

ScienceWorld®

VOL. 65, NO. 10 · ISSN 1041-1410

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Kim Wiens, science teacher at Actis Jr. High School in Bakersfield, California, contributed to this issue's Teacher's Edition.

From telescopes to narwhals, scientists are using new and innovative tools to gather information about our world. In that same spirit, we at *Science World* want to hear about new and innovative ideas you have about teaching science to your students. E-mail any tips, topics, stories, and suggestions you want to share to scienceworld@scholastic.com

—The Editors

Features

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8	Life: Body Systems	Cool Runnings See what it takes to be a Junior Iditarod champion.	Grades 5-8 Diversity and adaptations of organisms Grades 9-12 Biological evolution	Calculate how many calories a dogsled team will burn during the race in the cross-curricular connections on TE 2
12	Physical: Electromagnetic Spectrum	The Sky's the Limit Take a tour of the world's latest telescopes.	Grades 5-8 Abilities of technological design Grades 9-12 Abilities of technological design	Students will build their own "radio telescope" with the hands-on activity on p. 15
16	Earth: Oceanography	Animal Oceanographers Ocean researchers have new aquatic assistants.	Grades 5-8 Populations and ecosystems Grades 9-12 Behavior of organisms	The mapping activity on TE 6 will help students learn more about longitude and latitude.
18	Special Supplement	Heads Up: Real news about drugs and your body!	Grades 5-8 Risks and benefits Grades 9-12 Personal and community health	For related information, visit: www.scholastic.com/headsup .

Coming Next Issue

- *Science World* is celebrating its 50th anniversary!
- Melting alpine glaciers are revealing grisly surprises and archaeological treasures.
- Eagle Scout Michael Browne is working to save waterbirds from lead poisoning.

Teacher to Teacher



Kim Wiens

Tips for using Science World in the classroom

Kim Wiens, this teacher's edition's contributor, suggests: Classifying and summarizing information are two of the most significant learning strategies. Help students summarize and classify the information about telescopes by challenging them to create a "Chart of Telescopes." Have students work in cooperative groups to come up with the number of columns and rows and decide on labels for the columns (for example: Name of Telescope, Location, Type of Wave Detected, Focus of Study). For younger students, it may be helpful to provide a blank document.





LIFE: Body Systems
Cool Runnings

PRE-READING PROMPTS:

- Do you think you could survive a two-day, 225-kilometer race in freezing weather, driving a dogsled team?
- What tools and supplies would you need to pack for your dogs and yourself during this journey?

DID YOU KNOW?

- The Alaskan Husky, or Alaskan Malamute, is the dog most often used in races like the Junior Iditarod. Sled dogs must be trained and conditioned to be capable of withstanding environmental and exercise extremes. They also must show a willingness to be harnessed and a desire to compete.
- All sled dogs that compete in the adult Iditarod are identified by a rice-size microchip and collar tags. The microchips are programmed with an identification number. The microchips are then inserted under the dog's coat and can be read with a special scanner. The identification number can be double-checked against the information on the dog's collar tags. This ensures that if a tired dog has to be left behind at a checkpoint, the racer will be able to identify the dog when they reunite at the finish line in Anchorage.

CRITICAL THINKING:

- DeeDee Jonrowe, a musher who has raced in the Iditarod for the past 20 years wrote in her book *Iditarod Dreams*, "I'm sure the average Iditarod dog gets better care than 99 percent of the dogs in America." Why might Jonrowe have made this statement? How do you think a musher trains and treats his or her canine athletes in order to get them to perform well during such a hard race?

CROSS-CURRICULAR CONNECTIONS:

MATH: Calculate the combined amount of calories required by the 10 dogs in each dogsled team during the 2-day Junior Iditarod. Refer to the article to find out how many calories each dog requires per day during the race season (# of calories per dog \times 10 dogs \times 2 days). If a team in the adult race takes 13 days with 14 dogs, how many more calories do the dogs in the adult race require? (*Answer: Junior Iditarod: 240,000 calories, adult Iditarod: 2,184,000.*)

RESOURCES

- How do you think mushers communicate with the 10 dogs on their team? Check out the list of mushing terms here: www.iditarod.com/learn/terminology.html.
- To find out more about Alaskan Malamutes, check out the American Kennel Club site: www.akc.org/breeds/alaskan_malamute/index.cfm

POSTAL INFORMATION: SCIENCE WORLD (ISSN 1041-1410; in Canada, 2-c no. 59948) is published biweekly during the school year, 14 issues, by Scholastic Inc., 2931 East McCarty St., P.O. Box 3710 Jefferson City, MO 65102-3710. Periodical postage paid at Jefferson City, MO 65102 and at additional mailing offices. POSTMASTERS: Send notice of address changes to SCIENCE WORLD, 2931 East McCarty St., P.O. Box 3710 Jefferson City, MO 65102-3710.



PHYSICAL: Electromagnetic Spectrum
The Sky's the Limit

PRE-READING PROMPTS:

- What types of electromagnetic radiation can you name?
- Dave Finley of the National Radio Astronomy Observatory says that future generations will call today the "Golden Era of Astronomy." Why might this be?

DID YOU KNOW?

- While he did not invent the telescope, Galileo was the first to use it to systematically study the night sky through observation.
- In 2013, NASA will launch the Webb Space Telescope. It will be able to detect infrared radiation. Scientists hope it will unleash a torrent of discoveries about supernovae, black holes, and young galaxies—all of which will help them learn more about how the universe formed.

CRITICAL THINKING:

- Telescopes are located all over the world—and even in space. Imagine you are the director of NASA and you want to build a new telescope that observes the visible light region of the electromagnetic spectrum. Can you think of a good location for the telescope? Explain why you chose this location.

CROSS-CURRICULAR CONNECTIONS:

SOCIAL STUDIES: Create a timeline showing the history of the telescope. Begin with the invention of the telescope by Dutch spectacle makers in 1608 (there is still debate over who the actual inventor was) and note significant advances or modifications including all of the telescopes mentioned in this article. Use the following Web sites as resources: <http://galileo.rice.edu/sci/instruments/telescope.html> and www.antiquetelescopes.org/history.html.

RESOURCES

- See images of astronomical objects in various wavelengths here: http://coolcosmos.ipac.caltech.edu/cosmic_classroom/multiwavelength_astronomy/multiwavelength_astronomy/index.html.
- For more information on the Fermi Space Telescope including animations, quizzes, videos, and a glossary of terms, take a look at this NASA Web site: www.nasa.gov/mission_pages/GLAST/main/index.html.
- Visit NASA's Hubblesite for podcasts, images, videos, facts, and activities for stargazers, educators, and kids: <http://hubblesite.org>.

Editorial Offices: SCIENCE WORLD, 557 Broadway, New York, NY 10012-3999. Canadian address: Scholastic Canada Ltd., 175 Hillmount Road, Markham, ON, Canada L6C 1Z7. Original contributions to Science World magazine or to contests, projects, and special features sponsored by Science World magazine become the property of Scholastic Inc. Contributions cannot be acknowledged and cannot be returned. Please send to Editor, Science World, Scholastic Inc., 557 Broadway, New York, NY 10012-3999.



EARTH: Oceanography
Animal Oceanographers

PRE-READING PROMPTS:

- Where can you stand only a few feet away from 2,267 kilogram (5,000 pound) wild animals that are fighting, sleeping, nursing young, or even giving birth?
- What do you think makes elephant seals and narwhals ideal for helping scientists collect data about the ocean?

DID YOU KNOW?

- The narwhal is sometimes called the unicorn of the sea. This is because the male's left front tooth develops into a sword-like, spiraling, ivory tusk that grows right through its upper lip. This tusk can reach 2.7 meters (8.75 feet) in length.
- Elephant seals are pinnipeds, meaning "fin-footed", semi-aquatic marine mammals that have a torpedo shape. Other pinnipeds are seals, sea lions, and walruses.

CRITICAL THINKING:

- Narwhals are social whales that can live to be 50 years old. They live in cold Arctic seas and rarely stray far from ice. How do these mammals, which are related to dolphins, porpoises, and orcas, survive in such an extreme climate? How do you think climate change will affect these marine mammals?

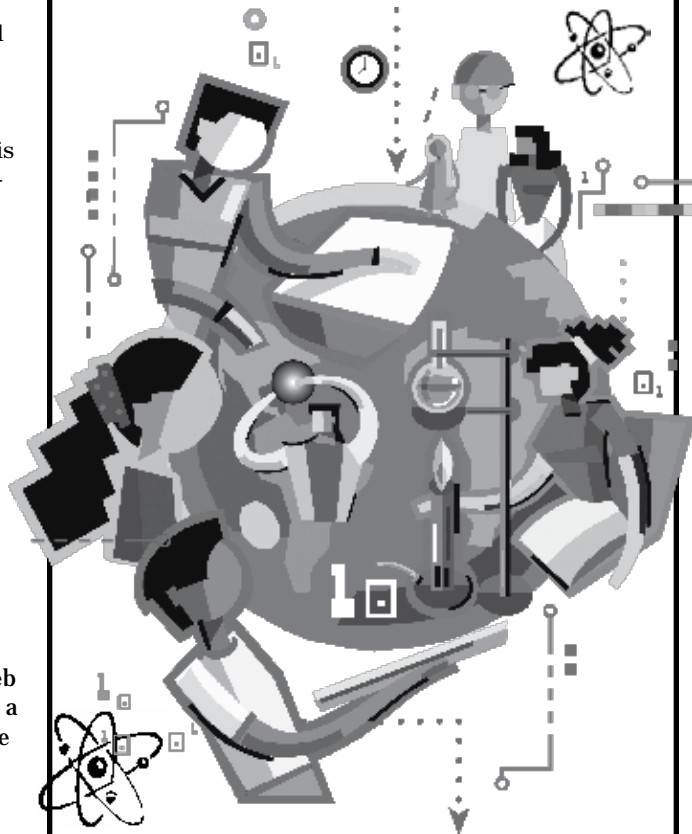
CROSS-CURRICULAR CONNECTIONS:

LANGUAGE ARTS: Read about the life and habits of the Northern elephant seal (*Mirounga angustirostris*) at this Web site: www.pinnipeds.org/species/nelephnt.htm. Then, write a short story from the point of view of an elephant seal. Be sure to include details such as where you live, what you eat, and how you interact with your fellow elephant seals.

RESOURCES

- California State Parks' PORTS program provides teachers with complete units of study and live videoconferences. Some of these resources are also available in Spanish. Find a multi-lesson unit on the evolution of elephant seals targeted for 7th-graders here: www.ports.parks.ca.gov/?page_id=23103
- California State University, Monterey Bay has an NSF-funded Web site about elephant seals centered on a continuously updated database of images and environmental data. Lesson plans, activities, several short movies, and video clips (including some in Spanish) are available. Check it out at: <http://essp.csumb.edu/eseal>.
- Listen to a narwhal's call, watch a video, and learn more about these tusked whales on the National Geographic Web site: <http://animals.nationalgeographic.com/animals/mammals/narwhal.html>.

Do You Know Teens Who Are Making a Difference?



If you know of teens making achievements in areas related to life, Earth, or physical sciences, we'd like to learn about them. *Science World* is scouting for dynamic teens to feature in upcoming issues. If you have a class or a particular student who is making cool science contributions, e-mail us at scienceworld@scholastic.com, or write us at:

Attn: Amazing Teens
Science World
Scholastic Inc.
557 Broadway
New York, NY 10012

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. Which of the following is NOT one of the causes of increased ocean noise?

- Ⓐ shipping
- Ⓑ carbon dioxide
- Ⓒ oil and gas drilling
- Ⓓ erupting underwater volcanoes

2. How do oceans becoming more acidic affect marine life?

- Ⓐ It increases the ocean's temperature.
- Ⓑ It allows underwater sound waves to travel farther and faster, making communication between animals difficult.
- Ⓒ It reduces the amount of salt in seawater.
- Ⓓ It kills smaller organisms that large marine animals eat.

3. All of the following are good reasons people should consider switching to CFL bulbs EXCEPT _____.

- Ⓐ Incandescent bulbs are cheaper than CFLs.
- Ⓑ CFLs last 10 times longer than incandescent bulbs.
- Ⓒ CFLs use less energy than incandescent light bulbs.
- Ⓓ Soon, incandescent bulbs will no longer be sold.

4. In the U.S., incandescent bulbs will be phased out by the year ____.

- Ⓐ 2012
- Ⓑ 2014
- Ⓒ 2019
- Ⓓ 2024

5. What is unusual about the way the sea slug *E. chlorotica* gets its food?

- Ⓐ It feeds on other sea slugs.
- Ⓑ *E. chlorotica* can survive without ever eating.
- Ⓒ The sea slug survives on algae that live in its gut.
- Ⓓ *E. chlorotica* can undergo photosynthesis to produce its own food.

6. The process of photosynthesis takes place in a plant's ____, which require about 2,000 ____ to run.

- Ⓐ DNA, minutes of sunlight
- Ⓑ nucleus, genomes
- Ⓒ chloroplasts, genes
- Ⓓ leaves, cells

7. Which sentence best summarizes the main idea of the article "Mammoth Breakthrough?"

- Ⓐ What caused woolly mammoths to go extinct 20,000 years ago remains a mystery.
- Ⓑ Scientists plan to use DNA from a fossil to re-create a living mammoth.
- Ⓒ The woolly mammoth is the first extinct animal to have its genome sequenced.
- Ⓓ Mammoths have the largest genome of any animal.

8. Scientists have concluded that the direction a horse's hair whorls turn indicates whether the animal is ____.

- Ⓐ right- or left-hoofed
- Ⓑ male or female
- Ⓒ a fast racer
- Ⓓ a good jumper

9. What is laterality?

- Ⓐ The ability to walk upright
- Ⓑ The act of turning in a circle
- Ⓒ The ability to move in a straight line
- Ⓓ The act of favoring one side

10. Nicolas Copernicus is considered the Father of Modern ____.

- Ⓐ Physics
- Ⓑ Astronomy
- Ⓒ Medicine
- Ⓓ Telescopes



ISTOCK

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Name: _____

PAGE **8** Cool Runnings

DIRECTIONS: Fill in the blanks to complete the sentences below.

- The course of the Junior Iditarod follows a section of the famed Iditarod Race route, which stretches more than 1,609 kilometers (1,000 miles) from _____ to Nome, Alaska.
- Sled dogs are able to trap body heat better than humans because the dogs lack _____ and they have less _____ to their skin than humans.
- Veterinarian Dr. Michael Davis believes that the key to the dogs' high performance comes from their ability to quickly convert the _____ they consume into fuel instead of tapping into their muscles' _____.
- The main factor that limits how far a sled dog can go is _____.
- In addition to pulling power and speed, when picking a 10-dog team, mushers must look at each dog's _____ and determine how well they get along together.

PAGE **12** The Sky's the Limit

DIRECTIONS: Match the terms in the left column with their descriptions in the right column.

- | | |
|----------------------------------|--|
| ___ 1. lenses | a. rapidly spinning remnants of a dead star |
| ___ 2. sunspots | b. a microwave telescope that is used to look at galaxy clusters |
| ___ 3. Fermi Space Telescope | c. pieces of curved glass that bend and focus light |
| ___ 4. Large Binocular Telescope | d. a group of 27 radio antennae in New Mexico that work together to gather radio waves |
| ___ 5. South Pole Telescope | e. dark spots on the sun discovered by Galileo |
| ___ 6. Very Large Array | f. the farthest-away objects that astronomers study to understand the <i>Big Bang</i> |
| ___ 7. pulsars | g. a telescope mounted to a satellite that senses gamma rays |
| ___ 8. galaxy clusters | h. a telescope that has two mirrors and detects visible light |

PAGE **16** Animal Oceanographers

DIRECTIONS: Answer the following questions in complete sentences.

- What equipment on the elephant seals' tags are used to gather and communicate information to scientists?
- What kinds of data do the elephant seals measure as they swim and dive?
- What are the advantages of using marine mammals over taking measurements from ships or buoys?
- Why are scientists so interested in the information narwhals are gathering in Baffin Bay?

Name: _____

Seal Trails

Location Data from two Northern Elephant Seals

Date	Location of Seal 1	Location of Seal 2
May 1, 2008	Año Nuevo Beach	Año Nuevo Beach
June 1, 2008	40°N, 125°W	39°N, 134°W
July 1, 2008	52°N, 133°W	40°N, 160°W
August 1, 2008	58°N, 149°W	40°N, 172°W
September 1, 2008	54°N, 140°W	42°N, 165°W
October 1, 2008	50°N, 150°W	45°N, 140°W
November 1, 2008	52°N, 142°W	41°N, 131°W
December 1, 2008	47°N, 131°W	40°N, 131°W
January 1, 2009	37°N, 122°W	39°N, 126°W

SOURCE: Locations and dates are approximated from TOPP data: http://las.pfeg.noaa.gov/TOPP_recent/index.html

In "Animal Oceanographers" (pp. 16 and 17), you read that the tags attached to elephant seals give vital information about the areas of the ocean where the seals travel. The chart (*right*) gives location information for two tagged seals after they left Año Nuevo Beach in the spring of 2008. Using two different colored pencils and the chart data, mark the trails of each of the seals on the map below.

Answer the following questions in complete sentences:

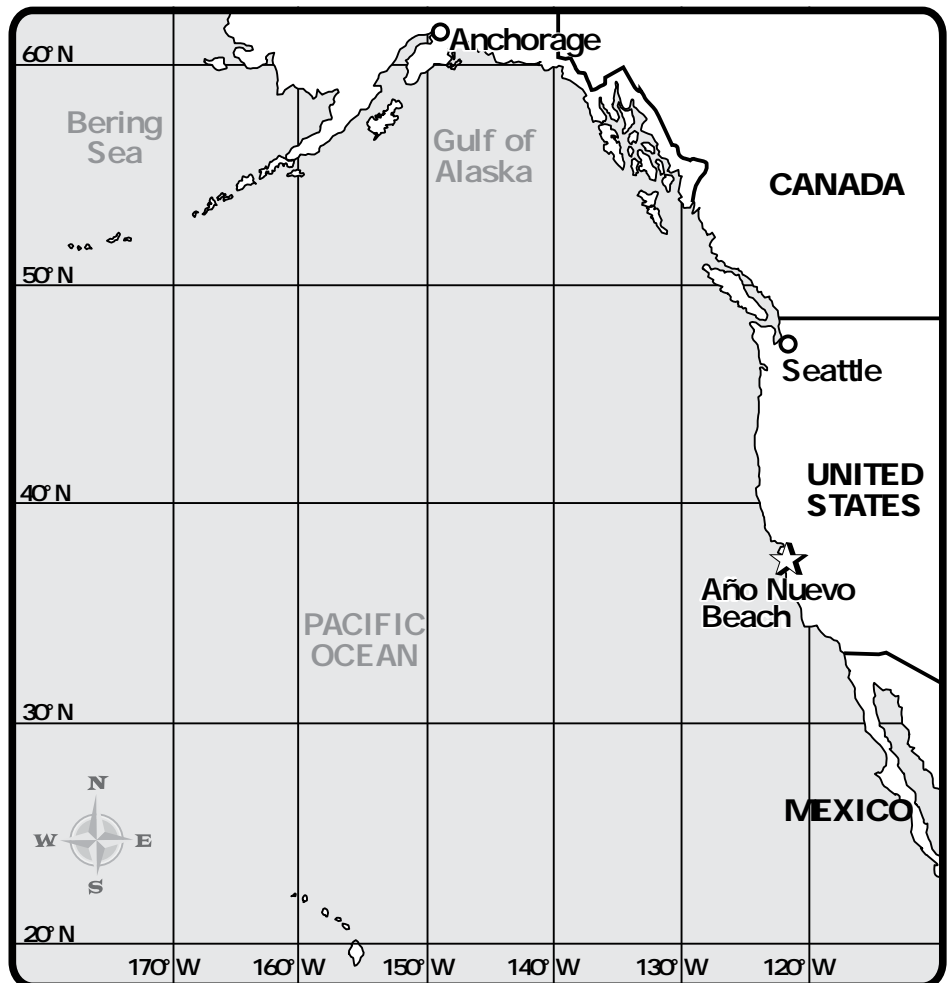
1. After the first month, which seal was farthest from Año Nuevo Beach?

2. Which cardinal direction (North, South, East, or West) did Seal 2 travel between July 1 and August 1?

3. Which seal traveled the farthest north?

4. When was Seal 1 closest to Anchorage, Alaska?

5. Had both of the seals returned all of the way back to Año Nuevo Beach by January 1, 2009? Explain.



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Name: _____

Racer Roster

In “Cool Runnings” (pp. 8-12), you read about teens who compete with their teams of sled dogs for the title of Junior Iditarod champion. Study the chart below of the 2009 competitors and then answer the questions that follow in complete sentences.

Junior Iditarod Mushers Registered as of January 12, 2009

Name	Gender	State	Veteran or Rookie?
Charlie Allison	Male	Alaska	Veteran
Cain Carter	Male	Alaska	Veteran
Kristen Crain	Female	Alaska	Veteran
MacKenzie Davis	Female	Alaska	Veteran
Justin Fink	Male	Michigan	Rookie
Lacey Hart	Female	Montana	Rookie
Jeff Holt	Male	Alaska	Veteran
Taylor Holt	Male	Alaska	Rookie
Carole Keller	Female	Alaska	Veteran
Jeremiah Klejka	Male	Alaska	Rookie
Ava Lindner	Female	Alaska	Veteran
Patrick Mackey	Male	Alaska	Veteran
Katherine Manderfield	Male	Michigan	Rookie
Meredith Mapes	Female	Alaska	Veteran
Garry McKeller	Male	Alaska	Veteran
Shameka Nelson	Female	Alaska	Veteran
Merissa Osmar	Female	Alaska	Rookie
Michael Owens	Male	Alaska	Veteran
Rebekah Ruzicka	Female	Alaska	Veteran
Ilsa Schwarzburg	Female	Alaska	Veteran
Anitra Winkler	Female	Alaska	Veteran

SOURCE: Junior Iditarod. <http://www.jriditarod.com/mushers.php>

- How many competitors were registered for the Junior Iditarod as of January 12, 2009? Of those, how many are male?
- What percent of the participants are female?
- How many states have representatives registered to compete in the 2009 Junior Iditarod? List the states and the number of representatives registered from each state.
- What percent of the participants are from Alaska?
- How many registered mushers are *veterans* (have previously competed in the Junior Iditarod)? How many are *rookies*, or new to the competition?