Dear Teacher,

We hope you’re feeling refreshed and ready to achieve new goals in 2020. If incorporating more digital supports for your students was on your list—we’ve got you covered! See what our teachers have to say about their favorite digital Science World teaching tools. And if you haven’t headed online to scholastic.com/scienceworld yet, you must! It will make the second half of the school year even better than the first.

Let me know how Science World is making an impact in your classroom. Email us or post on our Facebook page. We’d love to share your classroom stories!

Sincerely,

Patricia Janes, Editor

scienceworld@scholastic.com

Students read the article “Chewing on Plastics” after I shared it through Google Classroom. We also did the “Stretch Out” experiment, where the students tested how temperature affects the elasticity of gum. The students were so surprised by their results!

—Jami Phillips, 7th Grade Science Teacher & Science Department Chair; San Marcos, CA

My favorite online resources are the videos that accompany the articles. The articles include rich text, amazing graphics, and various data displays, and the videos support all of those components by giving students another way to comprehend text.

—Kathleen Charlson
6th Grade Language Arts Teacher; Gilbert, AZ

With every issue, you get an array of online supports for student learning.

Go to: scholastic.com/scienceworld
Activate with your access code

Need help? Give us a call:
1-800-SCHOLASTIC (1-800-724-6527)
OBJECTIVE
Gather information about how climate change is rapidly altering sea ice in the Arctic.

STANDARDS
NGSS: Practice: Obtaining, Evaluating, and Communicating Information
Crosscutting Concept: Stability and Change
Core Idea: ESS3.D: Global Climate Change

COMMON CORE:
Reading Informational Text: 1. Read closely to determine what the text says explicitly and to make logical inferences from it.
TEKS: 6.3D, 7.3D, 8.3D, E.8E

FEATURED LESSON PLAN
1 ENGAGE
Go to scholastic.com/scienceworld and open the digital version of the article. Click on the infographic titled “Ice in Decline” to enlarge it. Ask students to make observations about the map. Then ask them to brainstorm some questions they have related to what they see. Record their questions on the classroom board, encouraging questions about the effects of the decrease in sea ice. Then tell students they are going to explore some consequences of melting sea ice by carrying out an investigation and reading an article.

2 EXPLORE
Print out the “Rise or Fall?” skills sheet from the online teaching resources package. Hand it out to students and have them work in small groups to conduct the investigation. When everyone is finished, reconvene as a class and discuss what they observed and the conclusions they drew. Ask students to describe limitations of the model they used. (For example, the water in the bottle was not seawater; the model was on a small scale.) Then, have them complete the skills sheet.

3 EXPLAIN
Return to the article and read it aloud as a class. Be sure to also read the sidebars and infographic text. Then discuss the Core Question: Explain why studying the Arctic in winter is difficult but necessary. (Answers may include that it is dark all the time and very cold, but satellites can’t make direct detailed measurements.) Ask: What are some of the possible effects of warming global temperatures? Prompt students to consider what they learned in the article, the experiment, and their own knowledge. Make a list on the classroom board.

4 EVALUATE
Hand out the “Vanishing Ice” skills sheet. Tell students they will be integrating information from their investigation and the article, referring to the map about change in Arctic sea ice. Have students complete it for homework.

5 EXTEND
Challenge students to design an investigation that could be done aboard the Polarstern. Return to the list of questions they had at the beginning of the lesson. Discuss which ones they have answered so far. Add any additional questions they have. Then discuss how to turn those into research questions. Have students choose a question, do background research, and write a procedure that describes their investigation. (Search for “Plan an Analog Study” in the online Templates section for guiding questions.)
EVEN MORE DIGITAL RESOURCES TO LOVE!

Hear what our teachers love about Science World’s online toolkit:

I love to utilize the skills sheets. They have so many options, from design challenges to quick lab activities. We have a big push for reading in all classes and writing with emphasis on creating claims, using evidence, and explaining the reasoning. The skills sheets are always providing engaging ways for me to support my district’s efforts in those areas.

—Brandy M. Dornon
7th Grade Science Teacher; Galesburg, IL

My students really enjoy watching the videos! I will typically show them before having students read the article to entice them to want to read more.

—Tricia Kearns
6th Grade Science Teacher & 7th Grade Health Teacher; Fort Collins, CO

The digital magazine allows my learners to utilize past and current articles on their own devices. The articles are very engaging and facilitate critical thinking skills (like observing, inferring, and predicting).

—Mia Kang
6th Grade Science Teacher & Model U.N. Coordinator; Tarzana, CA

I have been using Science World for 31 years. Now, with access to all the digital resources, my students and I can learn even more! After using the print magazines, I like to use the online Sci-Triv game. My students enjoy choosing and answering questions from the game categories (Biology, Chemistry, Earth Science, and Physics).

—Jenny Karpelenia
8th Grade Science Teacher; Portage, WI

To access this treasure trove of material, visit scholastic.com/scienceworld and activate with your access code

How do you use our digital resources? Let me know!

Email me at pjanes@scholastic.com
OBJECTIVE
Analyze data to describe how butterflies use their compound eyes to navigate.

STANDARDS
NGSS:
Practice: Analyzing and Interpreting Data
Crosscutting Concept:
Structure and Function

COMMON CORE:
Literacy in Science:
7. Integrate quantitative or technical information expressed in words in a text with a version expressed visually.
TEKS: 6.2A, 7.2A, 8.2A, B.2E

FEATURED LESSON PLAN
1 ENGAGE
Ask students to think about how they use their senses to get around. What kinds of sensory information would they use to get to a new location that they’ve never visited? Record students’ ideas on the board. Then have them consider whether other animals use similar senses to gather information. Tell students to imagine they are flying insects looking for a new food source. Ask: How would they find it? How might insects’ means of taking in information differ from ours?

2 EXPLORE
Tell students that a biologist wanted to investigate how butterflies navigate. Encourage students to brainstorm ways to determine how a butterfly uses its senses to gather information about its surroundings. What are some challenges of testing what senses a butterfly uses? Hand out the “Insect Senses” skills sheet (available in the online teaching resources package), and have students work with a partner to plan an investigation to test whether butterflies use sight to navigate.

3 EXPLAIN
Tell students to open their magazines to page 14 and read the article “Butterfly Vision.” After they read, have students discuss the “Investigate It!” questions in pairs (available in the online teaching resources package). Hold a whole-group discussion comparing Zachary MacDonald’s investigation with students’. There are many ways to investigate a research question. Emphasize that different experimental designs can result in different types of data.

4 EVALUATE
Regroup students into teams of three or four and hand out the “Flight Data” skills sheet (available online). Have students examine the data from MacDonald’s investigation and draw conclusions about butterfly navigation.

5 EXTEND
Project the image of a compound eye (pages 14-15). Ask students for key differences between butterfly eyes and our eyes. (Butterflies have compound eyes with thousands of lenses; human eyes just have one lens.) What similarities can they think of? (Both take light to see and help navigate their surroundings.) Distribute the "Compound Eyes" skills sheet and materials. After students have built their model compound eyes and viewed the images, direct them to look at a moving object, such as someone slowly walking, using their model eyes. Have them complete the skills sheet and discuss their answers as a class.

INTERDISCIPLINARY ASSESSMENT PACKAGE
Available at scholastic.com/scienceworld.

BIOLOGY
Insect Senses
Students will design an investigation to determine whether butterflies use vision to navigate.

BIOLOGY
Flight Data
Students will analyze graphs of data from an investigation of butterfly navigation.

BIOLOGY
Compound Eyes
Students will build models of compound eyes and examine images of butterfly vision.
Yo-Yo Wizards

**OBJECTIVE**

Plan and carry out an investigation to gather evidence about how different factors impact a yo-yo’s motion.

**STANDARDS**

**NGSS:**
- Practice: Planning and Carrying Out Investigations
- Crosscutting Concept: Cause and Effect
- Core Idea: PS2.A: Forces and Motion

**COMMON CORE:**
- Literacy in Science: 2. Write informative/explanatory texts, including procedures/experiments.
- TEKS: 6.8A, 6.8B, 6.8D, 7.2D, 8.6A, P.2E, P.2J, P.4A

**FEATURED LESSON PLAN**

1. **ENGAGE**
   
   Demonstrate how to throw a yo-yo. Tip: Toss it over the front of your hand while flicking your hand. This should cause the yo-yo to spin, or “sleep,” at the bottom of the string. Jerk your hand up to bring the yo-yo back. Draw a simple diagram on the board showing the yo-yo leaving your hand, “sleeping,” and returning. Ask: What causes the yo-yo to fall downward? What causes the yo-yo to go back up? Write responses on the board. *Answers may include: Gravity and your downward throw made it fall and unwind; when you pull on the string, the spinning yo-yo catches on the string and winds back up.*

2. **EXPLORE**

   Go to scholastic.com/scienceworld and watch the video “Betty Gallegos in Action.” Then ask the class to describe the tricks. *(For example, she made the yo-yo swing like a pendulum, and bounced it through a web of string.)* Ask: Which tricks do you think were most challenging? Why?

3. **EXPLAIN**

   Separate the class into small groups and have them read the article aloud together. Ask them to think about how Betty Gallegos became so skilled. Have they ever worked hard to build a skill? What obstacles did they face? Give each group a yo-yo to experiment with how it moves. Have each group create a diagram of a simple yo-yo throw, labeling the forces *(such as gravity, friction).* Discuss the relationship between kinetic and potential energy during a simple downward throw, referring to the article.

4. **EXTEND**

   Hand out the “Sleep Study” skills sheet (available online). Note: If you don’t have enough yo-yos, students can investigate how mass or string length affects the pendulum motion of an object, like a washer. Prompt them to consider the importance of several trials, as some variables may be difficult to control. Discuss what students observed. What can they conclude about the motion of yo-yos? Remind students that cooperation is an important skill for scientists. Have students describe what did they did well as a group member and what they could improve.

5. **EVALUATE**

   Discuss the article’s Core Question: Explain the design elements that maximize how long a competitive yo-yo can sleep and why those features are important. Have students complete the “Spin Factors” skills sheet.

**INTERDISCIPLINARY ASSESSMENT PACKAGE**

- **PHYSICS**
  - Sleep Study
  - Students will carry out an investigation of how a chosen characteristic affects how long a yo-yo sleeps.

- **ENGINEERING**
  - Spin Factors
  - Students will analyze classic and competition yo-yo designs to compare the features that help them spin.

- **TIMELINES**
  - Toy Timeline
  - Students will obtain information from a timeline to analyze how yo-yos have changed.

**VIDEO EXTRA:**

Watch a video showing teenage Betty Gallegos’s yo-yo tricks at scholastic.com/scienceworld.

**SEL:** This lesson plan contains social-emotional learning (SEL) support related to self and social awareness.
The Wolves of Isle Royale

**Biology:** Conservation, Ecology, Genetics & Heredity, Human-Animal Interaction

**Pages:** 20-25, Lexile 1100L

**Features:**
- **Objective:** Develop and use models to describe the interactions among populations in an ecosystem.
- **Crosscutting concept:** Practice core idea, crosscutting concept, core idea

**Standards**
- NGSS: Practice: Developing and Using Models
- Crosscutting Concept: Stability and Change

**Common Core:** Reading Informational Text: 7. Integrate and evaluate content presented in diverse formats and media.

**TEKS:** 6.12E, 7.10B, 8.11A, E.4H, B.12C

**SEL:** This lesson plan contains social-emotional learning (SEL) support related to social awareness.

**Video Extra:** Watch a video about the Isle Royale wolves at scholastic.com/scienceworld.

---

**Featured Lesson Plan**

**Engage**

Play the “What Are Predators?” video found at scholastic.com/scienceworld. Have students come up with as many examples of predators as they can. Record their responses. Prompt them to include different types of animals (birds, mammals, reptiles, etc.). Have pairs of students choose a predator (animal that hunts and eats other animals) and consider its prey, or what animals it eats, and whether another animal eats it. If needed, students should conduct research in textbooks or online.

**Explore**

Discuss producers, such as plants, which make their own food, and consumers, which eat other organisms. Go to scienceworld.scholastic.com/issues/2018-19/100818/mapping-mangroves.html and display the “Mangrove Food Web” diagram. Explain how arrows go from the food source to the thing that eats it, which is the direction energy flows. Ask: Where do mangroves get their energy? (Plants get energy from the sun.) Distribute the “Eat or Be Eaten” skills sheet. Have students create their own food web and then do a gallery walk, looking at other food webs for examples where the webs could connect.

**Explain**

Tell students that predators and prey are both important components of an ecosystem. Write on the board, “Scientists describe ecosystems as ruled from the top down.” Discuss ideas students have about this statement. Tell students to open their magazines to page 20 and read the article, gathering evidence for the role of predators and prey in the ecosystem. Discuss how it supports the claim that predators “rule from the top down.”

**Extend**

Place students into small groups. Hand out the “Simulate a Wolf Population” skills sheet. Distribute two dice per group. Give students time to complete 15 rounds. Record the final number of wolves for all groups on the board. Discuss why isolated populations are more vulnerable to extinction.

**Evaluate**

Project the “Predators and Prey” graph (page 25). Discuss whether the data on wolf and moose populations allow students to make inferences about plants within the ecosystem. (Yes, when the moose population is large, the moose eat more of the trees.) Hand out the “Changing Populations” skills sheet. Revisit the idea of ecosystems being ruled from the top down. Discuss how the data provide further evidence to support this claim.

---

**Interdisciplinary Assessment Package**

**Biology**

- Eat or Be Eaten
  - Students will construct a food web centered on a chosen predator.

- Changing Populations
  - Students will analyze a graph showing wolf and moose populations over time.

- Simulate a Wolf Population
  - Students will model how small events can have large impacts on an isolated animal population.
OBJECTIVE

Carry out investigations to classify chemical reactions as endothermic or exothermic.

STANDARDS

NGSS:
Practice: Planning and Carrying Out Investigations
Crosscutting Concept: Energy and Matter
Core Idea: PS1.B: Chemical Reactions

COMMON CORE:
Literacy in Science:
9. Compare and contrast the information gained from experiments with that gained from reading a text.

TEKS: 6.5C, 7.6A, 8.5E, C.2I

FEATURED LESSON PLAN

1 ENGAGE

Show the class a handwarmer in a closed package and ask if they’ve ever used one. Ask for a volunteer to hold the handwarmer in the package. What do they observe? (While inside the package, the handwarmer does not give off heat, or thermal energy.) Ask students why. Then have the volunteer open the handwarmer and shake it. Ask them what they observe and then pass the handwarmer around to the rest of the class. (The handwarmer will heat up and stay warm for a while.) Ask them to draw or describe what was going on before the handwarmer was shaken, after it was shaken, and an hour after being shaken. Discuss their responses, focusing on the increase in temperature that was felt as thermal energy moved from the handwarmer to their hand.

2 EXPLORE

Go to scholastic.com/scienceworld and print out the skills sheet “Feel the Heat” from the online teaching resources package. Tell students they are going to investigate other combinations of substances as they react and whether their temperatures also change. Create groups of three to four students and hand out the materials for the experiments listed on the skills sheet. (Note: Citric acid can be found in grocery stores. All of the chemicals used in the experiments are nonhazardous, but remind students never to drink or taste anything in a lab and to always wear safety goggles.)

3 EXPLAIN

When each group has completed the experiments, instruct them to open their magazines and take turns reading each paragraph. Then have them create a Venn diagram (available online in the Templates section) that compares the reaction described in the article with one reaction they investigated. Reconvene as a class and create two Venn diagrams on the classroom board: one comparing handwarmers and the citric acid reaction and the other comparing handwarmers and the steel wool reaction. Ask each group to add characteristics to the diagram. (The Venn diagram might include: exothermic/releases heat (handwarmers and steel wool), endothermic/absorbs heat (citric acid), bubbles formed (citric acid), temperature change (all three), rust formed (handwarmers and steel wool).

4 EVALUATE

Hand out the “Reactions All Around” skills sheet and have students use what they have learned to classify other everyday processes as either exothermic or endothermic.
**FOCUS ON AN NGSS PRACTICE: OBTAIN AND COMMUNICATE INFORMATION**

**YOUR STUDENTS WILL:**
- Read and summarize an article in this issue
- Conduct their own library and internet research on an aerospace professional
- Write a biography for museum visitors
- Make copies of the skills sheet “Achievements in Aerospace,” available online at [scholastic.com/scienceworld](http://scholastic.com/scienceworld)

---

**BUTTERFLY VISION, p. 14**

**INVESTIGATE IT!**
1. He was inspired by taking close-up photos of butterflies and wondering if the flash affected their vision.
2. If his experiment had altered the butterflies’ other senses besides sight, he wouldn’t have been able to determine which changes were affecting their navigation.
3. A single flash from one direction would not be effective at blinding a butterfly, since it has compound eyes with thousands of units facing different directions. The butterfly would be blinded only if all the units were exposed to a flash.
4. Almost all the butterflies with unaltered vision navigated to the island successfully.

**WHAT IN THE WORLD?, p. 32**

It may look as though flames are shooting out of this alpaca’s mouth. But this fire-breathing trick is actually an optical illusion. The photo, taken on a chilly morning on a farm in Colorado, shows the alpaca mid-exhale. When an animal breathes out, it expels water vapor. Sunlight streaming through the barn doors hit the cloud of suspended droplets of water and ice crystals, making it appear as if the alpaca were breathing glowing fire.

---

**ANSWERS**

**BUTTERFLY VISION, p. 14**

**INVESTIGATE IT!**
1. He was inspired by taking close-up photos of butterflies and wondering if the flash affected their vision.
2. If his experiment had altered the butterflies’ other senses besides sight, he wouldn’t have been able to determine which changes were affecting their navigation.
3. A single flash from one direction would not be effective at blinding a butterfly, since it has compound eyes with thousands of units facing different directions. The butterfly would be blinded only if all the units were exposed to a flash.
4. Almost all the butterflies with unaltered vision navigated to the island successfully.

**WHAT IN THE WORLD?, p. 32**

It may look as though flames are shooting out of this alpaca’s mouth. But this fire-breathing trick is actually an optical illusion. The photo, taken on a chilly morning on a farm in Colorado, shows the alpaca mid-exhale. When an animal breathes out, it expels water vapor. Sunlight streaming through the barn doors hit the cloud of suspended droplets of water and ice crystals, making it appear as if the alpaca were breathing glowing fire.

---

**ISSUE AT A GLANCE**

<table>
<thead>
<tr>
<th>ARTICLES</th>
<th>NEXT GENERATION SCIENCE STANDARDS LESSON</th>
<th>READING AND WRITING STANDARDS</th>
<th>ONLINE MATERIALS</th>
</tr>
</thead>
</table>
| **TRAPPED IN ICE** p. 8  
Lexile 1100L | PRACTICE: Obtaining, Evaluating, and Communicating Information  
CROSSCUTTING CONCEPT: Stability and Change  
CORE IDEA: ESS3.D: Global Climate Change | READING INFORMATIONAL TEXT:  
1. Read closely to determine what the text says explicitly and to make logical inferences from it. | → Video about the MOSAiC expedition  
→ Plan and carry out an investigation activity  
→ Map analysis activity  
→ Paired text |
| **BUTTERFLY VISION** p. 14  
Lexile 950L | PRACTICE: Analyzing and Interpreting Data  
CROSSCUTTING CONCEPT: Structure and Function  
→ Analyzing data activity  
→ Integrating visual information activity |
| **YO-YO WIZARDS** p. 16  
Lexile 1080L | PRACTICE: Planning and Carrying Out Investigations  
CROSSCUTTING CONCEPT: Cause and Effect  
CORE IDEA: PS2.A: Forces and Motion | LITERACY IN SCIENCE: 2. Write informative/explanatory texts, including procedures/experiments. | → Yo-yo competition video  
→ Plan and carry out an investigation activity  
→ Integrating visual information  
→ Obtaining and evaluating information activity |
| **THE WOLVES OF ISLE ROYALE** p. 20  
Lexile 1100L | PRACTICE: Developing and Using Models  
CROSSCUTTING CONCEPT: Stability and Change  
CORE IDEA: LS2.A: Interdependent Relationships in Ecosystems | READING INFORMATIONAL TEXT:  
7. Integrate and evaluate content presented in diverse formats and media. | → Isle Royale wolves video  
→ Develop a model activity  
→ Analyzing a graph activity  
→ Simulate a population activity |
| **WINTER WARM-UP** p. 26  
Lexile 940L | PRACTICE: Planning and Carrying Out Investigations  
CROSSCUTTING CONCEPT: Energy and Matter  
CORE IDEA: PS1.B: Chemical Reactions | LITERACY IN SCIENCE: 9. Compare information gained from experiments with that gained from reading a text on the same topic. | → Hands-on investigation  
→ Constructing explanations activity  
→ Compare and contrast activity |

Statement of Ownership, Management, and Circulation of Science World (as required by Title 39, United States Code). Date of Filing: October 1, 2019. Title of Publication: Science World. Frequency of issue: 10 times during the school year; biweekly September; monthly October, November, December, January, February, March, April. Paid circulation, 342,831; average number of copies printed 427,426; free distribution, 18,260; total number of copies distributed, 445,696; copies not distributed, 405,003. For Single Issue Issued to Filing Date: Number of Copies Printed, 500,555; Paid Circulation, 360,344; Free Distribution, 1,225; Number of Copies Distributed, 445,696; Total, 530,555. 

**POSTAL INFORMATION:** Science World (ISSN 1041-1410) is published 10 times during the school year; biweekly September; monthly October, November, December, January, February, March, April; by Scholastic Inc., 2931 East McCarty St., P.O. Box 3710, Jefferson City, MO 65102-3710. Periodical postage paid at Jefferson City, MO 65102 and at additional mailing offices. POSTMASTERS: Send notice of address changes to Science World, 2931 East McCarty St., P.O. Box 3710, Jefferson City, MO 65102-3710.