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As the school year kicks into full swing, take a minute from your busy day to check out our new-and-improved website. There, you’ll find a refreshingly simple new design and a host of exciting features that will help you get the most out of your Science World subscription. To get started, just visit scholastic.com/scienceworld and enter the code.

In the meantime, we hope you enjoy this exciting new issue packed with exotic pets, terra-cotta warriors, a colossal new bridge, and a group of teenagers fighting climate change in a novel way. Enjoy!

Patricia Janes, Editorial Director
scienceworld@scholastic.com

ARTICLES

| WILD PATIENTS | p. 8 | Lexile 1010 |
| STANDING GUARD | p. 12 | Lexile 1020 |
| TEENS VS. CLIMATE CHANGE | p. 14 | Lexile 1020 |
| COLOSSAL CONSTRUCTION | p. 20 | Lexile 1110 |

NEXT GENERATION SCIENCE STANDARDS LESSON

| PRACTICE: Constructing Explanations and Designing Solutions |
| CROSSCUTTING CONCEPT: Systems and System Models |
| CORE IDEA: LS3.B: Variation of Traits |
| PRACTICE: Planning and Carrying Out Investigations |
| CROSSCUTTING CONCEPT: Stability and Change |
| PRACTICE: Engaging in Argument from Evidence |
| CROSSCUTTING CONCEPT: Stability and Change |
| CORE IDEA: ESS3.D: Global Climate Change |
| PRACTICE: Constructing Explanations and Designing Solutions |
| CROSSCUTTING CONCEPT: Structure and Function |
| CORE IDEA: ETS1.B: Developing Possible Solutions |

READING AND WRITING STANDARDS

| READING INFORMATIONAL TEXT: 7. Integrate and evaluate content presented in diverse formats, including visually, as well as in words. |
| WRITING STANDARDS: 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly. |
| WRITING STANDARDS: 1. Write arguments to support claims, using valid reasoning and relevant and sufficient evidence. |
| LITERACY IN SCIENCE: 9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. |

ONLINE MATERIALS

| → Exotic pet video |
| → Analyzing-models activity |
| → Interpreting-information activity |
| → Paired-text activity |
| → Designing-solutions activity |
| → Terra-cotta warriors video |
| → Designing-experiments activity |
| → Analyzing-models activity |
| → Interpreting-information activity |
| → Paired-text activity |
| → Climate change video |
| → Writing-arguments activity |
| → Paired-text activity |
| → Analyzing-models activity |
| → Designing-experiments activity |
| → Bridge video |
| → Hands-on activity |
| → Designing-solutions activity |
| → Paired-text activity |
| → Analyzing-data activity |

TEACHER TO TEACHER: Tips for using Science World in the classroom

Kelly Mitchell, a teacher at Woodward Park Middle School, in Columbus, Ohio, says: I use Science World’s videos to encourage my students to create their own video shorts. With a little help, the students take articles from Science World and create a video showing how the subject matter relates to their lives. It’s a popular assignment because the students can make the content their own, using their own music in the background and words in the foreground. Right now, we’re hoping to use the Gross Out articles to create a video short series to show to the entire school.
OBJECTIVE

Use a model of the digestive system to explain the factors that affect the anatomy of different organisms.

STANDARDS

NGSS: Practice: Constructing Explanations and Designing Solutions
Crosscutting Concept: Systems and System Models
Core Idea: LS3.B: Variation of Traits
COMMON CORE: Reading Informational Text 7. Integrate and evaluate content presented in diverse formats, including visually, as well as in words.
TEKS: 6.12E, 7.11A, 8.11B, B.10

FEATURED LESSON PLAN

1 WATCH A VIDEO ABOUT EXOTIC PETS

Play a video about exotic pets, available online at scholastic.com/science world. Guide students in a discussion about the possible downsides of keeping exotic animals as pets. (For example, the animals are not usually accustomed to living with humans and may not thrive living in a house or cage; the animals may become too big or too dangerous, etc.) What challenges do exotic pets pose for a veterinarian? (Each type of animal has a different anatomy and may develop unusual problems that a veterinarian would need to be able to identify.)

2 READ THE ARTICLE TO GATHER MORE INFORMATION

Ask students to open their magazines to page 8. Read the article aloud as a class, asking for volunteers to read each paragraph. When you are done, discuss characteristics of the exotic pets mentioned in the article that may cause problems when the animals live in captivity. (For example, budgies have tough beaks to open up seeds to eat; hedgehog quills help protect them against attacks from predators.)

3 COMPARE THE ANATOMY OF DIFFERENT ANIMALS

Ask students to look at the photos of the different animals in the article and compare their anatomies. Discuss how their different traits are related to their diet or how they help the animal survive in the environment. (For example, a lynx may be similar to a house cat; a rare bird may be similar to more common birds, etc.) Guide students to consider lifestyle and diet of the animals. Discuss.

4 PAIR SKILLS SHEET

Have students complete the “Animal Anatomy” skills sheet available online at scholastic.com/scienceworld. When all of the students are finished, go over their answers together. Discuss why it is important for veterinarians to understand the anatomy of animals they are treating. Ask the class: How might a veterinarian approach a case if someone brings in an unfamiliar animal? (They might assume it has the same anatomy as a similar type of animal that the veterinarian is familiar with; they might ask a colleague or do some research, etc.) Name a few different types of animals and ask students to consider what might be a good animal to compare them to. (For example, a lynx may be similar to a house cat; a rare bird may be similar to more common birds, etc.) Guide students to consider lifestyle and diet of the animals. Discuss.

INTERDISCIPLINARY ASSESSMENT PACKAGE

Available at scholastic.com/scienceworld.

CHEMISTRY

Inside View
Students will learn how X-rays interact with matter and how they can be used to analyze materials.

EARTH SCIENCE

Into the Wild
Students will learn about the potential environmental consequences of releasing exotic pets into the wild.

ENGINEERING

Brand-New Body Parts
Students will design and draw a model for a prosthetic for an alligator that has lost its tail.
Name:

ANIMAL ANATOMY

In “Wild Patients” (p. 8), you read that veterinarians who treat exotic pets must understand the anatomy of the animals they care for. The diagram below shows the digestive system of a rabbit*. Use the information to answer the questions that follow.

RABBIT DIGESTIVE SYSTEM

1. Rabbits practice coprophagy—they eat their own droppings. Why might they do this?

2. Birds also have a caecum, but its size and function vary among species. How do you think the caecum of a bird that eats plants would compare with that of a bird species that eats mainly fish? Support your answer with evidence from the diagram.

3. How is a rabbit’s digestive system similar to that of a human? Explain your answer.

4. Imagine you are a veterinarian. You suspect a rabbit has developed a disease that affects its small intestine. What symptoms might you expect the animal to show?

* For a bonus diagram of a bird’s digestive system, visit scholastic.com/scienceworld.
OBJECTIVE
Plan and conduct an experiment to test how the properties of materials affect how they can change in the environment.

STANDARDS
NGSS:
Practice: Planning and Carrying Out Investigations
Crosscutting Concept: Stability and Change

COMMON CORE:
Writing Standards: 2. Write informative/explanatory texts to examine and convey complex ideas and information clearly.

TEKS:
6.5A, 7.5B, 8.5, C.4A

FEATURED LESSON PLAN
1 DISCUSS WHAT CAUSES OBJECTS TO DECAY
Show the class several objects, such as a soda can, a piece of paper, a plastic bottle, and an apple. Prompt students to consider what might happen to these objects if left outside for long periods of time. What changes might they observe? (For example, colors fade, paper breaks down, the apple rots, etc.) What do they think causes these changes? (Exposure to the sun, air, or water; microorganisms can cause materials to decompose.)

2 MAKE OBSERVATIONS ABOUT ANCIENT CLAY SOLDIERS
Open the digital edition of the magazine at scholastic.com/scienceworld to pages 12-13. Ask students to compare the pictures of the terra-cotta soldiers with the illustration showing how scientists believe the warriors originally looked. What changes do they notice? (The warriors lost their color and polish.) Predict what may have caused the changes.

3 GATHER INFO ABOUT PRESERVING ARTIFACTS
Read the article to learn how the warriors were made and how they are being studied. Ask students if they think it is important to preserve ancient art or artifacts. Why or why not? Guide a discussion about other ways artworks are preserved. (For example, paintings in museums are often kept in conditions with low light and no air to protect the paint; artists may restore paintings.)

4 CONDUCT AN EXPERIMENT
Print out the “What Will Survive?” skills sheet and hand it out to students. Complete the first half of the skills sheet as a class. Discuss the main factors that affect how objects decay (composition of the material, the conditions they are exposed to, etc.) Have students work in groups to plan and carry out an experiment that tests how things break down. The experiments should include placing groups of the same type of objects (such as a plastic item, something made of paper, and an apple) in different conditions and leaving them for a set period of time.

5 POST-EXPERIMENT DISCUSSION
Discuss the results of your experiments. Have students use their observations to predict what types of items in your classroom might be preserved if they were buried for 2,000 years. How might the objects change? Guide a discussion about how preservation can affect what future generations are able to learn about a society. (For example, organic materials may have vanished because they may have broken down completely.)

INTERDISCIPLINARY ASSESSMENT PACKAGE
Available at scholastic.com/scienceworld.
WHAT WILL SURVIVE?

In “Standing Guard” (p. 12), you learned how the paint on terra-cotta soldiers deteriorated when it was exposed to air after being buried underground for 2,200 years. Environmental changes can affect materials in different ways. In this activity, you’ll predict and make observations regarding how certain objects withstand the test of time.

STEP 1: MAKE PREDICTIONS

1. **Organic materials**, such as wood, paper, and cotton clothing, come from animal or plant sources. On a separate piece of paper, list three other organic objects in your classroom.

2. **Inorganic materials**, such as metal, glass, and plastic, are substances that come from nonliving sources. List three inorganic objects in your classroom.

3. How do you think the make up of different materials affects how each decays? Do you think organic or inorganic materials will break down faster? Explain your answer.

4. How do you think the conditions in an object’s environment affect how fast its materials break down?

STEP 2: PLAN AN EXPERIMENT

Design an experiment that will compare how organic and inorganic materials break down in different environments. Describe the steps of your experiment. Think about what materials you will need. What factors will you change and control during the experiment? What data will you collect?

STEP 3: CONDUCT YOUR EXPERIMENT

Gather the necessary materials and carry out your experiment. Record the data you collect.

STEP 4: DRAW CONCLUSIONS

When your experiment is complete, summarize what you discovered in the space below. Support your conclusions with evidence from your experiment.

TAKE IT FURTHER:

Use the observations from your experiment to explain why you think the terra-cotta warriors, in general, are relatively well preserved after 2,200 years.
OBJECTIVE
Gather evidence about climate change and write an argument about whether the U.S. government should act to limit it.

STANDARDS
NGSS:
Practice: Engaging in Argument From Evidence
Crosscutting Concept: Stability and Change
Core Idea: ESS3.D: Global Climate Change
COMMON CORE:
Writing Standards: 1. Write arguments to support claims, using valid reasoning and relevant and sufficient evidence.
TEKS: 6.3B, 7.8A, 8.10, E.9H

FEATURED LESSON PLAN
1 MAKE OBSERVATIONS ABOUT CLIMATE CHANGE
Before reading the article, show the class pictures that demonstrate how different areas on Earth have changed in recent years because of climate change. You can find good examples on the internet by searching "climate change before and after photos." Guide students to describe the differences they see in the pictures. Ask them to explain what may have caused these changes (irregular weather patterns, drought, water-level rise, etc.). Discuss what impact these changes may have on wildlife or humans that live in the area. (Some plants and animals may be unable to survive new conditions; humans may have to leave flood-prone areas, some species may have to adapt, etc.)

2 READ THE ARTICLE TO GATHER EVIDENCE ABOUT CLIMATE CHANGE
Have students open their magazines to page 14. Group students into pairs and have them read the article aloud together. As they read, ask them to take note of evidence about whether climate change appears to be negatively affecting humans and the environment. When everyone is done reading, reconvene as a class and make a list of the evidence students collected. (For example, sea levels have risen by 7 inches in the past 100 years, causing coastal regions to erode or become submerged; extreme storms are becoming more frequent; average temperatures have risen by 1.7°F since 1880; and permafrost in Alaska is thawing and causing sinkholes to develop.) Discuss how climate change might affect the region where you live. (If you live in a coastal area, you may be affected by rising sea levels; if you live in a farming community, agriculture may be affected by changing temperatures, etc.) Ask the class the Core Question on page 17 aloud: Explain why or why not these students’ “right to life, liberty and property” may be threatened by the effects of climate change. Support your answer with evidence from the text or independent research.

3 USE EVIDENCE TO SUPPORT AN ARGUMENT
Print out the “Take a Stand” skills sheet found in the online assessment package, available at scholastic.com/scienceworld. Have students complete the skills sheet and write a letter that argues for or against the government taking action against climate change. As time permits, encourage students to undertake additional research online. Discuss as a class what type of politician or government official they should reach out to in order to make their opinion heard. Then search for an address and send the letters.

INTERDISCIPLINARY ASSESSMENT PACKAGE
Available at scholastic.com/scienceworld.

BIOLOGY Changing Habitat
Students will learn how climate change could be causing bee populations to decline.

CHEMISTRY Underground Carbon
Students will study a model to learn how permafrost thawing could cause Earth’s temperature to rise even more.

PHYSICS Rising Waters
Students will design experiments that model how melting floating and land-locked ice could affect sea levels.
TAKE A STAND

In “Teens vs. Climate Change” (p. 14), you learned that a group of kids are suing the U.S. government to force it to take action against climate change. You also read that the U.S. has announced that it is pulling out of an international climate agreement that aims to reduce the emissions of greenhouse gases.

Do you think the U.S. government should or should not take stronger action to curb the production of greenhouse gases? Use this skills sheet to compose a letter to a politician to tell him or her what you think. Gather evidence from the article and your own research to support your opinion. Use your answers to write your letter on a separate sheet of paper.

DATE _________________________________________

Dear ______________________________________________________________ (choose a local, state, or national politician),

Your Statement (State your opinion about whether the U.S. should or should not act to try to reduce climate change.)

______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________

Give Supporting Reasons (Provide at least two arguments that support your opinion. Use facts from the article and/or your own research.)

______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________

Call to Action (What specific actions do you think should be taken?)

______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________

Write a Conclusion (Conclude with a few sentences that reinforce your main points.)

______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________
______________________________________________________________________________________________________________________

Sincerely, ____________________________________________ (your name)
OBJECTIVE
Develop a solution to design and build a bridge with a structure to support a large amount of weight.

STANDARDS
NGSS:
Practice: Constructing Explanations and Designing Solutions
Crosscutting Concept: Structure and Function
Core Idea: ETS1.B: Developing Possible Solutions
COMMON CORE:
Literacy in Science: 9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
TEKS:
6.12E, 7.8C, 8.6, P.3E

FEATURED LESSON PLAN
1 BEFORE READING: MAKE OBSERVATIONS ABOUT THE BRIDGE STRUCTURE
Open the digital edition of the magazine at scholastic.com/scienceworld to page 22 and show students the diagram of the Governor Mario Cuomo Bridge. Ask students to describe the features they observe and make predictions about why engineers used that design. Guide them to theorize how the weight is supported and the purpose of the cables. Continue the discussion by considering what criteria a bridge like this one would need to meet as well as any constraints. (It would need to support a large amount of weight and last for a certain length of time; the construction should not harm nearby people or wildlife, etc.)

2 READ ARTICLE TO GATHER INFORMATION
Ask students to read the article in their magazines. As they read, have them take notes on the challenges the engineers faced in designing and building the bridge. Afterward, have students discuss those challenges and the solutions engineers used to solve them. (For example, where there is no bedrock, the piles rely on friction to support their weight; machinery was used to minimize turbidity in the water; a bubble curtain prevented too much noise from entering the water.)

3 PAIR SKILLS SHEET TO BUILD A BRIDGE
Divide students into pairs or small groups and distribute the “Under Construction” skills sheet, available at scholastic.com/scienceworld. Hand out the listed building materials to each group. Place two desks 12 inches apart and explain that each pair or group must build a bridge across the span with the given materials. The goal is to build a bridge that can hold the most weight. As a class, discuss the challenges the students will face. Then have them complete the skills sheet and build their bridges. Afterward, test their completed designs as a class. When a group’s bridge begins to break, discuss what structures failed and why. As a class, brainstorm how each design could be improved with a new approach or different materials.

TAKE IT FURTHER
Have students choose a specific bridge from another area (for example, the Golden Gate Bridge in California, the Mackinac Bridge in Michigan, or a local bridge.) Then ask students to research how the bridge they chose was designed and constructed. Ask them to present their bridges to the class and compare the designs with that of the Governor Mario Cuomo Bridge.

INTERDISCIPLINARY ASSESSMENT PACKAGE
Available at scholastic.com/scienceworld.

BIOLOGY
Hazardous Structures
Students will design solutions that can help reduce the risk to wildlife caused by infrastructure.

CHEMISTRY
Toxic River
Students will learn about the cleanup of toxic chemicals found in the Hudson River.

EARTH SCIENCE
Tracking Salt
Students will analyze data to understand how salinity varies in parts of the Hudson River.
In “Colossal Construction” (p. 20), you learned about some of the challenges engineers faced in the designing and construction of a new bridge across the Hudson River in New York. In this activity, you’ll test your engineering skills by trying to design the strongest bridge possible while working within a set of specific building criteria and constraints.

**BUILDING OBJECTIVE:**
Using the building materials listed below, build a bridge that can support the greatest weight without collapsing. You will test its strength by measuring the number of pennies the bridge can hold. The bridge must meet the following criteria and operate under certain constraints:
- It needs to extend across a 30.5 centimeter (12 inch) gap between two desks.
- It must have a roadway that can hold a plastic cup.
- You may use only the building materials given to you.

**MATERIALS:**
- scissors
- 2 desks
- ruler
- plastic cup
- 300 pennies
- scale

**Building materials:**
- 25 drinking straws,
- 50 toothpicks, plastic tape, glue

1. **DESIGN:** Brainstorm what type of structure will be the strongest. Draw models of your bridge designs.

2. **BUILD:** Select your best design and use the given materials to build it.

3. **TEST:** Place two desks 30.5 cm (12 in.) apart. Place your bridge across the gap and place the plastic cup in the middle of your bridge’s roadway. Predict how many pennies the bridge will hold. Then gradually fill the cup with pennies until the bridge starts to collapse. Measure how much the cup weighed when the bridge toppled.

4. **REFINE:** Which areas of your bridge began to fail first? Use your observations to improve your design. Rebuild or alter your bridge based on your new design. Test the bridge. Did the adjustments make it stronger?

**CONCLUSIONS**
1. Compare your results with the results of your classmates. Which bridge design was the strongest? What characteristics do you think made the bridge strong?

2. What criteria and constraints might need to be taken into account when building a bridge in real life?
SCIENCE NEWS

DIRECTIONS: Read the “Science News” section on pages 2–7. Then test your knowledge, filling in the letters next to the correct answers.

1. The Cassini spacecraft was launched in ______.
   A 1982
   B 1997
   C 2004
   D 2015

2. NASA programmed Cassini to crash into ______ in September 2017.
   A Mars
   B Saturn
   C Titan
   D Venus

3. A ________ is an organelle that supplies energy to a cell.
   A nucleus
   B membrane
   C Golgi apparatus
   D mitochondrion

4. The ________ forms the outer covering of a cell.
   A organelle
   B cell membrane
   C cytoplasm
   D lysosome

5. Dinosaurs came to rule Earth after a mass extinction about ______ years ago.
   A 20 million
   B 200 million
   C 2 billion
   D 500,000

6. Scientists believe that dinosaurs may have survived ________ that wiped out many other species.
   A volcanic eruptions
   B asteroid impacts
   C diseases
   D droughts

7. Engineers outfitted the Bloodhound with a ________, in hopes that it will reach speeds of 320 kilometers (200 miles) per hour.
   A rocket engine
   B combustion engine
   C electric battery
   D jet engine

8. A(n) ________ was recently spotted near the Statue of Liberty in New York Harbor.
   A humpback whale
   B blue whale
   C elephant seal
   D narwhal

9. ________ are sometimes used to detect underwater noise.
   A Scubaphones
   B Sonar
   C Hydrophones
   D Hydroscopes

10. A university in Spain recently installed a giant ________ on the side of a building.
    A color wheel
    B periodic table
    C dictionary
    D cell diagram
EXPLAIN THIS, P. 24

A simple process was used to give these watermelons their cube shape. They were grown in boxes. This process was started in Japan to save space in refrigerators, since round melons take up a lot of room on shelves. While the process might be a space saver, these melons are often harvested before they fully ripen, so they might not be as tasty as their round counterparts.

SKILLS SHEETS, T3, T5, T7, T9

Go to scholastic.com/scienceworld for the answers, 12 additional skills sheets, and check for understanding quizzes.

NEWS QUIZ, T10


Find all print and online answers at: SCHOLASTIC.COM/SCIENCEWORLD.

Just click on the “Answer Key” button associated with the issue.

THE EFFECTS OF DRUGS AND DRUG ABUSE ON THE BRAIN AND BODY - SCHOLASTIC.COM/HEADSUP

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Fall 2017 (All Times Central)

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Find all print and online answers at: SCHOLASTIC.COM/SCIENCEWORLD.