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ISSUE DATES	9/7	9/21	10/5	10/26	11/9-23	12/7	1/11	2/1	2/22	3/15	4/5	4/19	5/10
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In this issue, *Science World* delves into the world of sanguivores, or animals that drink blood. And in keeping with the spirit of the season, check out the feature on pumpkin chunking. It provides a fun way to discuss the physics of catapults and trebuchets. As always, e-mail any other tips, topics, comments, or suggestions to us at: scienceworld@scholastic.com.

—The Editors

Visit www.scholastic.com/scienceworld for more resources!

Features

PAGE	CONTENT	TITLE SUMMARY	NATIONAL SCIENCE EDUCATION STANDARDS	LESSON IDEAS
8	Life: Parasites	Real-Life Bloodsuckers There are a variety of vampiric animals.	Grades 5-8: Regulation and behavior Grades 9-12: Interdependence of organisms	Check out the hands-on activity on p. 11 to see if you can use the clues to determine which bat is a vampire bat.
12	Earth: Deserts	Cactus Trackers Park rangers are keeping their cactuses safe using technology.	Grades 5-8: Populations and ecosystems Grades 9-12: Interdependence of organisms	Practice map-reading skills with the map on p. 14.
16	Physical: Forces and Motion	Smashing Pumpkins Teens build catapults and trebuchets to hurl pumpkins.	Grades 5-8: Motions and forces Grades 9-12: Motions and forces	
18	Life: Life Cycles	Secrets of Silk How the Chinese kept their silkworms secret.	Grades 5-8: Form and function Grades 9-12: Form and function	

Coming Next Issue

Teen Life Issue

- Are growing portion sizes contributing to obesity rates?
- California teen builds a solar bike.
- Name that element!
- Discover the chemistry that gives you a good hair day.
- Would you drink recycled sewer water?
- Unlock secrets of the teen brain.
- Students use cell phones to monitor their CO₂ footprints.

Teacher to Teacher



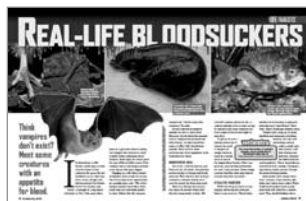
Laura Barone

Tips for using *Science World* in the classroom

Laura Barone, science teacher at Portsmouth Middle School in Portsmouth, New Hampshire, suggests:

When a new issue of *Science World* arrives, I have my students scan the entire issue and write down all of the italicized vocabulary words with Greek or Latin roots. Then, I ask the students to try and decode as many as possible before we read the articles. After reading the articles and discussing the words, students look at their list to see how close their list of guesses were. They are usually amazed at how many they found in the issue and how many they already know. We then use the unknown roots as an assignment to learn new vocabulary. For example, the vocabulary word *sanguivore* in this issue is composed of the Latin root words *sangui-* meaning "blood" and *-vore* meaning "to eat."





LIFE: Parasites
Real-Life Bloodsuckers

PRE-READING PROMPTS:

- Can you think of any animals that drink blood?
- What is a parasite?
- What does a carnivore eat? An herbivore? What word do you think scientists use to categorize animals that get their nutrients from blood?

DID YOU KNOW?

- Bloodletting, or draining a person's blood, was once wrongly believed to help cure diseases. The practice was used on George Washington when he was extremely ill with a throat infection and most likely hastened his death.
- The anticoagulant secreted by leeches is three to five times stronger than human-made anticlotting drugs.
- Many recipes from around the world use blood as their main ingredient, including blood soup, blood sausage, and blood bread.

CRITICAL THINKING:

- Vampires are all the rage in books and movies like the *Twilight* series. Based on what you've learned about the obstacles that bloodthirsty animals face in obtaining and surviving on blood, do you think it would be possible for fictional human vampires to live off this resource, assuming they had traditional human nutritional needs?

CROSS-CURRICULAR CONNECTIONS:

ART: Imagine you are a forest ranger and it is tick season. Because of the threat of Lyme disease, which ticks may carry, you need to teach hikers and campers how to avoid tick encounters and what to do if bitten. Create an illustrated poster to hang at the visitors' center using information found at:

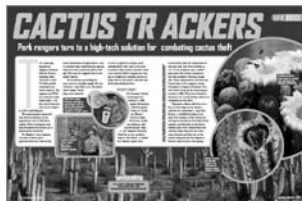
www.tickcounter.org/prevention.

RESOURCES

You can access these Web links at www.scholastic.com/scienceworld.

- Want to see more parasites in action? Meet the stars of the new Animal Planet show *Monsters Inside Me*, at: <http://animal.discovery.com/tv/monsters-inside-me>.
- Learn about the adventures *National Geographic* filmmakers had tracking down vampire bats in Nicaragua, here: www.nationalgeographic.com/fieldtales/bats/?fs=animals.nationalgeographic.com.
- Ghosts, monsters, and vampires got you scared? Then read *Are You Afraid Yet? The Science Behind Scary Stuff*, by Stephen James O'Meara, Kids Can Press, 2009.

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EARTH: Deserts
Cactus Trackers

PRE-READING PROMPTS:

- What is a desert? Where on Earth can you find deserts?
- Can you name three desert plant or animal species?
- Why would park rangers want to keep tabs on their parks' cactuses?

DID YOU KNOW?

- You may think that, with an area just over 9,000,000 square kilometers (about 3,500,000 square miles), the Sahara Desert is the largest desert on Earth. But it's only the second largest. The big winner is the interior of Antarctica. This cold desert covers approximately 14,000,000 square kilometers (about 5,400,000 square miles).
- The saguaro blossom is the state flower of Arizona.
- Saguaro cactuses have an extensive root system. The roots have special hairs that allow the plant to capture as much as 757 liters (200 gallons) of water from a single rainstorm.

CRITICAL THINKING:

- The special identification tags that the rangers at Saguaro National Park are using to help prevent cactus theft are also used for identifying lost pets. For what other applications might this technology be useful?

CROSS-CURRICULAR CONNECTIONS:

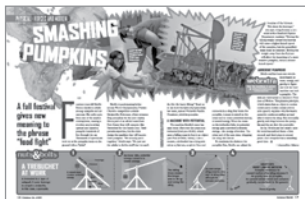
LANGUAGE ARTS: The thieves have struck again! Two more of the park's cactuses have been stolen. Imagine you're a park ranger at Saguaro National Park. Use the information in the article to write a press release describing the two stolen saguaro cactuses, from where they were stolen, and your plan to track down the culprits—and prevent future theft.

RESOURCES

You can access these Web links at www.scholastic.com/scienceworld.

- Want to learn more about the different types of deserts? Check out the University of California Museum of Paleontology's online exhibit here: www.ucmp.berkeley.edu/exhibits/biomes/deserts.php.
- The Arizona-Sonora Desert Museum's Web site is full of information about the area's plants and animals: www.desertmuseum.org.
- Pima County, Arizona, has this Web site for kids with Sonoran Desert-related games, activities, quizzes, and more: www.pima.gov/cmo/sdcp/kids/index.html.

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PHYSICAL: Forces and Motion

Smashing Pumpkins

PRE-READING PROMPTS:

- What is a catapult? A trebuchet?
- What physical factors do you think allow machines like a catapult or trebuchet to hurl objects farther than a person alone can?
- Would you want to enter a contest where you build your own pumpkin-launching machines? Why or why not?

DID YOU KNOW?

- The Punkin Chunkin contest has categories for the different methods of pumpkin hurling: slingshots, catapults, trebuchets, and air cannons. If a pumpkin explodes in mid-air, it's called "pumpkin pie in the sky."
- The heaviest pumpkin grown in the U.S. in 2008 weighed in at 696.9 kilograms (1,536.5 pounds). But competitors in the Punkin Chunkin contest use pumpkins weighing 3.6 to 4.5 kg (8 to 10 lbs) for the adult classes; the youth competitors hurl pumpkins that are no less than 1.8 kg (4 lbs).
- The trebuchet was invented in China between the fifth and third centuries B.C.; the first catapult was an arrow-hurling machine invented in Greece around 339 B.C.

CRITICAL THINKING:

- A trebuchet uses a weight and a fulcrum to gain leverage and store enough potential energy to hurl an object. A catapult uses elastic tension (like a slingshot) to store its potential energy. What do you think the advantages and disadvantages of using these two methods would be?

CROSS-CURRICULAR CONNECTIONS:

HISTORY: The trebuchet and catapult were part of the arsenal for medieval siege warfare to attack rival castles. How would you build a castle to defend against such strong weapons? Use this Web site that has information about medieval life to figure out the best design for your castle:

http://score.rims.k12.ca.us/activity/castle_builder.

RESOURCES

You can access these Web links at www.scholastic.com/scienceworld.

- Want to know all about the history of pumpkin chunking? Check out Bob Kotowski's book *Pie in the Sky: The Authorized History of Punkin Chunkin*, Cedar Tree Books, 2008.
- Trebuchets use levers to propel heavy objects. Check out this lesson plan about levers from Tufts University's STOMP Web site: <http://stompnetwork.org/tufts/fellowresources/activity-database?sobi2Task=sobi2Details&catid=0&sobi2Id=20>.
- This Web site that accompanies NOVA's "Medieval Siege" episode from its "Secrets of Lost Empires" series has trebuchet-related lesson plans, interactive games, and more: www.pbs.org/wgbh/nova/lostempires/trebuchet.



LIFE: Life Cycles

Secrets of Silk

PRE-READING PROMPTS:

- What is silk?
- What kinds of things do you own that are made from silk?
- Where do you think silk comes from?

DID YOU KNOW?

- In 2008, the full genome of the silkworm was published by the International Silkworm Genome Consortium. The genome contains 530,000,000 base pairs, which is approximately one sixth the size of the human genome.
- Korean street vendors sell a food called *beondegi*, which is made from seasoned silkworm larvae that are steamed or boiled.
- According to the United Nation's Food and Agriculture Organization, China has more than 6,000 square kilometers (2,317 square miles) of land dedicated to cultivating mulberry trees, which feed the country's silkworms. That's more space than the landmass of the state of Delaware!

CRITICAL THINKING:

- Silk is produced by caterpillars and then used in clothing, parachutes, home furnishings, and many other items. Can you think of other animals that produce materials that humans can make use of? For what type of manufactured products could these different materials be used?

CROSS-CURRICULAR CONNECTIONS:

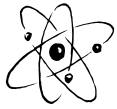
GEOGRAPHY: Silk has a rich history and is woven throughout all the cultures that interacted along the Silk Road. Split the class into three groups and assign an explorer to each of them: Zhang Qian, Xuan Zang, and Marco Polo. Have the groups use the interactive maps on the Web site below to see which climates, languages, and belief systems the explorers encountered on their journeys. Web site: <http://virtuallabs.stanford.edu/silkroad/SilkRoad.html>.

RESOURCES

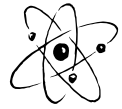
You can access these Web links at www.scholastic.com/scienceworld.

- For everything you could ever want to know about silkworms, visit this Web site from the University of Arizona. It has information sheets, lesson plans, tips for raising silkworms, and more! <http://insected.arizona.edu/silkinfo.htm>.
- Check out this online exhibit about the art and history of the Silk Road from the University of Washington: <http://depts.washington.edu/silkroad/exhibit/index2.html>.
- Find out more about the mulberry tree, which is the main food for silkworms, here: http://faculty.ucc.edu/biology-ombrello/POW/mulberry_tree.htm.

Name: _____



Science News



DIRECTIONS: Read the Science News section on pages 3 to 7. Then, test your knowledge by filling in the letters of the correct answers below.

1. Radar works by bouncing _____ off an object.

- (A) ultraviolet rays
- (B) microwaves
- (C) visible light waves
- (D) laser beams

2. Which is NOT part of the information that ESPN's new ball tracker will use to predict where a ball will land?

- (A) the ball's location
- (B) weather conditions
- (C) the ball's spin
- (D) the speed of the batter's swing

3. In hot weather, toucans regulate their body temperature by _____.

- (A) sweating
- (B) panting
- (C) increasing blood flow to their beaks
- (D) flapping their wings



4. What is the secret ingredient to create ice cream that does not melt?

- (A) protein
- (B) starch
- (C) fat
- (D) gelatin

5. People with which hair color are most likely to carry a gene that makes them more sensitive to pain?

- (A) red
- (B) black
- (C) brown
- (D) blond

6. How much more anesthesia do people with red hair require to block pain than people of other hair colors?

- (A) 20 percent
- (B) 40 percent
- (C) 50 percent
- (D) 95 percent

7. How often are people responsible for starting wildfires?

- (A) 1 out of 5 times
- (B) 3 out of 6 times
- (C) 6 out of 10 times
- (D) 9 out of 10 times

8. What do scientists think is causing Scotland's Soay sheep to become smaller in size?

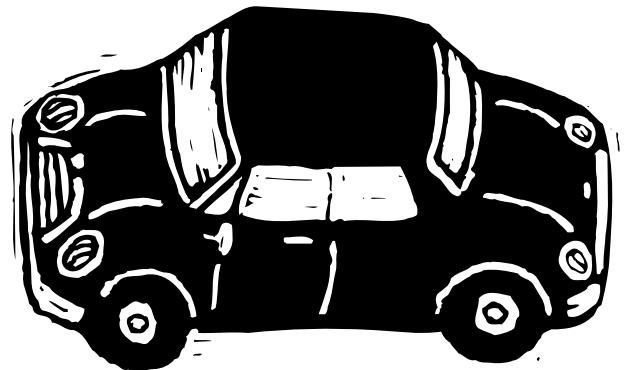
- (A) harsher winters
- (B) malnutrition
- (C) climate change
- (D) pollution

9. What is another example of species responding to warmer temperatures on Earth?

- (A) plants flowering later
- (B) trees not growing as tall
- (C) birds changing migration
- (D) animals moving to lower elevations

10. The U.S. government's "Cash for Clunkers" program did what?

- (A) recycled cars that were more than 40 years old
- (B) got gas-guzzling cars off the road
- (C) provided new cars to those people who were in need
- (D) paid for repairs for broken cars



Name: _____

PAGE **8** Real-Life Bloodsuckers

DIRECTIONS: After reading the article about vampiric animals, fill in the blanks to complete the summary paragraph below.

Sanguivores are animals that _____. A vampire _____ is a sanguivore. But blood is a skimpy food source, and about 80 percent of it is _____ with the rest being mainly _____. Blood contains very little _____, which is used to store energy, so a vampire bat needs to eat _____ its weight in blood each night!

PAGE **12** Cactus Trackers

DIRECTIONS: Circle the incorrect word or phrase below and write the correct word or phrase below it.

1. A saguaro cactus is a short, smooth plant.
2. The Sonoran Desert covers parts of Northern Mexico, Mexico's Baja Peninsula, Southern Texas, and Oklahoma.
3. Thieves are stealing the old, large, saguaros to sell to nurseries on the black market.
4. Park rangers are using passive integrative transponders that they will wrap around the cactuses' bases to prevent further thefts.

PAGE **16** Smashing Pumpkins

DIRECTIONS: Match the words in the left column with the words or phrases in the right column.

- | | |
|-------------------------------------|---------------------------------------------------------------------------------------------------|
| ___ 1. trebuchet | a. pivot point |
| ___ 2. kinetic energy | b. stored energy |
| ___ 3. Newton's First Law of Motion | c. energy of motion |
| ___ 4. fulcrum | d. machine that uses a falling mass to throw an object |
| ___ 5. potential energy | e. principle that states that an object in motion will stay in motion unless a force acts upon it |

PAGE **18** Secrets of Silk

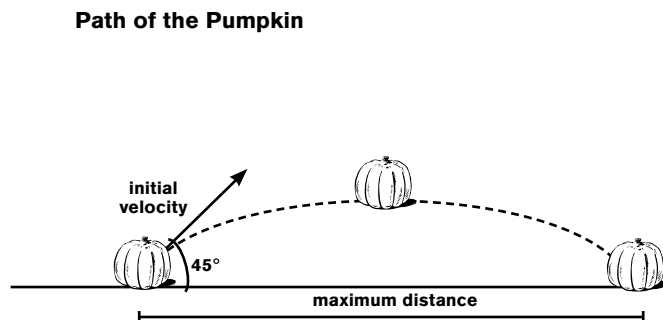
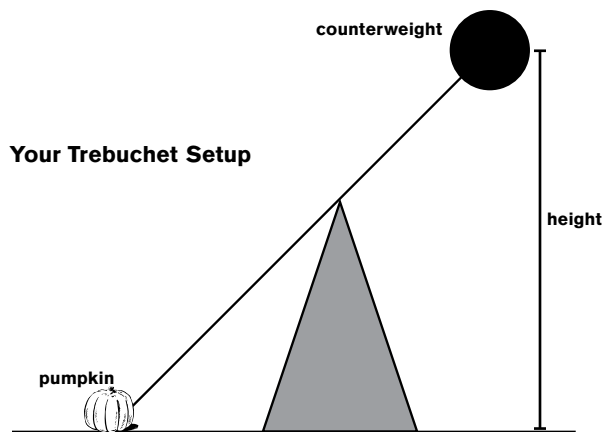
DIRECTIONS: Answer the following questions in complete sentences.

1. What is the Silk Road?
2. What was the heavily guarded secret of silk, and what was the penalty for sharing the secret with foreigners?
3. Why did ancient sericulture practitioners use selective breeding? What was the result?
4. What are the two proteins that a silkworm produces from its spinneret, and what are their functions?
5. How similar is modern sericulture to ancient sericulture? Explain.

Name: _____

Tinkering With Trebuchets

In “Smashing Pumpkins” (p. 16), you read about the physics behind Punkin Chunkin contestants’ trebuchets. Now use what you learned to answer the following questions, using the equations below.



EQUATIONS*

$$\text{Kinetic Energy of Pumpkin (Joules)} = \frac{1}{2} \times \text{Pumpkin Mass (kilograms)} \times \text{Initial Velocity (meters/second)}^2$$

$$\text{Potential Energy of Counterweight (Joules)} = \text{Counterweight Mass (kg)} \times \text{Acceleration Due to Gravity (9.8 m/s}^2) \times \text{Counterweight Height (m)}$$

$$\text{Maximum Distance (m)} = 2 \times \text{Counterweight Mass (kg)} \div \text{Pumpkin Mass (kg)} \times \text{Counterweight Height (m)}$$

*Note: All of these equations assume that there is a perfect transfer of potential energy to kinetic energy in your trebuchet and that the pumpkin will launch at a 45-degree angle.

Directions:

For the following questions, assume you have a trebuchet with a counterweight having a mass of 30 kg, which you raise to a height of 4 meters.

- How much potential energy does your trebuchet store?
- For your first launch, you hurl a 2-kg pumpkin. What is the maximum distance this pumpkin will travel?
- For your second launch, you use an extra large pumpkin that weighs 4 kg. What’s the maximum distance that this new pumpkin will travel? Is this distance greater than or less than the distance your 2-kg pumpkin traveled?
- What will be the initial velocity of the 2-kg pumpkin when it leaves the trebuchet? (Hint: Since your trebuchet converts all of the potential energy to kinetic energy, use your answer from question 1 as the kinetic energy of the pumpkin to find the initial velocity.)
- If you add 10 kg to your counterweight, what’s the new maximum distance that the 2-kg pumpkin will travel? The 4-kg pumpkin?
- The world record for the longest distance a pumpkin was hurled in the youth trebuchet competition was beaten last year. It’s now 232 meters. Using a 2 kg pumpkin, how much weight would you have to add to your 30-kg counterweight to beat the record by one meter?
- If you didn’t have any extra weight to add to your trebuchet, what other changes could you make to break the record?

Name: _____

Silk States

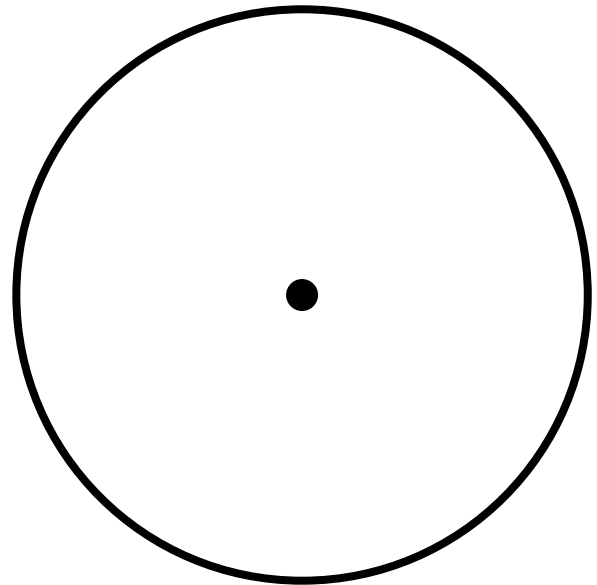
In “Secrets of Silk” (p. 18), you read about how ancient Chinese rulers guarded their silk-making secrets. But the secret got out, and now other countries have embraced sericulture. Complete the activity to learn more about the world’s silk production.

Title: _____

**Silk Cocoon Production
by Top-5 Silk-Producing Countries in 2005**

Country	Cocoons Produced (metric tons)	Percent of Top-5 World Silk Producers (%)
China	290,003	72
India	77,000	
Uzbekistan	17,000	
Brazil	11,000	
Iran	6,000	
Total	401,003	

SOURCE: FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS



Graph It

1. Divide the production of each country by the total to find the percent and fill in the rest of the chart (round to the nearest whole number). We did the first one for you.
2. Use the circle above to make a pie chart from the data. Each wedge will start from the center point marked on the circle.
3. Convert the data from percents to angle degrees by multiplying the percent by 360. For example: 72 percent of the cocoons come from China, so the pie wedge for that country would be 72 percent of the 360° circle, or 259° ($360 \times .72 = 259.2$, rounded to 259). Position a protractor at the center point of the circle. Mark 0° and 259° angles with points on the edge of the circle. Draw a line from these points to the center of the circle.
4. Label the wedge (include its percent).
5. Measure your next wedge from the edge of the first. Do this for the remaining data. When finished, the entire circle should be filled and the wedges should add up to 360°. And don't forget to give your pie chart a title!

Analyze It

1. Which of the top-5 silk producers yields the greatest percent of silk cocoons? The smallest percent?
2. Of the top-5 silk producers, how many countries are in Asia?
3. How many more metric tons of cocoons does India produce than Brazil?
4. Which two countries together are responsible for producing roughly the same amount of silk cocoons as Uzbekistan?
5. Why might China still be the leading producer of silk cocoons after all these years?