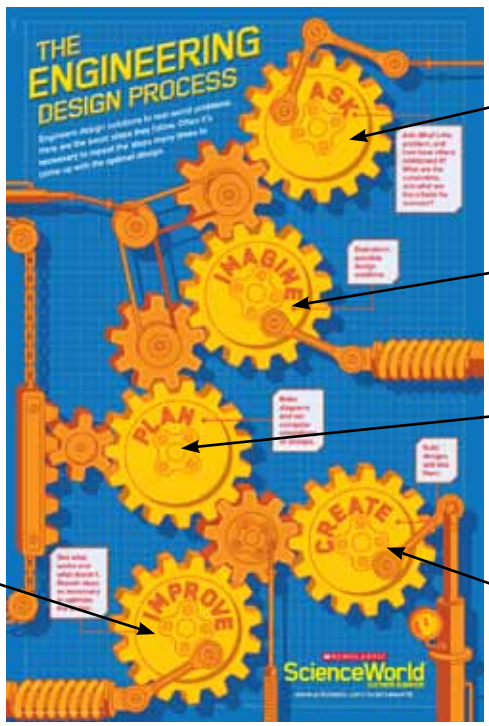
Name: _____

PROBLEM SOLVERS

In "Battling Bedbugs" (p. 8), you learned about three teens who designed a new type of bedbug trap. Below is one model of the engineering design process scientists use to invent something new to solve problems. Answer the questions below to analyze how the teens used this process to design their invention.



Ask: What's the problem, and how have others addressed it? What are the constraints, and what are the criteria for success?

Imagine: Brainstorm possible design solutions.

Plan: Make diagrams and run computer simulations of designs.

Create: Build designs and test them.

Improve: See what works and what doesn't. Repeat steps as necessary to optimize the design.

QUESTIONS

1. What problem did the teens want to solve?

2. What two constraints did the teens place on the materials they used?

3. What variable did the teens test in their prototype mesh designs?

4. Describe the experiment the teens used to test the mesh traps.

5. What criteria did the teens use to determine which design worked best? How did they optimize their design?

Name: _____

SELF-DESTRUCT

In "Battling Bedbugs" (p. 8), you read about teens who developed a new way to get rid of bedbugs. Read the following passage to learn how scientists are trying to harness chemicals from the insects' own bodies to lure them into deadly traps. Then answer the questions that follow.

SCARED TO DEATH

Many chemicals used to kill bedbugs are also toxic for humans. Now scientists are using safer substances from the insects' own bodies against them.

Insects release *pheromones* to communicate with one another. When disturbed, they emit one of the chemical scents that alerts others to danger. That causes nearby bedbugs to scurry around. Scientists at Ohio State University are using this alarm chemical to lure the insects into deadly *dessicant* dust traps.

Unlike DDT, a poisonous chemical once used on bedbugs, dessicant dust is a relatively non-toxic pesticide. It kills by scratching insects' protective outer layers, causing their bodies to dry out.

The insects need to run through the dust for it to work. But bedbugs tend to hide out in hard-to-reach cracks for long periods. To draw the insects into the open, the researchers sprayed a synthetic copy of the alarm pheromone into an area containing the insects. The result: The insects began scurrying around and were more likely to walk through the deadly dust.

QUESTIONS

1. What is a pheromone?

Ⓐ a type of pesticide used to kill bedbugs
Ⓑ a chemical scent used by organism to communicate
Ⓒ a human-made copy of a natural substance
Ⓓ a toxic substance

2. What is an advantage of using dessicant dust as a pesticide?

Ⓐ It is less toxic than other pesticides.
Ⓑ It is found in the natural environment.
Ⓒ It can easily enter hard-to-reach areas.
Ⓓ It kills insects in a wide area.

3. What is one limitation of dessicants' effectiveness?

Ⓐ They are not as effective as DDT.
Ⓑ Bedbugs have outer layers that protect them from dessicants.
Ⓒ Bedbugs don't often come out in the open where the pesticides are placed.
Ⓓ The insects are scared of dessicants and avoid them.

4. Which of the following statements BEST represents the central idea of the passage?

Ⓐ It is difficult to get rid of bedbugs.
Ⓑ Bedbugs' natural defenses may help kill them.
Ⓒ Toxic pesticides should be avoided.
Ⓓ It is important to study bedbug behavior.

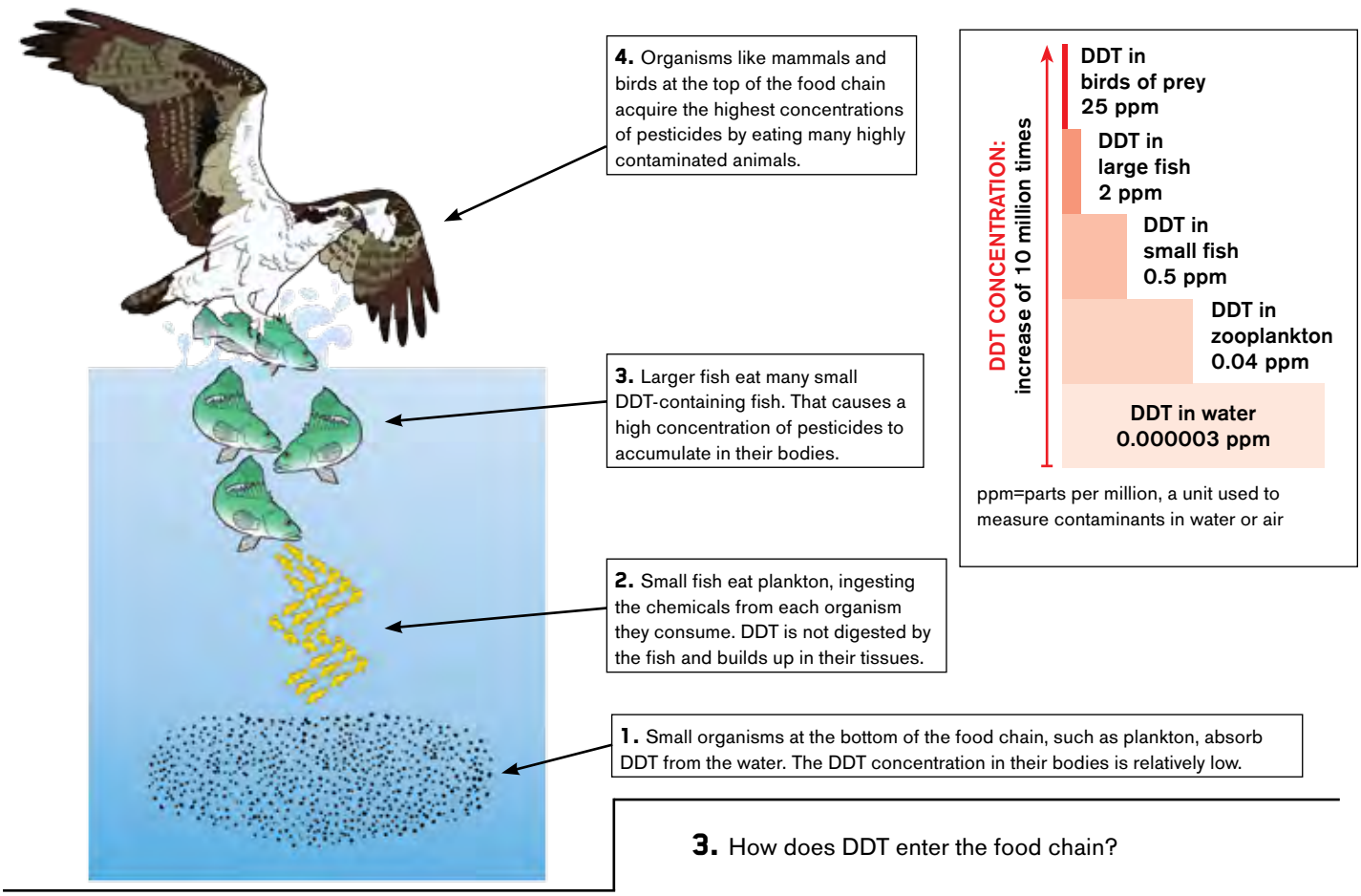
5. Insects have many different types of pheromones, including ones that attract mates. How might this pheromone be used in pest control?

Name: _____

TOXIC BUILDUP

In "Battling Bedbugs" (p. 8), you learned about a group of teens who developed a chemical-free bedbug solution. The insect-killing pesticide DDT was once used to kill bedbugs, but the toxic chemical was discovered to harm the environment. Animals exposed to the chemical can experience reproductive difficulties or die.

The pesticide also builds up in animals' tissues. The diagram below shows how this process of *biomagnification* causes dangerously high levels of DDT in animals at the top of a food chain. Study the diagram and then answer the questions that follow.



QUESTIONS

1. What is the DDT concentration in the water?

2. By how much does the DDT concentration increase from the water to the top of the food chain?

3. How does DDT enter the food chain?

4. How do small fish absorb DDT?

5. Which animals have the highest concentration of DDT? Explain why.

Name: _____

FORMING FIBERS

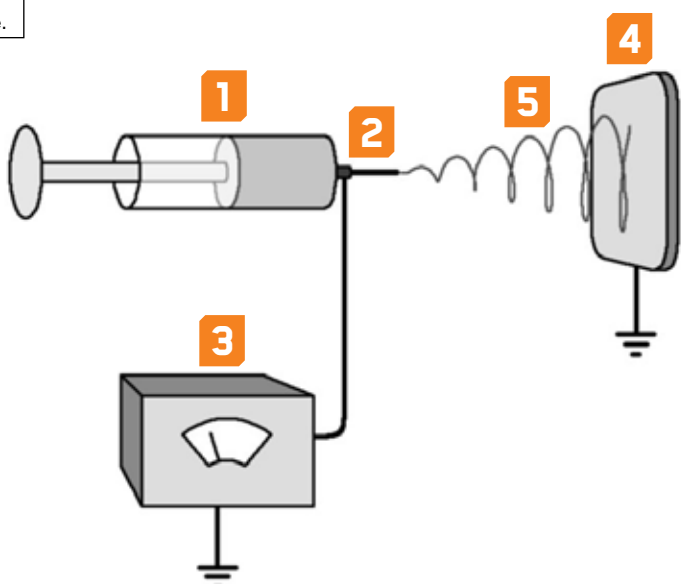
In "Battling Bedbugs" (p. 8), you learned that three teens used an electrospinning apparatus to create a bedbug trap. The diagram below shows how these devices spin polymer fibers. Study the diagram, and then answer the questions that follow.

[1] Syringe: A solution containing dissolved polymer molecules is held in a syringe.

[2] Needle: At the end of the syringe is a hollow needle through which the solution is pumped.

[3] Power Supply: A high-voltage power supply is connected to the needle. That causes the solution inside to become electrically charged.

How the Electrospinning Apparatus Works



[4] Collector: A metal target placed several feet from the syringe's needle acts as a collection plate. When the power supply is turned on, the metal plate has the opposite electric charge from the needle. That creates an electric field between the plate and the needle.

[5] Charged Stream: When the power is turned on, a thin stream of charged solution spews out of the needle toward the oppositely charged collection plate. Threadlike fibers of polymer solidify on the collector. The characteristics of the fibers depend on the size and length of the needle, the solution, the distance between the needle and the plate, and the voltage used.

SOURCE: NEOTHERIX LTD/WWW.NEOTHERIX.COM

QUESTIONS

1. What is contained in the syringe?

2. What does it mean when a material is electrically charged?

3. How does the polymer solution obtain an electric charge?

4. List two factors that control the characteristics of the spun fibers.

5. Suppose the perfect fibers for making a bedbug trap have a relatively large diameter. Would you choose an electrospinning device that has a needle with a narrow or a wide opening?

Name: _____

PRINTER REVIEW

In "More Than a Toy" (p. 12), you learned how Shubham Banerjee built a Braille printer using a LEGO® set. How does his Braigo printer compare with a commercial Braille printer? Use the graphic organizer below to summarize how the printers are similar and how they are different.

Category	Braigo Printer	Commercial Braille Printer
Purpose		
Cost		
Printing Speed/ Ability		
Paper Quality		
Dot Size		
Availability		

ANALYZE IT

1. Why might a Braigo printer be a better choice than a commercial printer for certain people?

2. What do you think is the biggest limitation of the Braigo printer?

Name: _____

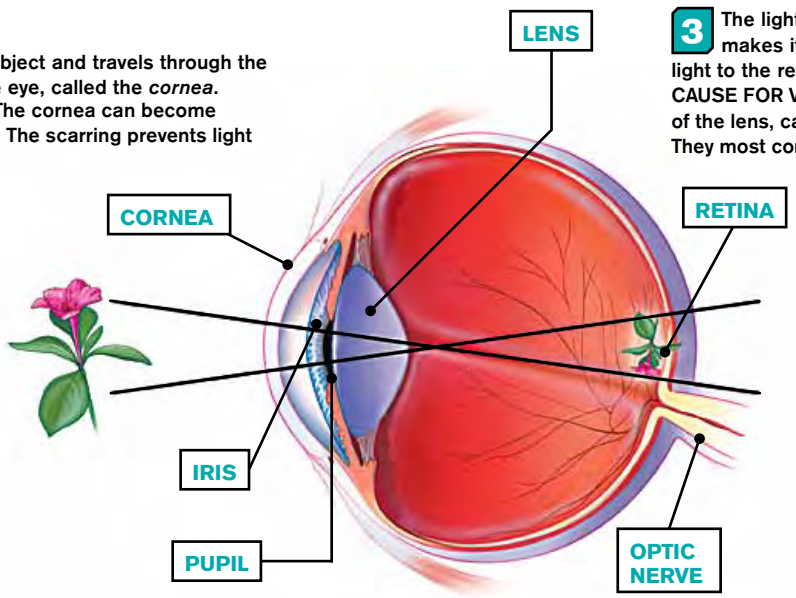
VISION LOSS

In "More Than a Toy" (p. 12), you read about a teen who designed a device that prints Braille letters to help blind people read. What causes blindness? The diagram below shows how the eye works and how certain injuries or diseases can cause vision to become impaired. Study the diagram, and then answer the questions that follow.

HOW DOES THE HUMAN EYE SEE?

1 Light bounces off an object and travels through the clear outer layer of the eye, called the *cornea*.
CAUSE FOR VISION LOSS: The cornea can become scarred by injury or disease. The scarring prevents light from entering the eye.

2 The light travels through the *pupil*—a hole in the eye. The *iris* causes the pupil to widen or shrink, adjusting the amount of light that enters the eye.
CAUSE FOR VISION LOSS: Defects in the pupil or iris can cause vision problems and sensitivity to light.



3 The light that passes through the pupil makes its way to the *lens*, which focuses light to the retina.
CAUSE FOR VISION LOSS: Cataracts, a clouding of the lens, can cause vision to become blurry. They most commonly form as people grow older.

4 The *retina*—a layer of tissue with light-sensitive cells—lines the back of the eye. There the focused light forms an upside-down image.
CAUSE FOR VISION LOSS: Some conditions cause progressive damage to the retina's light-sensitive cells. They can't process the light information—resulting in blindness.

5 Information from the retina travels as an electrical signal through the *optic nerve* to the brain, where the image is processed and interpreted as right-side-up.
CAUSE FOR VISION LOSS: The leading cause of blindness in the U.S. is glaucoma. This disease causes the optic nerve to become damaged, preventing signals from traveling to the brain. Glaucoma is usually caused by the buildup of fluid pressure inside the eye.

QUESTIONS

1. What is the outer layer of the eye called?

2. On which part of the eye is a focused image produced?

3. What is the purpose of the iris?

4. Which part of the eye is affected by cataracts?

5. Explain how glaucoma causes blindness.

Name: _____

BUILDING BLOCKS

In "More Than a Toy" (p. 12), you learned about a teen who used a LEGO® kit to build a Braille printer. Read the following passage to learn how LEGO bricks are made. Then use complete sentences to answer the questions that follow.

PRODUCING PERFECTION

Every year, the LEGO company produces tens of billions of the signature plastic building blocks. Out of every million parts created, only about 18 blocks are misshapen and therefore discarded. How do the factories make such precise pieces?

LEGO bricks are made from colored granules of *ABS*, a plastic made of three different *polymers*, or molecules made of long chains of repeating units. ABS has a high impact resistance, so it doesn't break easily.

Machines first heat ABS granules to temperatures of roughly 232°C (450°F). The molten material is then pumped into hollow molds in the shape of LEGO elements. The molds are squeezed together at high pressures to remove air and ensure that tiny details are precisely shaped. That way each piece can snap together perfectly. The molding process is so accurate that size differences of only 0.002 millimeters (0.00008 inches) occur between identical pieces.

After the pieces are cooled and ejected onto a conveyor belt, printers stamp on faces or other features. Machines then snap together multipieced elements. Finally, sorting machines and workers separate the pieces into sets and place them in boxes.

QUESTIONS

1. About how many LEGO pieces have to be discarded out of every million that are produced?

2. Describe the material used to make LEGO pieces.

3. What is one reason mentioned in the text why LEGO pieces are made from this material?

4. Explain how machines ensure that tiny details are correctly formed in the molded plastic.

5. LEGO pieces have a high standard of quality. What is one piece of evidence from the text that supports this statement?

Name: _____

ASTRONAUT TOY

In "More Than a Toy" (p. 12), you found out how a teen used a LEGO® kit to make a device to aid blind people. Read the following passage to learn about two teenagers who used the toys to get a close-up view of space. Then answer the questions that follow.

LEGOs IN SPACE

Two teenagers from Toronto, Canada, made a real-life LEGO astronaut by sending a LEGO figurine about 24 kilometers (15 miles) into space.

Mathew Ho and Asad Muhammad built a Styrofoam capsule with four cameras and a LEGO figurine attached. They connected the device to a 7-meter (23-foot)-wide helium balloon. The design was based on the weather balloons scientists use to study the conditions that control weather in Earth's protective atmosphere.

Mathew and Asad's balloon reached more than double the attitude at which commercial aircrafts typically fly and well into the *stratosphere*—a roughly 37-km (23-mi)-thick layer of the atmosphere. The stratosphere sits above the atmosphere's lowermost *troposphere*, where most of Earth's weather takes place. The device's cameras captured the LEGO figurine amid the deep black of the stratosphere and recorded Earth's curving surface.

When the balloon popped, a parachute carried the capsule slowly back to Earth's surface. An attached GPS device allowed the teenagers to retrieve it. The LEGO-naut landed 122 km (76 mi) from the launch site.

QUESTIONS

1. How did the LEGO figurine travel into space?

Ⓐ Scientists released it from the International Space Station.
Ⓑ A commercial airplane carried it into the atmosphere.
Ⓒ A helium balloon carried it into the stratosphere.
Ⓓ A rocket carried it into space.

2. Where in Earth's atmosphere does most weather occur?

Ⓐ the troposphere
Ⓑ the stratosphere
Ⓒ between the troposphere and the stratosphere
Ⓓ above 26 km in attitude

3. At about what altitude do commercial aircrafts fly?

Ⓐ 37 km
Ⓑ 24 km
Ⓒ 12 km
Ⓓ lower than 12 km

4. Which of the following statements is FALSE?

Ⓐ A parachute brought the LEGO figurine back to earth.
Ⓑ Earth's curvature is visible from the stratosphere.
Ⓒ Helium balloons pop when they reach the altitude at which commercial airplanes fly.
Ⓓ The stratosphere appears black.

5. Which of the following opinions is BEST supported by the passage?

Ⓐ LEGOs are fun toys.
Ⓑ People can take amazing photos of Earth from space.
Ⓒ It's easy to send an object into the stratosphere.
Ⓓ It is difficult to study the atmosphere.

Name: _____

LOCATE THE EVIDENCE

In "Super Sandbags" (p. 16), you learned about a teen who designed a new type of reusable barrier of sandless bags that can protect against saltwater flooding during a hurricane. Use this skills sheet to analyze the article, using text evidence.

QUESTIONS

1. Which piece of evidence from the text BEST demonstrates why saltwater flooding can be particularly damaging?

Ⓐ "A record-high storm surge engulfed low-lying parts of New York City."
Ⓑ "The storm killed more than 70 people in the U.S. alone, forced tens of thousands to evacuate, and caused billions of dollars' worth of damage."
Ⓒ "If people don't clean away the salt quickly, it can corrode buildings, sidewalks, and electrical systems long after the floodwaters have receded."
Ⓓ "In my home state of Florida, we are all keenly aware of how devastating saltwater floods can be."

2. In the article, Peyton advises students attempting to come up with winning inventions to try to solve problems that are close to home. Did he follow his own advice? Use evidence from the text to support your answer.

3. Sandbags have pros and cons as a hurricane defense. Which piece of evidence from the text BEST supports this idea?

Ⓐ "Moving bulky sandbags into place is hard, slow work that carries the risk of injury."
Ⓑ "[Sandbags are] inexpensive, and they're easy to make—but they are heavy."
Ⓒ ". . . preventative measures [like seawalls] are the best way to reduce flood damage."
Ⓓ "Peyton's idea was to replace heavy sandbags with lightweight, reusable bags that contained something other than sand."

4. Use your own words to explain how Peyton designed his bags to protect specifically against saltwater floods. Cite evidence from the text.

5. Which piece of text evidence BEST explains an advantage of Peyton's sandbags over traditional ones?

Ⓐ "He tested each design against traditional sandbags."
Ⓑ "He found that his prototype can resist the same amount of force as the control when stacked in a straight line. . . "
Ⓒ "Peyton wanted to design a bag specifically to fight saltwater flooding."
Ⓓ "Unlike conventional sandbags, Peyton's bags mold against each other as they expand, so there are no gaps between them."

Name: _____

BEACH PROTECTION

In "Super Sandbags" (p. 16), you read about a teen who designed a new type of barrier against hurricane flooding. Read the following passage to learn about Earth's natural defense against a hurricane's damaging forces: sand dunes. Dunes protect coastlines and also provide critical habitat for many organisms. After reading the passage, use complete sentences to answer the questions that follow.

DUNE DEFENSE

After Hurricane Sandy slammed into the eastern part of the U.S. in 2012, officials surveyed the coastline to assess the damage. One finding: Areas with large sand dunes on the beaches suffered less damage than those without dunes.

Dunes form when waves and wind move sand around, causing piles to accumulate on the inland side of a beach. Over time, seeds of plants that are adapted to live in sand blow in and take root. This vegetation grows on the dunes and is the key to maintaining them. The grasses and shrubs have characteristics such as tough, waxy leaves that help them survive high winds, salty sprays, and blowing sand. They often have deep or wide roots to collect water. These structures help keep sand from blowing away.

Sand dunes are also part of an important coastal ecosystem. The inland side of sand dunes provides habitat that is protected from the wind for many organisms, including insects, reptiles, and small mammals. Many endangered animals also depend on dunes to survive. For example, sea turtles lay their eggs in the dunes.

QUESTIONS

1. Identify one piece of text evidence that supports the following statement: Sand dunes are nature's own storm defense.

2. Explain why vegetation is important for sand dunes.

3. What is one adaptation described in the text that helps plants survive on sand dunes?

4. What do you think would happen to the sea turtle population if the number of sand dunes decreased? Explain.

5. Communities often bulldoze sand into piles to create artificial dunes. These hills don't have the same characteristics as natural dunes and may not be as stable. Do you think it is a good idea for communities to build artificial sand dunes? Why or why not?

Name: _____

DIAPER DUTY

In "Super Sandbags" (p. 16), you learned how polymers in sandless sandbags soak up water to create flood barriers during a hurricane. A water-absorbing polymer called sodium polyacrylate is the secret ingredient that allows disposable diapers to soak up liquids and keep babies dry. Try this activity to learn how the polymer soaks up water and how salt affects its absorbing ability.

PREDICT

How much water can one diaper hold? How does salt affect its ability to soak up liquids?

MATERIALS

3 disposable diapers • 1 large shallow baking tray • 1 empty 2-liter soda bottle filled with tap water • marker • clock or stopwatch • safety goggles* • scissors • 2 large plastic bags • 2 medium-size plastic bowls • graduated 1-cup measuring cup • measuring spoons • table salt

*The material inside diapers is not toxic, but it may cause irritation to the eyes. Students should wear goggles and wash their hands after handling it.

PROCEDURE

PART 1

1. Lay one diaper flat in the baking tray with its inner side facing up.

2. Predict how much water the diaper will absorb. Estimate how much water will remain in the bottle when the diaper is full. Mark that level on the bottle.

3. Carefully pour roughly $\frac{1}{2}$ cup of water onto the center of the diaper. Pour slowly and close to the diaper so that it doesn't immediately run off into the tray.

4. Add another $\frac{1}{2}$ cup of water every minute. Stop adding water when there is still unabsorbed water on the diaper at the end of the minute. Observe how much water remains in the bottle.

PART 2

1. Put on safety goggles.

2. Use scissors to cut the sides off another diaper. Cut inside the elastic bands.

3. Place the cut diaper in a large plastic bag. Reach into the bag and pull open the diaper to expose the inner layer.

4. Zip the plastic bag closed and shake it for 30 seconds. You should notice white grains gathering in the bottom of the bag. This is the sodium polyacrylate polymer.

5. Open the bag carefully and remove the cotton and outer layer from the diaper. Carefully pour the polymer grains into a plastic bowl. Label the bowl "Plain."

6. Repeat steps 2 through 5 with a second diaper, but this time label the bowl "Salt."

7. Wash your hands with soap and water.

8. Fill the measuring cup with 1 cup of water. Add this to the "Plain" bowl. Refill the measuring cup with 1 cup of water and stir in 1 teaspoon of table salt until dissolved. Pour saltwater into the "Salt" bowl.

9. Let the bowls sit for 5 minutes. Observe the mixtures in the bowls. What happened to the polymer?

CONCLUSIONS

1. How did the amount of water absorbed by the diaper compare with your prediction?

2. Describe the difference between the sodium polyacrylate mixed with plain water and that mixed with salt water.

3. How did the addition of salt affect the sodium polyacrylate's absorption ability?

Name: _____

WIND-PROOF DESIGN

In "Super Sandbags" (p. 16), you learned how a teen designed bags that can be used as a flood barrier during a hurricane. Surging water is just one threat from these storms. When designing buildings in hurricane-prone areas, engineers and architects try to create structures that can withstand the storms' powerful winds. Try this activity to find out if you can build a wind-proof home.

PREDICT

How does a building's design affect how well it can withstand a hurricane's winds?

MATERIALS

pencil • graph paper • ruler • 2 sheets of letter-size paper • 2 straws • scissors • clear tape • glue stick • large plastic tray • goggles • multispeed hair dryer • stopwatch

PROCEDURE

1. Find a partner. In the following steps, each two-person team will design a model house made from the following: 2 sheets of paper, 2 straws, 40 centimeters (16 inches) of clear tape, and a glue stick. You will be required to use all the paper.
2. Draw a diagram of your house design on graph paper. The house must have 4 walls, a roof, a door, 2 windows, and a base no smaller than 10 x 13 cm (4 x 5 in.). Include the house's measurements, such as the dimensions of each wall or window, in your design.
3. Follow your diagram to build your house. When you've finished, secure the base of your house to the tray using 9 pieces of tape, each measuring 5 cm (2 in.).
4. Once your house is built, have your group pair up with another team.
5. Label one team's house "1" and the other "2." Study both houses and make a list of their similarities and their differences.
6. Have each student in the combined team put on his or her safety goggles and take on one of the following roles: A, B, C, or D.
7. Student A should hold the tray containing House 1. Student B should stand to one side of Student A and hold the hair dryer with the tip placed 30 cm (1 foot) from the side of House 1. (Keep the hair dryer off for now.) Students C and D should stand on the opposite side of the house facing Student A. (Note: No student should be in the hair dryer's blowing path.)
8. Student C will be the timer. When Student C starts the stopwatch and says, "Go," Student A should rotate the tray parallel to the ground at a steady rate, and Student B should put the hair dryer on low speed. All four students should observe the house during the "hurricane." Student D should record as many details as possible. Stop after 30 seconds.
9. Repeat Step 8 with the hair dryer at high speed.
10. Repeat Steps 7 and 8 with House 2.

CONCLUSIONS

1. Which house suffered the most damage, 1 or 2?

2. What structures do you think helped the stronger house survive the winds?

3. What changes might you make to your designs to improve the ability of the houses to withstand a hurricane?

Name: _____

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 below.**

1. A garden at the San Francisco Giants' ballpark consists of different _____, with varying amounts of shade and sunlight.
Ⓐ oxygen
Ⓑ soil
Ⓒ microclimates
Ⓓ water

2. This chemical carries genetic information.
Ⓐ carbon dioxide
Ⓑ DDT
Ⓒ fat
Ⓓ DNA

3. Tumbleweed was brought to the United States on ships from _____.
Ⓐ Russia
Ⓑ Hawaii
Ⓒ Australia
Ⓓ Panama

4. The recent Ebola outbreak is believed to have started in this country.
Ⓐ Liberia
Ⓑ Senegal
Ⓒ Sierra Leone
Ⓓ Guinea

5. Elephants have about _____ genes dedicated to the sense of smell.
Ⓐ 200
Ⓑ 2,000
Ⓒ 2 million
Ⓓ 2 billion

6. _____ light cannot be seen by the human eye but can be detected by cameras.
Ⓐ X-ray
Ⓑ red
Ⓒ infrared
Ⓓ blue

7. What was the estimated amount of money pledged to Kickstarter in 2013?
Ⓐ $48,000
Ⓑ $150,000
Ⓒ $1,315,000
Ⓓ $480 million

8. Waves in the electromagnetic spectrum are arranged in order of _____.
Ⓐ frequency
Ⓑ wavelength
Ⓒ color
Ⓓ pitch

9. Of the following animals, which has the greatest number of olfactory receptors?
Ⓐ human
Ⓑ guinea pig
Ⓒ cow
Ⓓ orangutan

10. The eye's _____ detects only certain wavelengths of light.
Ⓐ lens
Ⓑ retina
Ⓒ optic nerve
Ⓓ eyelid

reset answers

Name: _____

BATTLING BEDBUGS Page 8

DIRECTIONS: Fill in the blanks in the following sentences. Use the words in the word bank below.

50	electrospinning apparatus	polylactic acid
allergic reactions	materials science	polymer
blood	microscope	polystyrene
coffee	pesticides	spandex; paint

1. Bedbugs feed on _____.

2. Some people have severe _____ _____ to bedbug bites.

3. In the past several years, bedbugs have been found in _____ states in the U.S.

4. Bedbugs have developed resistance to many _____.

5. The three teens were inspired to create a bedbug trap while attending a _____ _____ program at Stony Brook University in New York.

6. An _____ _____ creates very thin fibers that can be used for many applications.

7. A _____ is a molecule made of long chains of repeating structures.

8. The teens dissolved a clear-plastic cup to obtain the material _____ _____.

9. Bedbugs got tangled in the mesh made of _____.

10. The polymer polyacrylamide is found in _____ and _____.

MORE THAN A TOY Page 12

DIRECTIONS: Correct the following sentences by crossing out or adding words or numbers as necessary.

1. A modern commercial Braille printer can cost less than $2,000.

2. In the English Braille code, each cell represents one word.

3. Shubham's Braigo printer uses six motors to create the dots and move the paper.

4. Shubham used an open-source code for his printer to prevent other people from changing the computer programming.

5. One advantage of the Braigo is that it prints a single letter at a time.

Name: _____

SUPER SANDBAGS Page 16

DIRECTIONS: Answer the following questions in complete sentences.

1. According to Kristin Mazur, what is the best way to reduce flood damage from a hurricane? _____

_____

_____

2. Why are sandbags sometimes used to protect people and property from hurricanes? _____

_____

_____

3. What is one disadvantage of sandbags? _____

_____

_____

4. What characteristic of the polymers in sandless sandbags makes them advantageous as a flood barrier? _____

_____

_____

5. Why did Peyton add salt to the polymers in his bags? _____

_____

_____

6. How does adding salt affect the behavior of the polymers? _____

_____

_____

7. According to Peyton, how did he benefit from failed tests in his experiment? _____

_____

_____

8. According to Peyton's results, what stack shape would provide the strongest defense against flooding? _____

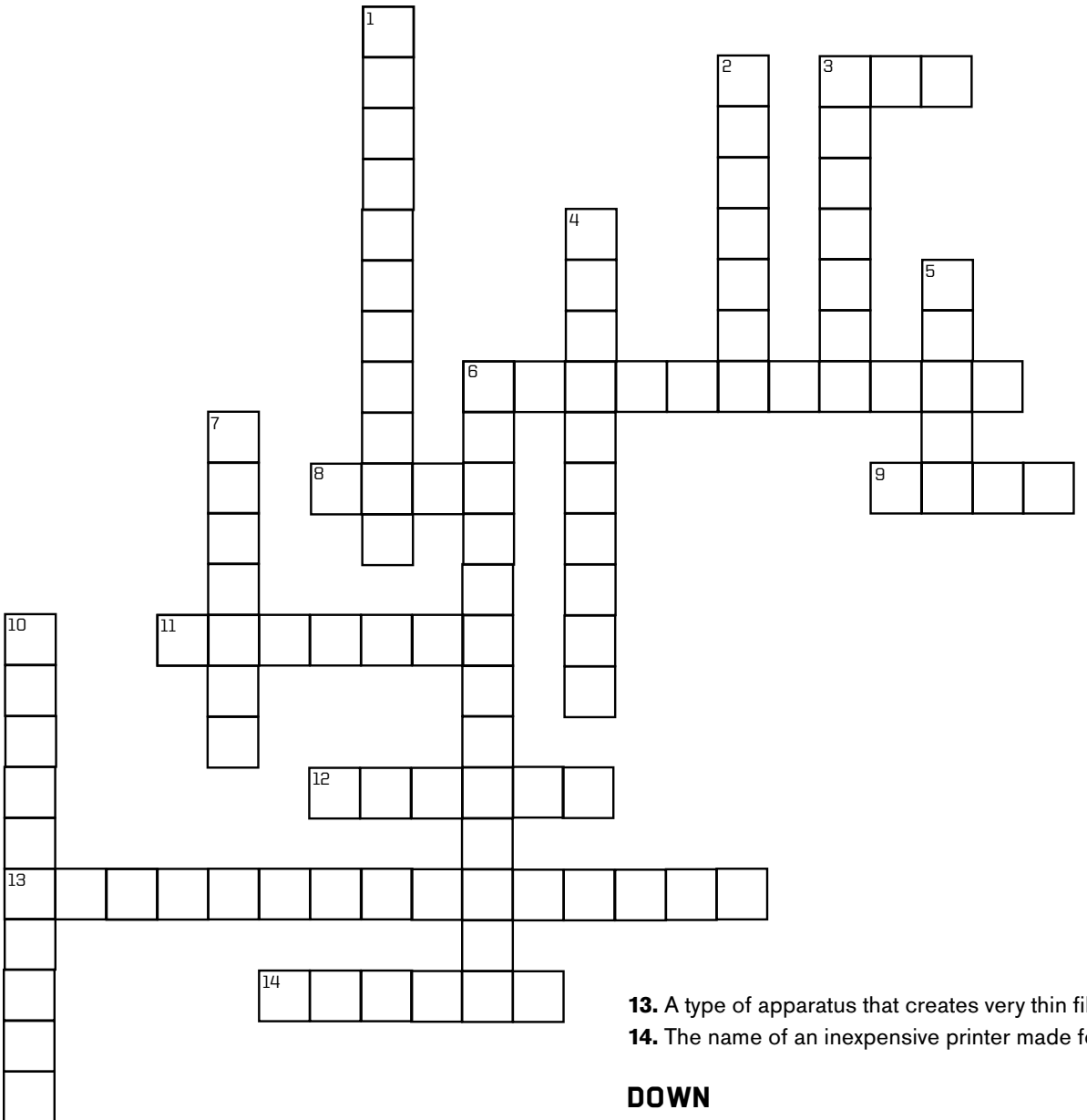
_____

_____

_____

Name: _____

DIRECTIONS: Use the clues below to fill in the crossword puzzle. All answers can be found in this issue.



ACROSS

3. This pesticide was thought to have eliminated bedbugs in the 1950s.

6. Pythons are this type of snake.

8. A teen used this brand of toy bricks to make a printer for blind people.

9. Seawater causes damage to materials because it has this in the water.

11. The name of an organ that allows snakes to breathe while swallowing food

12. The name of a company that produces inventions based on ideas from the public

13. A type of apparatus that creates very thin fibers

14. The name of an inexpensive printer made for blind people

DOWN

1. A type of light that can damage a developing chick embryo's DNA

2. A molecule made up of long chains of repeating structures

3. The name of the first cellular phone

4. A type of computer programming that anyone with know-how can change and customize

5. An outbreak of this virus has affected several countries in West Africa

6. Gathering ideas or funding from an online community

7. A system of raised dots that represent letters, numbers, and punctuation

10. An invasive plant that is expanding its range in the western United States