

current SCIENCE®

TEACHER'S GUIDE



| Issue Dates | Sept. 2 | Sept. 23 | Oct. 14 | Oct. 28 | Nov. 11 | Nov. 25 | Dec. 9 | Jan. 13 | Feb. 3 | Feb. 24 | Mar. 9 | Mar. 30 | Apr. 13 | Apr. 27 |
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► LIFE SCIENCE

Mighty Bites

Pages 4–5 940L

Critical Thinking

■ The ability to produce venom is much more common among reptiles than it is among mammals or birds. Why might that be?

■ What else of value might Bryan Grieg Fry be learning as he studies various venomous creatures?

National Science Education Standards

■ *Diversity and adaptation of organisms:* defensive behaviors and reproductive success

► EARTH SCIENCE

Out of Sight

Pages 6–7 990L

Critical Thinking

■ Give another example of sublimation. (*When heated, dry ice [solid carbon dioxide] turns directly into a smoky-looking gas. When cooled, carbon dioxide turns directly into a solid.*)

National Science Education Standards

■ *Earth in the solar system:* the formation of the solar system; comets, planets, the Kuiper belt, the Oort cloud

► HEALTH SCIENCE

Test Results

Pages 8–9 960L

Critical Thinking

■ Why did the number of cases of tuberculosis (TB) in the United States rise during the 1980s and 1990s? (*The number of AIDS cases exploded then. AIDS weakens the immune system, making the body more vulnerable to infections such as TB.*)

National Science Education Standards

■ *Science and technology as local, national, and global challenges:* benefits of new technology

► PHYSICAL SCIENCE

Game Changer

Pages 10–11 1190L

Critical Thinking

■ Which kinds of baseball bats—wooden, metal, or composite—are used at your school? Which kinds of baseball bats are used by the amateur and professional baseball teams in your community?

■ Give some examples of kinetic energy turning into potential energy and vice versa.

National Science Education Standards

■ *Motion and forces:* kinetic, potential energy

Comments? Complaints? Compliments? E-mail *Current Science* at science@weeklyreader.com.

NOVA *Great activities from the hit science show on PBS!*

Venom's Healing Bite ("Mighty Bites," p. 4)

www.pbs.org/wgbh/nova/body/venoms-healing-bite.html

Toxic compounds in animal venom could yield new drugs for heart disease, cancer, and chronic pain.

Tour the Solar System ("Out of Sight," p. 6)

www.pbs.org/wgbh/nova/space/tour-solar-system.html

Explore the planets, visit the moon, and gaze at the stars in this 3-D interactive model of the solar system.

How to Get an Atmosphere ("Satellite Maps Earth's Gravity," p. 13)

www.pbs.org/wgbh/nova/space/how-to-get-an-atmosphere.html

Only four planets or moons with solid bodies have substantial atmospheres. Why?

mystery photos

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MIGHTY BITES (Page 4)

Short Answer

1. For what purposes do animals use venom? _____

2. What is antivenom? _____

3. What feature in the fossilized bones of the dinosaur *Sinornithosaurus* indicates that the animal was venomous?

4. What is happening when one king cobra taps another on the head? What would you expect to see after that tap?

5. How do many venoms disable the victims of a bite? _____

6. Why, according to Bryan Grieg Fry, should venomous animals be protected? _____

OUT OF SIGHT (Page 6)

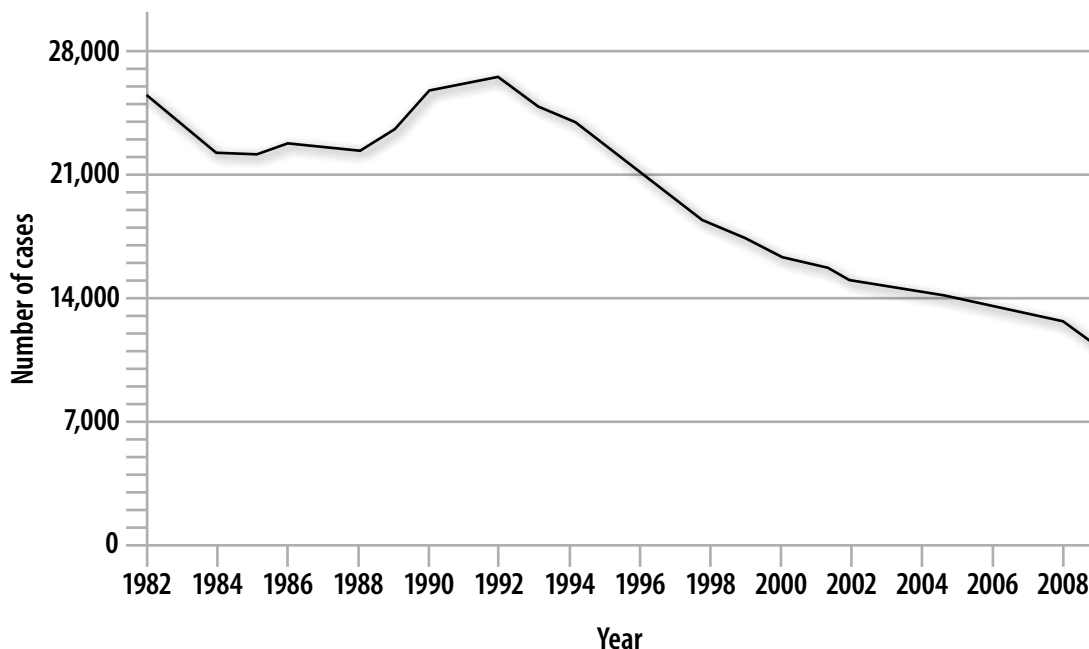
Vocabulary Challenge Match each numbered word or phrase with its correct description. Write the letter of the description in the space provided.

- | | |
|----------------------|--|
| _____ 1. Kuiper belt | A. a cloud of gas that encircles a comet |
| _____ 2. Halley's | B. a cloud of dust and gas in space |
| _____ 3. sublimate | C. a bright stream of gas that is blown off a comet |
| _____ 4. nebula | D. Wide-field Infrared Survey Explorer |
| _____ 5. light-year | E. the name of a short-period comet |
| _____ 6. Oort cloud | F. to change directly from a solid to a gas |
| _____ 7. tail | G. millions of cold chunks of rock and ice that orbit the sun beyond Neptune |
| _____ 8. WISE | H. the distance that light travels in a year |
| _____ 9. coma | I. a sphere of billions of chunks of rock and ice that surrounds the solar system |
| _____ 10. Tyche | J. a hypothetical planet |

TEST RESULTS (Page 8)

Graph Interpretation The graph on this page shows the number of cases of tuberculosis (TB) in the United States between 1982 and 2009. Examine the graph, and then answer the questions.

Reported Tuberculosis Cases in the United States, 1982–2009



1. In which year was the number of cases of TB highest? _____
2. In which year was the number of cases of TB lowest? _____
3. About how many cases of TB were there in 2005? _____
4. About how many cases of TB were there in 1996? _____
5. By about what percentage did the number of cases of TB drop between 1992 and 2009? _____
6. Roughly how many fewer cases of TB were there in 2009 than in 1982? _____

GAME CHANGER (Page 10)

True or False Read each statement, and decide whether it is true (T) or false (F). Write your response in the space provided.

- _____ 1. Kinetic energy is the energy of motion.
- _____ 2. Most metal bats are made of iron.
- _____ 3. Moment of inertia is a measure of how difficult it is to lift something.
- _____ 4. Potential energy is stored energy.
- _____ 5. A composite bat has a thin layer of graphite lining the metal wall of the barrel.
- _____ 6. Baseball teams that switch from metal bats to wooden ones should expect to hit more home runs.
- _____ 7. Balls tend to bounce off metal and composite bats as if off a trampoline.
- _____ 8. When a baseball hits a bat, kinetic energy is briefly transformed into potential energy.
- _____ 9. Baseballs hit by metal bats tend to travel faster and farther than balls hit by wooden bats.
- _____ 10. The ball-bat coefficient of restitution measures the speed of a baseball before and after it hits a bat.

DISCOVERIES (Page 12)

Fill in the Blank Find the word or words that best complete each statement. Write the words in the blanks.

1. _____ is a force of attraction between bodies of matter.
2. A molecule of methane contains _____ atoms of hydrogen.
3. _____ is the process in which a plant uses light to make food from carbon dioxide and water.
4. A layer of rock that holds water is called a(n) _____.
5. _____ is a field in which researchers study the origin, evolution, and future of life in the universe.
6. A cow has a _____, a chamber in its body where bacteria break down chewed-up grass.
7. A(n) _____ is a blast of high-energy radiation from a star.
8. The dimples on a golf ball reduce _____, the backward force that acts on the ball when it's in flight.
9. A group of little people in the mountains of Ecuador has a condition called _____.
10. Plants contain a green pigment called _____.

How Sweet It Is

By Pearl Tesler

The article “Game Changer” explains that the design of a baseball bat has a big impact—literally—on how well a bat transfers energy to a baseball. In this activity, you can locate an important spot on any baseball bat, the *sweet spot*, and find out what makes it so sweet for hitters.



Chuck Savage/Corbis

What You Need

- a baseball or a softball bat
- a small hammer or mallet

What to Do

Hold the bat upside down between your thumb and index finger, just below the knob on the bat’s handle. Hold it loosely enough so that the bat can swing freely.

Have a volunteer tap on the bat gently with the hammer or mallet, starting at the *barrel* (the fat end) and working up toward the handle. (You can also do this yourself, but it’s a little easier to have someone else do it.)

While you or the volunteer taps the bat, pay attention to the vibrations you feel in your fingers as you hold the bat. Also pay attention to the sound you hear.

At one spot on the bat, you’ll notice that the striking of the hammer creates no vibrations in your fingers, and you’ll hear a slightly more “solid” sound.

Hint: If you’re having trouble locating that spot, it’s usually located between 10 and 18 centimeters (4 and 7 inches) from the fat end of the bat.

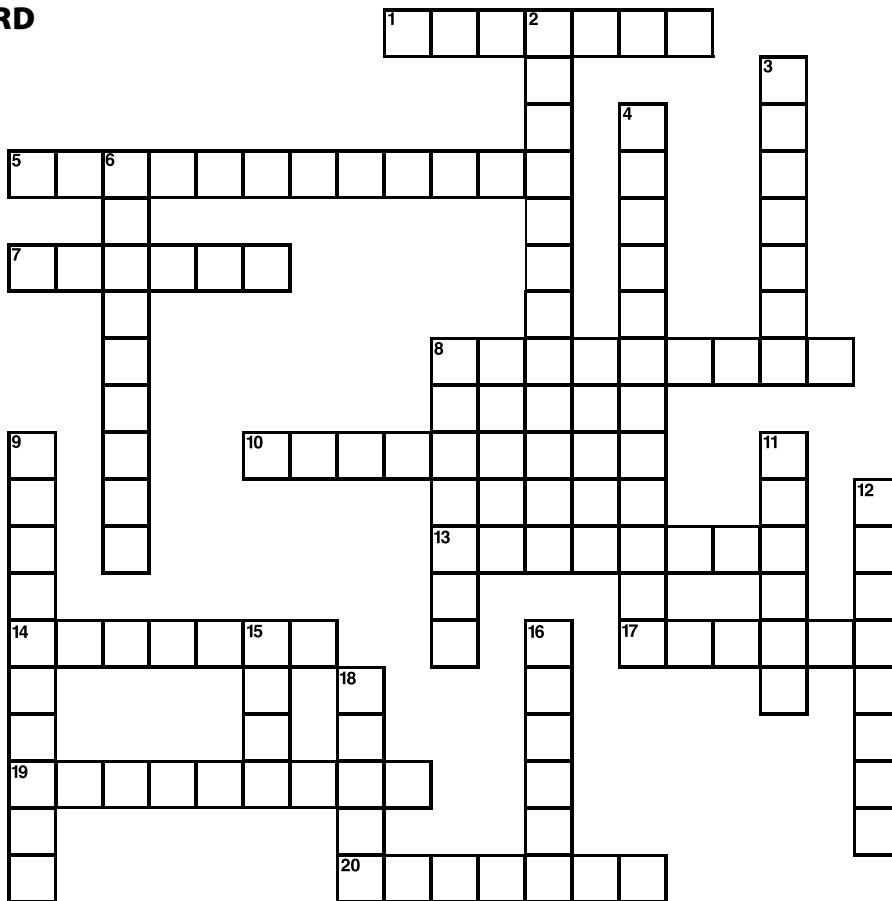
What Happens

The spot you’ve located is known as the *sweet spot*. All bats, metal and wood alike, have one. When you hit a baseball on that spot, the resulting vibrations in the bat are minimized. The hit feels nice and solid—in short, sweet. Hit a ball elsewhere and you’ll experience *sting*, a painful sensation in your hands caused by vibrations in the bat—not so sweet.

Whenever you strike an object, you create a pattern of vibrations in that object that depends on a complex array of factors: the size and shape of the object, the material it’s made of, and the place where you strike it. Those vibrations travel in waves up and down the length of the object. In some places, called *nodes*, the waves overlap in such a way that they cancel one another out. The sweet spot you found is just such a node. Striking that node leads to a lack of vibrations that you can both feel and hear.

There’s another sweet side to hitting a ball at the sweet spot of a bat: faster, longer hits. When less energy goes into creating vibrations in the bat, there’s more energy left to send the baseball flying.

CROSSWORD



ACROSS

- 1. a greenhouse gas
- 5. a male sex hormone
- 7. a cloud of gas and dust in space
- 8. a venomous snake (two words)
- 10. stored energy
- 13. an element whose chemical symbol is W
- 14. a force of attraction between bodies of matter
- 17. a mixture of saliva and phlegm
- 19. a sphere of billions of chunks of rock and ice at the edge of the solar system (two words)
- 20. indentations on the surface of a golf ball

DOWN

- 2. high blood pressure
- 3. a layer of rock that holds water
- 4. a bacterial disease that attacks the lungs
- 6. to change directly from a solid to a gas
- 8. the energy of motion
- 9. native to a region
- 11. inborn
- 12. an undersea mountain
- 15. a bright stream of gas that is blown off a comet
- 16. a country where 4 Down is prevalent
- 18. a type of colloid