WHAT IN THE WORLD?, p. 24
Spanish photographer Dani Caxete took this photo of the International Space Station (ISS) as it passed in front of the sun on September 5, 2017. To capture the image, Caxete attached a camera to a telescope with a filter that reduced the brightness of the sun's light. The ISS travels at a speed of 7.66 km (4.76 mi) per second. Caxete had to have quick reflexes to snap this picture since the ISS took only 0.6 seconds to zoom across the sun's face. The sun is 150 million kilometers (93 million miles) away from Earth, but the ISS is much closer. The space station orbits Earth about 320 kilometers (200 miles) above the planet's surface. Caxete just happened to photograph the space station as it drifted between two sunspots, named AR 12674 and AR 12673. These darker, cooler patches on the sun's surface form in areas where the sun’s magnetic field is very strong. For more information, visit scholastic.com/scienceworld.

ONLINE EDITION

CREATURE CLOSE-UPS

AN ANIMAL’S TALE
Answers will vary depending on the chosen species, but should be written in first person and include specific details about the animal's life and how it is affected by threats in the environment.

WHO’S AT RISK?
1. amphibians, reptiles and birds OR fish, birds, and mammals
2. D
3. $13,482 \times 0.1 = 1,348$ reptile species
4. Answers may include that the percentage of endangered fish species would likely become larger than what is shown in the graph because scientists would likely find additional species that are threatened.
5. Answers will vary but may include that endangered mammals may get more attention because they tend to have characteristics that are more humanlike and, as a result, make them more relatable.

HISTORY OF SPECIES PROTECTION
1. The creation of the first list of endangered species occurred before the Environmental Protection Agency was created.
2. After the Endangered Species Act was created, four years passed before plants were included.
3. California condors were brought into captivity because they were almost extinct, with only nine condors left in the wild. The plan was successful because the birds were reintroduced into the wild, and in 2004 they began reproducing again in the wild.
4. The removal of the peregrine falcon from the endangered species list was likely made possible because of the EPA ban on DDT in 1972. This once widely used pesticide caused a decline in peregrine falcon populations.
5. The U.S. Supreme Court upheld an ESA regulation stating that destroying or damaging habitat is considered harming a threatened or endangered animal. That means that damaging the habitat of an endangered animal is illegal. This regulation can help protect threatened species by preserving their habitats.

SEED SAVER

SPROUTING SEEDS
Answers will vary. A possible setup is as follows:

PREDICT: A likely hypothesis could be: Seeds planted the deepest may germinate, but the seedlings will not be able to reach the surface.

PLAN AN EXPERIMENT: A possible procedure would be: Label four cups: A, B, C, and D. Cup A is the control and 25 seeds are planted at 0 cm. Cups B, C, D contain 25 seeds planted at 2 cm, 4 cm, and 6 cm, respectively. Place the cups in an area with light and water them daily with the same amount of water. Count the number of seedlings present after 10 days.

RESULTS: Typically, seeds germinated the best when planted at 2 cm below the soil surface.

CAN WE COOL THE PLANET?

ANALYZE A VIDEO
1. The graph shows how temperatures have increased since 1880. The timeline shows that 10 of the past 14 years have been the warmest on record.
2. The graph and the timeline present evidence that supports the theory that climate change that is happening today is different from climate change that has occurred in the past.
3. The map shows how carbon dioxide is emitted around the world. Carbon dioxide is a greenhouse gas that traps heat in the atmosphere, causing Earth to warm.
4. Climate change has caused seawater temperatures to warm, ocean water to become more acidic, and sea levels to rise.
5. Answers will vary depending on the chosen solution but may include that the action would cause people to use less energy, which could decrease the amount of fossil fuels that are burned and the amount of greenhouse gases that are emitted.
6. Answers will vary.

GEOENGINEERING STRATEGIES
Answers should include the following information:

<table>
<thead>
<tr>
<th>Geoengineering Strategy</th>
<th>Describe what this strategy would entail.</th>
<th>Explain what effects this strategy would have on the environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice Saver</td>
<td>Sprinkle sea ice with microscopic glass powder.</td>
<td>The powder would cause more sunlight to be reflected into space. Process: Reflecting Sunlight</td>
</tr>
<tr>
<td>Go Green</td>
<td>Plant more trees.</td>
<td>Trees absorb carbon dioxide, which is a gas that traps heat in the atmosphere. With less CO$_2$ in the atmosphere, less heat would be trapped, and temperatures would cool. Process: Absorbing Carbon Dioxide</td>
</tr>
<tr>
<td>Trapping Carbon</td>
<td>Build devices that absorb carbon dioxide directly from the air.</td>
<td>With less heat-trapping CO$_2$ in the atmosphere, temperatures would cool. Process: Absorbing Carbon Dioxide</td>
</tr>
<tr>
<td>Sun Shade</td>
<td>Spray sulfur gas into the stratosphere.</td>
<td>The sulfur gas would react with the air to produce sulfuric acid droplets, which reflect sunlight back into space. Process: Reflecting Sunlight</td>
</tr>
</tbody>
</table>

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**GAS BLANKET**

1. Solar radiation is energy from the sun made up of high-energy particles or waves.
2. The arrows represent radiation that bounces off Earth’s surface. Some radiation returns to space (straight arrow), while some radiation is trapped by gases in the atmosphere and returns to Earth (curved arrow).
3. If there were significantly more clouds, Earth’s temperatures would likely cool because some solar radiation bounces off the clouds before it reaches Earth’s surface.
4. The greenhouse effect is what allows heat from the sun to be trapped so that temperatures are warm enough for life to survive. Without it, all the solar radiation passing through Earth’s atmosphere would return to space and temperatures would be much colder.
5. Carbon dioxide is a greenhouse gas that traps heat. The amount of carbon dioxide gas in the atmosphere determines how much temperatures will increase. As CO₂ levels rise, temperatures rise. The orange line on the graph shows how temperatures should rise if CO₂ emissions stay at a high level. The green line indicates what might happen if CO₂ emissions were to be reduced.

**CORAL KILLER**

**BUILDING REEFS**

1. A coral polyp is an individual organism that forms reefs.
2. A coral polyp builds a hard skeleton under itself. As it grows, it builds a new layer, causing the coral structure to grow. Young corals attach to other corals to grow taller.
3. Algae provide most of the energy that corals use to survive.
4. Pollution can cause corals to expel the algae that live inside their tissues, a process called bleaching. Without that energy source, the corals can die.
5. Answers will vary but may include that it would likely take time for coral reefs to rebuild if the harmful chemicals in sunscreen were banned. It can take thousands of years to build a reef.

**SUN BLOCKERS?**

**PREDICT**

A likely hypothesis could be: Sunscreen with a higher SPF will better protect against the sun’s rays.

**PLAN AN EXPERIMENT**

A possible procedure would include placing UV beads inside plastic bags and applying a different sunscreen to the outside of each labeled bag. The control would have UV beads in a bag with no sunscreen. The bags would be placed outside for a period of time and then analyzed using the UV bead scale to determine what UV exposure the beads experienced.

**DRAW CONCLUSIONS**

1. The sunscreen with the highest SPF will protect best against the sun’s rays. The UV beads in that bag will change color the least when exposed to the sun. The amount of color change is related to how much UV exposure the beads have had.
2. Answers may include the total time the bags were set in the sun and the amount/thickness of the layer of sunscreen applied to each bag. Those factors need to be the same so that the difference in UV exposure is due only to the type of sunscreen used.
3. Answers may include that the sunscreen that absorbs the sun’s rays the best would protect your skin better than the others. To make a conclusion about which is the best sunscreen, you may also want to include other evidence, such as which chemicals are in the sunscreens and how they might affect the environment.

**REEF REGIONS**

1. Pacific Ocean
2. Great Barrier Reef and New Caledonia Barrier Reef
3. Coral reefs need to be in warm tropical/subtropical waters to grow. Most reefs are found around the equator between the Tropic of Cancer and the Tropic of Capricorn, where temperatures are warm.
4. The Arctic Ocean and Southern Ocean do not contain coral reefs because the waters are too cold for corals to grow.
5. Most coral reefs are located near coastlines. This may make them more at risk for damage from sunscreens because people mainly swim in the shallow waters along coast.

**BALL GAME OVER?**

**CREATE A COMIC**

Answers will vary, but comic strips should include details from the article, such as how emerald ash borers enter and damage the trees and how infestations can spread.

**INSECT INVASION**

1. 2002; Michigan
2. Each colored box represents a county in which ash borer infestations have been detected.
3. Answers will vary depending on where students live.
4. Answers may include Michigan, Ohio, and Indiana. By 2015, nearly all areas in those states were affected by ash borer infestations.
5. Answers may include that each year, new ash borer infestations were discovered in counties far from areas affected the previous year. The article states that ash borers do not move far from infected trees. Other activities must have caused those new infestations, such as contamination that occurs when people bring insects hidden in wood to new areas.

**BUILDING BATS**

**Step 1:** The bat should use high-grade hard wood.
**Step 2:** Workers place a billet into a computer-controlled machine. Then the billet is placed on a scale to weigh it. The raw bat is then sanded to make sure the surface is smooth.
**Step 3:** Billets are graded, judged, and weighed to select the highest-quality wood to make bats. Bats are tested for the slope of the grain to make sure the bat meets MLB requirements.
**Step 4:** To make a raw bat harder, workers compress the bat with heat and friction, sand the bat several times, and coat it with sealer, color, and top coat.
**Step 5:** Louisville Slugger bats are made of the highest-quality wood, have the most consistent feel, and are the hardest bats.

**CHECK FOR UNDERSTANDING**

**CREATURE CLOSE-UPS**

1. Rather than taking pictures of the animals in their natural environment, Flach takes intimate portraits that capture the animals’ personalities.
2. Scientists have found that people have a stronger reaction to animals when their characteristics seem more humanlike.
3. When people build cities or cut down forests for farmland, animals lose habitat. That could cause species to die out, decreasing the variety of animals on Earth.
4. Answers may include that average global temperatures are rising. That could cause animals to die because they can’t adapt fast enough. Or rising temperatures are causing sea ice to melt, which makes it difficult for the animals to return.

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for polar bears to find food.
5. Answers may include that the project shows how even students can work on relatively small and simple solutions to make a difference in protecting endangered species.

CAN WE COOL THE PLANET?
1. e 2. c 3. h 4. j 5. b 6. f 7. g 8. i 9. d 10. a

CORAL KILLER

BALL GAME OVER?
1. ash borers
2. galleries
3. phloem
4. invasive species
5. woodpeckers
6. larvae
7. metamorphosis
8. insecticides
9. quarantine
10. Maple

CROSSWORD
ACROSS
3. endemic
6. nostril
8. geoengineering
9. stratosphere
12. entomologist

DOWN
1. zooxanthellae
2. viability
4. chytrid
5. biodiversity
7. endangered
10. ash
11. polyp

NEWS QUIZ