a chance to work with your Balloon Eye. Continue to **observe** and **discuss** what you see. Now **review** your notes from Steps 2 and 3. **Share** and **compare** observations with your research team.

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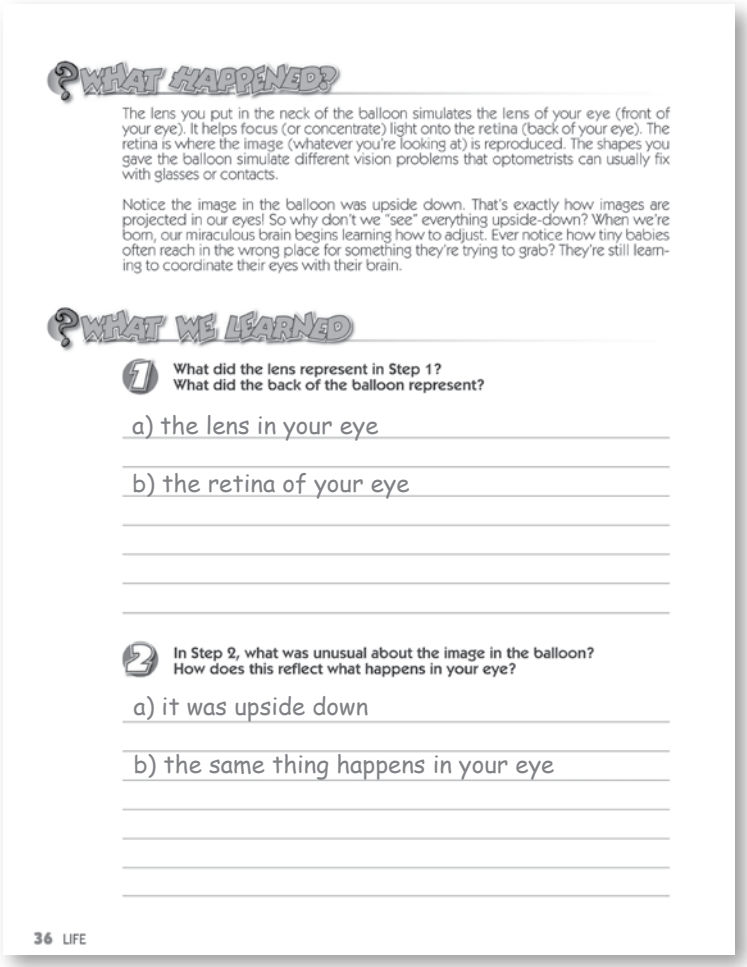
Teacher to Teacher

The retina is covered with light-sensitive cells called rods and cones. There are three types of cone cells, each with sensitivity to particular wavelengths. Cones function best in bright light and help us see colors. Rod cells have one type of cell. Rods work best in low light conditions. The "blip" in vision you experience when moving from bright sunlight to a dark room is your eyes switching from mostly cones to mostly rods.



WHAT HAPPENED?

The lens you put in the neck of the balloon simulates the lens of your eye (front of your eye). It helps focus (or concentrate) light onto the retina (back of your eye). The retina is where the image (whatever you're looking at) is reproduced. The shapes you gave the balloon simulate different vision problems that optometrists can usually fix with glasses or contacts.

Notice the image in the balloon was upside down. That's exactly how images are projected in our eyes! So why don't we "see" everything upside-down? When we're born, our miraculous brain begins learning how to adjust. Ever notice how tiny babies often reach in the wrong place for something they're trying to grab? They're still learning to coordinate their eyes with their brain.

WHAT WE LEARNED

1. What did the lens represent in Step 1? What did the back of the balloon represent?

a) the lens in your eye

b) the retina of your eye

2. In Step 2, what was unusual about the image in the balloon? How does this reflect what happens in your eye?

a) it was upside down

b) the same thing happens in your eye

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3. Describe what happened to the image when you modified the shape of the balloon in Step 3.

Answers will vary, but should indicate both times the image was distorted or went out of focus.

4. Based on what you observed in this lesson, how do contact lenses or glasses help correct vision problems?

They correct the distortion caused by an out-of-shape eyeball.

5. Name three devices (other than glasses or contacts) that use lenses.

Answers will vary, but should include devices like microscopes, telescopes, cameras, etc.

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What Happened

Review the section with students. Emphasize bold-face words that identify key concepts and introduce new vocabulary.

*The lens you put in the neck of the balloon simulates the **lens** of your **eye** (front of your eye). It helps **focus** (or concentrate) light onto the **retina** (back of your eye). The retina is where the **image** (whatever you're looking at) is reproduced. The shapes you gave the balloon simulate different vision problems that optometrists can usually fix with glasses or contacts.*

Notice the image in the balloon was upside down. That's exactly how images are projected in our eyes! So why don't we "see" everything upside-down? When we're born, our miraculous brain begins learning how to adjust. Ever notice how tiny babies often reach in the wrong place for something they're trying to grab? They're still learning to coordinate their eyes with their brain.

What We Learned

Answers will vary. Suggested responses are shown at left.

Conclusion

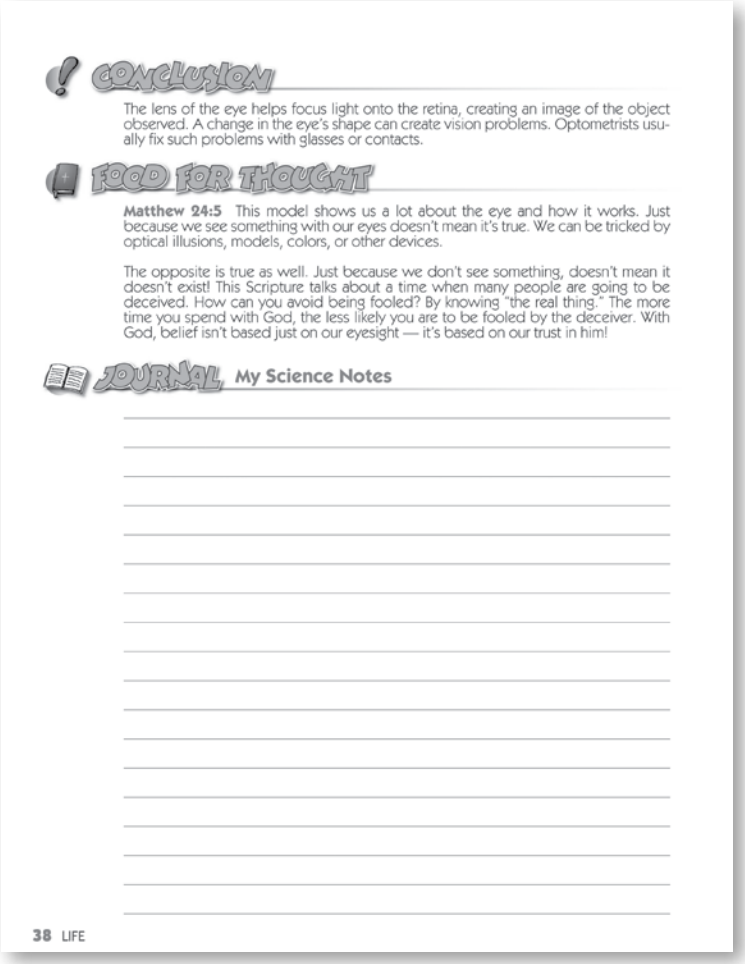
Read this section aloud to the class to summarize the concepts learned in this activity.

Food for Thought

Read the Scripture aloud to the class. Talk about how we can avoid being deceived. Focus on the importance of trusting God who knows all things.

Journal

If time permits, have a general class discussion about students' journal entries. Share and compare observations. Be sure to emphasize that "trial and error" is a valuable part of scientific inquiry!



CONCLUSION

The lens of the eye helps focus light onto the retina, creating an image of the object observed. A change in the eye's shape can create vision problems. Optometrists usually fix such problems with glasses or contacts.

FOOD FOR THOUGHT

Matthew 24:5 This model shows us a lot about the eye and how it works. Just because we see something with our eyes doesn't mean it's true. We can be tricked by optical illusions, models, colors, or other devices.

The opposite is true as well. Just because we don't see something, doesn't mean it doesn't exist! This Scripture talks about a time when many people are going to be deceived. How can you avoid being fooled? By knowing "the real thing." The more time you spend with God, the less likely you are to be fooled by the deceiver. With God, belief isn't based just on our eyesight — it's based on our trust in him!

JOURNAL My Science Notes

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Extended Teaching

1. Have students research the causes of blindness. Discuss ways of preventing blindness, and steps we can take to protect our eyes.

2. Some animals have excellent night vision. Discuss this with students and give examples. Now have teams brainstorm what might account for better night vision. (Their eyes have many more rods!)

3. Take a field trip to an optometrist's office. Discuss types of glasses and contact lenses. Challenge teams to create a poster based on some aspect of this visit.

4. Have students research eye changes that take place with age. Have them compare these changes to the vision problems of older relatives and friends. Have students make lists of problems and possible solutions (if any).

5. Many eye clinics now perform laser vision correction. Invite a clinic representative to visit your classroom. Discuss how this relatively new procedure corrects vision problems, and who can and can't benefit.