

CURRICULUM GUIDE: CIRCUMNAVIGATION



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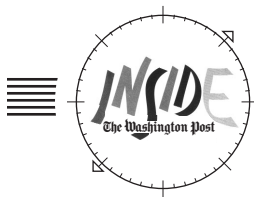
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Circumnavigation

KidsPost Article: "Home on the Water"

Lesson: Learn about geography and weather while reading about a round-the-world endurance sailboat race

Level: Beginning to Middle

Subjects: Geography, Mathematics

Related Activity: Physical Education, Health

Procedure

Read and Discuss

Ask students to estimate the size of their classroom. Have them measure the room in feet. Then compare it to the 60-foot long sailboats on which each 12-member team lives for most of nine months. What would they want and need in that space if they were to live there for one week?

Read the articles on the Volvo Ocean Race from KidsPost as a class, then answer the questions. Tell students that while they are reading about one round-the-world race, they are also learning about geography and weather.

1. How many people are on each sailboat?

2. How many total sails may a sailboat pack? Why are different kinds and sizes of sails needed?

3. List ways the sailboats have been designed to sail as fast as possible.

4. Where do crew sleep? Why don't they all sleep at the same time?

5. People need water to

survive. What precautions have been taken to ensure that water will be available to the crew?

6. What is the Global Positioning System? Do any students have navigation systems in their family vehicles? How does it work?

7. What danger do whales present to sailors?

8. What is a "growler"? How might growlers harm a sailboat?

9. What is frostbite?

10. What are seaweed and kelp? Explain what sailors do with seaweed and kelp.

11. Why do the sailors have such long stops in harbor between legs of the race?

Learn About "Circumnavigation"

Give students "Word Study: a look at circumnavigation."

Develop Vocabulary

After reading about "circumnavigation," have students create their own vocabulary lists of new words found in the KidsPost articles. Have them define the words.

Use a Map

Students are asked questions as they follow the round-the-world race route of the Volvo Ocean Race. Three reproducibles are provided, dividing the race into segments: Southampton, England, to Auckland, New Zealand; Auckland to Baltimore,

Ocean Resources

<http://www.volvooceanadventure.org/article.php/home.html>

Volvo Ocean Adventure

For students. Satellite images of wind and waves and weather are provided during the round-the-world Volvo race. Special features include explanation of the Gulf Stream, ocean currents, calving of an iceberg and dark water in the Florida Bay. Teachers are provided teaching guides for science, geography, IT and citizenship, for students age 10-16. Students are encouraged to enter for Young Environmentalists awards. Impact Zone looks at human impact on marine pollution, endangered species. Ocean Zone interactives are worth a visit.

<http://www.nationalgeographic.com/volvooceanrace/>

Round the World

National Geographic interactive section allows visitors to take the helm and check out the anatomy of an ocean racer. Fascinating GEO Files include hitting "Liquid Himalaya." Check on National Geographic channel coverage.

<http://www.volvooceanrace.org/homepage.html>

Volvo Ocean Race: Round the World 2001-2002

Official site for the 32,700 nm, nine-leg race that began in England in September 2001 and ends in Germany in June 2002.

<http://www.volvooceanrace.org/port/maryland/website.html>

Baltimore, Annapolis & Sandy Point

Race links, news and events for the Maryland leg of the race

<http://www.volvooceanrace.org/port/larochelle/website.html?URL=port%2Flarochelle&x=23&y=4>

La Rochelle

Practice your French when you entrez the La Rochelle official site. This town on the west coast of France is a fascinating mixture of the old and the new.

<http://www.nmfs.noaa.gov/>

National Marines Fisheries Service

NOAA Fisheries main objective is to sustain, protect and rebuild the U.S.' national living oceans. Site covers main topics including endangered species and mammals, trade and fisheries economics. Kids Corner provides activities, career information and resources for teachers.

<http://www.pewoceans.org/>

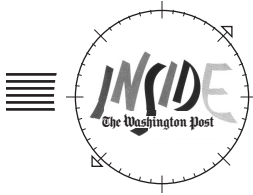
Pew Oceans Commission

A 2002 study of the status of marine life and pollution, coastal development, effect of agriculture, and aquaculture and fishing. Comprehensive but accessible.

<http://www.noaa.gov/charts.html>

NOAA Charting and Navigation

Nautical charts, tide and current tables



Maryland; Baltimore/Annapolis to Kiel, Germany. What do students know of the oceans the boats will sail and the countries that will host the crew? Give students each reproducible and ask them to answer the questions. Discuss their answers.

Take a Closer Look

Give students "Careful Packing." Think about the impact of endurance races on the human body. For example, while sailing over 7,000 nautical miles of Leg One in heat and cold, team members lose body fat, vitamins and minerals. Their bodies need time to restore before facing the extreme cold and dangerous passage of Leg Two. Younger students may be given "Which of These Is True?" instead of this activity.

Write

Ask students to write a short essay on the follow topic. How might the experience of these endurance racers benefit other endurance racers and pleasure boaters? Who else might benefit from this round-the-world endurance race?

Enrichment

1. Read more about one of these endurance races: Tour de France, Iditarod, Le Mans. Write a short, informative piece. Include answers to the following questions: When and why was the race begun? What are the dangers and challenges? What are and who set the records? Why do people participate?

A variation on this would be to study the impact of technology on endurance races. For example, in the 1970s contact with sailboats was by high frequency radio once or twice a week; in the current race, BText Technologies provides position data every 10 minutes. One of the most isolated of competitions is now accessible to the interested public. How is this same technology helpful to the teams?

2. Who sailed the seas in search of adventure, riches and other lands? Study those who came before our modern maritime marathoners. Here are a few to get you started. Research the Vikings, Polynesians and Phoenicians. Egyptians, Greeks and Persians were aware that Africa was almost surrounded by water. Which individuals should students research to put a face on the story? Try Bartolomeu Dias, Vasco da Gama, Pedro Cabral, Nunez de Balboa and Hernan Cortes. Don't forget the immortals—Ferdinand Magellan, Sebastian del Cano, Sir Francis Drake and Captain James Cook.

Vocabulary

Cyclone: Storms that reach sustained 74-mph or greater winds in the Indian Ocean and Bay of Bengal.

Doldrums: A region of the ocean near the equator, characterized by calms, light winds or squalls. A slump. Period of depression or unhappy listlessness. This plural noun is used with a singular or plural verb.

Gale: A very strong wind. Winds with speeds from 32 to 63 miles (51 to 102 kilometers) per hour.

Gale force: Raging, wild, furious, blustery, tempestuous, stormy

Gulf Stream: A warm ocean current of the northern Atlantic Ocean off eastern North America.

Hurricane: A severe tropical cyclone originating in Pacific east of the International Date Line, equatorial regions of the Atlantic Ocean or Caribbean Sea, usually involving heavy rains. A wind with a speed greater than 74 miles (119 kilometers) per hour.

Knot: A unit of speed, one nautical mile per hour, approximately 1.85 kilometers (1.15 statute miles) per hour.

Nautical mile: Unit of length used in sea and air navigation, based on the length of one minute of arc of a great circle, especially an international and U.S. unit equal to 1,852 meters (about 6,076 feet).

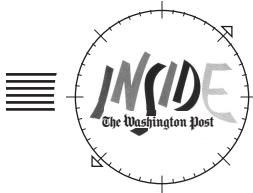
Sailing: Movement of a boat or ship by means of the driving force of the wind through the use of sails. The sail or sails are set at approximately a 90-degree angle to the longitudinal axis of the boat, with power derived from the wind's push on the sails' back surfaces.

Tornado: A violent, rotating column of air in contact with the ground. Whether it lasts a few minutes or hours, its winds are very destructive to anything in its whirling path.

Typhoon: Storms reaching sustained 74-mph or greater winds in the Pacific west of the International Date Line.

Water spout: A tornado over water. Its winds are typically 50-100 mph.

Definitions are from the American Heritage Dictionary and The Handy Weather Answer Book



If you don't have time for reading and research, place the explorers and their dates of voyage in random order. Ask students to organize them in a chronological timeline. Or ask students to record on a map how far each explorer got in his journeys.

3. Does an all-woman team have a chance in an endurance race? Go to the news archives and team sections on the home page of the Volvo Ocean Race to meet the skipper and 12-woman crew of *Amer Sports Too*.

The KidsPost articles used in this curriculum guide:

"Home on the Water" can be found at
<http://www.washingtonpost.com/wp-dyn/education/kidspost/niel/A31540-2002Apr22.html>

"On Board" can be found at
<http://www.washingtonpost.com/wp-dyn/education/kidspost/niel/A31538-2002Apr22.html>

"Around the World"
Graphic of the race course found on page 5 of this guide:
http://www.washingtonpost.com/wp-srv/metro/graphics/volvorace_041702.html

To read more about the Miami to Baltimore/Annapolis leg of the race, read the following:

"News Corp Takes Lead In Volvo"
<http://www.washingtonpost.com/wp-dyn/education/kidspost/niel/A63362-2002Apr17.html>

"Aussies Take Leg Up in Wee Hours Finish"
<http://www.washingtonpost.com/wp-dyn/education/kidspost/niel/A11104-2002Apr18.html>

"Elite Yacht Race Marketed to the Masses"
<http://www.washingtonpost.com/wp-dyn/education/kidspost/niel/A62721-2002Apr16.html>

These dispatches were used to gather data for the "Careful Packing" exercise:

Weight Watchers
http://www.volvooceanrace.org/news/feature/f1_011017_weight_watchers.html

Man Overboard Drill
http://www.volvooceanrace.org/news/feature/f2_011123_manoverboard.html

The Curse of the Cold
http://www.volvooceanrace.com/news/feature/f2_011114_hypothermia.html

Making the Unsafe Safe
http://www.volvooceanrace.com/news/feature/f3_011228_safetyfirst.html

Battered and Bruised
http://www.volvooceanrace.org/news/feature/f3_injuries_020108.html

Answers

Which of These Is True? 1. D, 2. B, 3. A, 4. C, 5. B, 6. B, 7. D, 8. C, 9. A, 10. C

Volvo Ocean Race

Southampton to Auckland

Leg One: 3. 96; 4. At the equator; This is a calm area with little or no winds; 5. Winds can cause huge waves that may damage a boat, fill it with water or capsize it. Members of the crew have been blown overboard.

Leg Two: 2. 7,537.60 miles; 3. The Southern Ocean area surrounds Antarctica. Here the Indian, Pacific and Atlantic oceans merge as they near the South Pole. Much of this leg was spent in the Southern Ocean, considered the most treacherous stretches of water on the planet. 4. Summer. They are near Antarctica where icebergs and hypothermia may endanger them. You may wish to use the map in the Antarctica curriculum guide.

Leg Three: 3. Read "Week 1: Highway Through Hell" (http://www.volvooceanrace.org/news/feature/f3_011229_week1.html) for a full account of what happened. Depending on how close the water spout is, skippers can try to steer away from it or drop sails and hope. 4. Tasmania. 5. 15,950 nautical miles.

Auckland to Baltimore

Leg Four: 2. Southern Ocean, Pacific Ocean, Atlantic Ocean. 3. The International Date Line is in the Pacific Ocean. It is an imaginary line mostly corresponding to 180 degrees longitude. To the east of it, the calendar date is one day earlier than to the west. 4. Tierra del Fuego belongs to Chile and Argentina. 5. Ferdinand Magellan and his crew called it land of fire when they saw the fires from native camps during the nights they made their way through the straits.

Leg Five: 2. Brazil; Brasilia. 3. A statue of Christ on Corcovado Mountain. 4. No. The boats were already in the Atlantic Ocean when they reached Brazil. 5. Florida.

Leg Six: 2. Chesapeake Bay. 3. This is where the 25-hour bombardment took

place that inspired Francis Scott Key to write the poem "The Star-Spangled Banner." On September 13-14, 1814, during the War of 1812, the fort withstood British attack. The poem became the national anthem in 1931. 4. The Gulf Stream assists boats sailing north. 6. 12,025 nautical miles.

Baltimore/Annapolis to Kiel

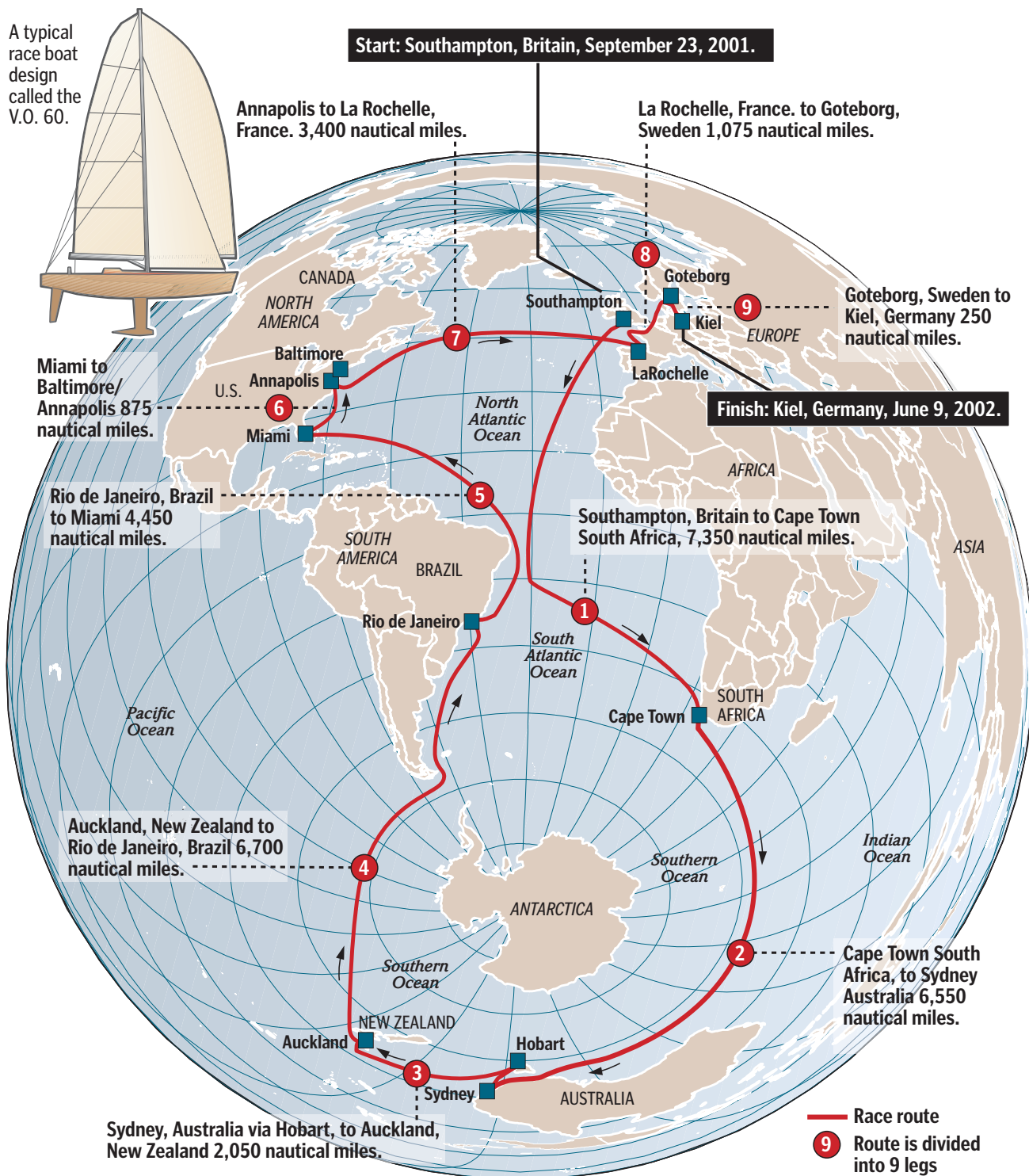
Leg Seven: 2. Remind students that Annapolis is the capital of Maryland and the home of the U.S. Naval Academy. 4. Titanic. On its maiden voyage, the luxury liner that had been declared unsinkable sank. It is believed 1,513 of more than 2,220 people aboard died.

Leg Eight: 2. Bay of Biscay, English Channel, North Sea, Baltic Sea. 3. The Vikings were Nordic people - Danes, Swedes, Norwegians. In the 11th century, England, Denmark and Norway composed the Scandinavian empire of the North Sea. They settled the uninhabited Atlantic lands of Iceland and Greenland. In Iceland, they produced the sagas of medieval literature.

Leg Nine: 2. 32,712 nautical miles. 3. Leg One. 4. Yes. 5. Kiel is located on Kiel Fjord and the Baltic Sea, directly facing the water, in Schleswig-Holstein between the North Sea and the Baltic. Kiel lives on the water and off the water with regular shipping links to the lands around the Baltic, Scandinavia, Russia and the Baltic States. 6. Helge Alten, Chief Executive of The Volvo Ocean Race stated, "Germany is one of the major markets in Europe, for race sponsors, syndicates and for Volvo. It is with great pleasure that I am able to confirm today that Kiel will be the finish port for The Volvo Ocean Race. Kiel was a natural choice for us to stage the finish. It has a world-class reputation for sailing, staging the Olympics sailing regatta twice, and Kieler Woche is also a fine example. The final leg will provide some exciting racing and the finish in Kiel will mark the end of a nine-month test of stamina, strength and endurance not just for the crews who will have sailed over 32,250 nautical miles, but also for the shore crews, sponsors and partners who have supported them."

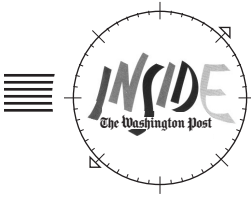
THE VOLVO 2001-2002

The boats circumnavigate the world around Antarctica in the southern regions. Total race distance is 32,700 nautical miles and exceeds the circumference of the world which is 21,600 nautical miles. All distances shown are in nautical miles and are approximate. 10 nautical miles equals 11.5 statute miles.



Azimuthal equidistant projection —Shows the whole world. The Web address for Volvo update <http://volvooceanrace.org>

BY LARRY FOGEL—THE WASHINGTON POST



Volvo Ocean Race: Southampton to Auckland

Sailboats sail from one harbor to another in the Volvo Ocean Race. The starting place to the destination is called a leg. There are nine legs in this race. Use the map on Page 5 to complete this activity. Answer on your own paper.

LEG ONE

1. Sailboats departed from Southampton, United Kingdom. Find it on the map.
2. Eight 60-foot yachts set sail for Cape Town, South Africa, on Sept. 23, 2001. They were to travel the 7,350 nautical miles by Oct. 23, 2001. Find Cape Town, South Africa, on the map. Mark the route from Southampton to Cape Town.
3. There are 12 crew on each sailboat. How many total sailors were competing in the Volvo Ocean Race?
4. The crew encountered very unusual weather on this leg of the trip. There were no northeasterly trade winds in the north Atlantic; then they made an uncharacteristically quick passage across the Doldrums. Where are the Doldrums?
Why does being in the Doldrums usually slow sailboats?
5. Unexpected weather influenced the sailboats as they neared Cape Town. Gale-force winds struck, blowing at 35 knots with gusts up to 45 knots. When is wind dangerous out at sea?

LEG TWO

1. On Nov. 11, 2001, the sailboats left Cape Town and sailed toward Sydney, Australia. Find Sydney on the map. Trace the route sailed from Nov. 11 to Dec. 4, 2001.
2. The distance on this leg is 6,550 nautical miles. A nautical mile is equivalent to 1.150779 miles. To how many "statute" or land miles was this leg equal?
3. This is the Southern Ocean leg of the route. Why is it called this?
4. What season is this in the Southern Hemisphere? Why might the sailors see icebergs?

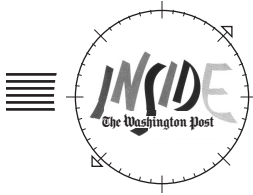
LEG THREE

1. On Dec. 26, 2001, the boats left Sydney by way of Hobart for Auckland, New Zealand. Find Auckland on the map. Trace the 2,050 nautical mile-route sailed Dec. 26 to Jan. 3, 2002.
2. While sailing the 630 miles from Sydney to Hobart, the weather turned bad. A thunderstorm began about 11 hours into the trip. The skipper of Djouce described what happened next: "I was driving at the time and while I was looking at the big cloud ahead of us, I could see a tornado-shaped thing starting to shape under the cloud. Within five minutes it had reached all the way down to the surface and was growing and spinning very fast - very scary stuff." A water spout had formed. It is fast-moving, long, vertical and spinning with the bottom of it pulling up water from the sea. Draw a picture of the water spout.
3. If you were skipper of a sailboat when a water spout set down, what would you have your crew do?
4. What is the name of the island on which Hobart is located? It is a part of Australia.
5. The distance from Sydney to Auckland is 2,050 nautical miles. How many total nautical miles were sailed on legs one, two and three?

Sydney Harbor



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Volvo Ocean Race: Auckland to Baltimore

This part of the race takes us from New Zealand to Brazil in the Southern Hemisphere, then north to the eastern coast of the United States. Use the map on page 5 to complete this activity. Answer on your own paper.

LEG FOUR

1. On Jan. 27, 2002, the sailboats departed Auckland for Rio de Janeiro, Brazil. They sailed 6,700 nautical miles and reached their destination by February 19. Trace the route of leg four on the map.
2. In what oceans are they sailing?
3. Where is the International Date Line? Why does it exist?
4. What countries lie at the southern most point of South America?
5. Which early circumnavigator named the southern tip of South America Tierra del Fuego (land of fire)?

LEG FIVE

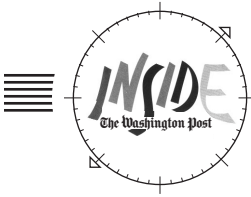
1. From Rio de Janeiro, the eight sailboats headed north for Miami. This is a journey of 4,450 nautical miles. They left the start line on March 9, 2002, and reached Miami by March 27. Trace the route on the map.
2. In what country is Rio de Janeiro located? What is its capital city?
3. What large statue greets people as they enter the bay in Rio de Janeiro?
4. Did the sailboats have to use the Panama Canal to get from Rio de Janeiro to Miami?
5. In what state is Miami located?

LEG SIX

1. Leg six is 875 nautical miles. The boats left Miami on April 14 and sailed for Baltimore. They were to reach Baltimore by April 17. Trace the route on the map.
2. In what bay is Baltimore located?
3. Leg Six finished at Fort McHenry. Why is this Maryland fort famous?
4. Why do you think only four days were needed to make this trip?
5. The Gulf Stream flows from the Gulf of Mexico through the Florida Keys to Cape Hatteras. It then flows northeast into the Atlantic Ocean away from land. East of Greenland, the Gulf Stream sinks into the deep ocean. Color its flow along the coast and into the open ocean, to Greenland where it disappears into the depths of the oceans.
6. How many total nautical miles were sailed in legs 4-6?



REUTERS



Volvo Ocean Race: Baltimore/Annapolis to Kiel

The last three legs of the race takes us from the United States to France, then north and east to Sweden and Germany. Use the map on page 5 to complete this activity. Answer on your own paper.

LEG SEVEN

1. On April 28, 2002, eight sailboats sail from Annapolis. They begin a 3,400 nautical mile-voyage to La Rochelle, France, where they are to arrive on May 11, 2002. Trace the route of this leg on the map.

2. Why do you think Annapolis was selected as the starting point for Leg Seven?

3. Where is Newfoundland located? Find it on the map.

4. In April 1912, a luxury liner was sailing from Southampton, England, to New York City when it struck an iceberg south of Newfoundland. What was the name of the liner? What happened to it?

5. Fishing and shipbuilding are part of the culture of La Rochelle. So are sidewalk cafes. Draw a picture of a scene in La Rochelle.



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LEG EIGHT

1. The sailboats depart La Rochelle on May 25 to travel 1,075 nautical miles to Gøteborg, Sweden. They are to arrive on May 31, 2002. Trace the route on the map.

2. On what bodies of water do the boats sail on Leg Eight?

3. Who were the Vikings? Where did they live?

4. This is the first time the race will visit Sweden. Swedish boats have competed in the race many times. Gøteborg is also the hometown of Volvo. Do you think it is a good idea to visit Gøteborg?

LEG NINE

1. On June 8, the last leg begins. The competitors sail 250 nautical miles from Gøteborg to Kiel, Germany. They are expected to cross the finish line on June 9, 2002. Trace the route on the map.

2. How many total nautical miles were sailed in the Volvo Ocean Race?

3. Which was the longest leg of the entire race?

4. Was the longest leg of the race given the most days to complete?

5. On what body of water is Kiel located?

6. Kiel hosted the Olympics sailing regatta twice and has a reputation around the world for gifted sailors. It is a major economic, academic and cultural center in both northern Germany and northern Europe, where both the navy and shipbuilding industries have their bases. State why you think Kiel is or is not a good place to end the round-the-world race.

7. Why do you think people compete in endurance races?

Chesapeake Bay Bridge

Which of These Is True?

You are given four choices after each question. One of the choices is the correct answer. Put the letter of the correct answer on the blank before the question.

_____ 1. Which of these items do most people need to survive?

- a. Apples
- b. Chocolate
- c. Pancakes
- d. Water

_____ 2. Which of these people would usually be found on a Volvo race boat?

- a. Fireman
- b. Sailor
- c. Reporter
- d. Acrobat

_____ 3. Which ocean is located between Annapolis, Maryland, and Southampton, England?

- a. Atlantic
- b. Baltic
- c. Pacific
- d. Southern

_____ 4. The crew encountered all of these **except**

- a. Doldrums
- b. Wind
- c. Desert
- d. Icebergs

_____ 5. Which is the shortest distance?

- a. 6,700 nautical miles
- b. 875 nautical miles
- c. 2,050 nautical miles
- d. 6,550 nautical miles

_____ 6. In which direction did the eight sailboats sail from Rio de Janeiro to reach Miami?

- a. East and South
- b. North and West
- c. South
- d. West and South

The Iditarod is an annual race held in March.

Approximately 75 teams start the race each year.

Twelve to 16 dogs pull a sled for 1,150 miles from Anchorage to Nome, Alaska. During the eight to nine days, the mushers and dogs face freezing temperatures, snow and very difficult terrain.

_____ 7. How often is the Iditarod race held?

- a. Once every month
- b. Only when it snows
- c. Once every four years
- d. Once a year

_____ 8. What is a “musher”?

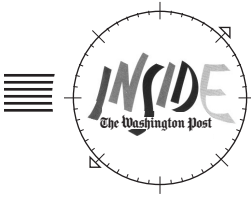
- a. Specially trained dogs
- b. Lead dogs
- c. Human who drives the sled
- d. Veterinarian

_____ 9. How many dogs usually pull each sled?

- a. Around a dozen
- b. Fewer than a half dozen
- c. More than two dozen
- d. Ten

_____ 10. If the race took nine days to complete, how many miles per day would the team have to average to complete the race?

- a. 96 miles
- b. 2 miles
- c. 128 miles
- d. 1,000 miles



Careful Packing: Staying Healthy and Safe is Challenging

The eight sailboats in the Volvo Ocean Race are competing with each other all nine legs of the race. In order to win, each team must navigate well, sail fast and keep its boat and crew in good shape. This means they must travel light, and be ready for any danger and extremes in weather conditions. Let's take a closer look at the decisions they have made. Write your answers on your own paper.

Safety

Each boat must be as light as possible, yet the team must ensure the safety of each of its 12 members. List four examples of the basic equipment that the crew packed, then tell how each example will help to keep the crew safe.

Drill

Just as school administrators require fire drills, the organizers of this race required all competing teams to demonstrate their ability to operate their emergency equipment prior to the start in Southampton. These demonstrations included the use of the emergency rudder, storm sails and the most important exercise of all—the man-overboard drill. What equipment would you expect to see used in the man-overboard drill?

Navigation

The skipper and crew must make wise decisions of where to sail in the large bodies of water. What advances in modern technology are helping the boats to find the fastest and safest routes? Do you think it is fair to use modern technology in an endurance race?

Meals

The team members eat three main meals a day. To save weight the meals are freeze-dried. Their meals range from pasta bolognese to Chinese rice and beef stroganoff. For every day at sea, each crew member needs to consume more than 5000 calories, more than double the normally recommended calories for a person. If you have had astronaut's ice cream from the Smithsonian, you have eaten freeze-dried food. Plan one day's menu that will be interesting, balanced, and provide zinc and other necessary minerals and vitamins.

Snacks

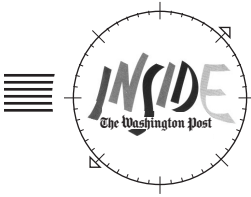
Snacks are consumed for health and motivation. Why would each of the following be a wise choice for snacks? 1. Mixed nuts and dried fruit, 2. Chocolate candy bar, and 3. Peanut butter.

Dehydration

Every boat carries a water-maker (plus a back up) which removes the salt from sea water to make it drinkable. When thirsty, crew do not care what the water tastes like. Lack of water can effect mental acuity, physical ability and kidney function. Magellan and other sailors knew the benefits of vegetables and fresh fruit for water and nutrition. Should race organizers make it mandatory that each boat pack a ration of fresh vegetables and fruit on each leg for each crew member?

IV Intervention

Riders in the Tour de France finish each stage of their bicycle race through France, enjoy dinner, and then sleep while hooked up to intravenous (IV) drips that feed all the necessary vitamins along with fluid directly into their circulation. Do you think the bicyclists should continue with this practice in order to compete at the current high performance level or should the race be changed to reflect real human needs? Why would you or would you not recommend this practice to maritime marathoners?



Word Study: A Look at Circumnavigation

What do “circumlocution,” “circumvent” and “circumspect” have in common? They have the same prefix, “*circum*.” Do you remember what the Latin word “*circum*” means? Think of the circumference of a circle. It is the distance around the outside of a circle.

Have you ever been to a three-ring circus performance? Inside three large circles action is taking place. “Circus” comes from the Middle English word *cercle*, which was from Old French. For the word origin, we have to look further back to Latin *circulus*, which meant circle and came from Greek *kirkos*. We’ve been going in circles for many generations.

We don’t want to be running, or walking, in circles in the hallways at school. We want to navigate our way to class to be on time. “Navigate” is actually a seafaring term. It comes from *navis*, the Latin word for ship. You know what a navy is. Perhaps, you have visited the U.S. Naval Academy in Annapolis.

The second part of “navigate” is a verb. “*Agere*” is the Latin action word that means to drive or lead. So “navigate” originally meant to voyage over water in a boat or ship. The first boats to navigate the waters used the wind and sails.

After the Greeks and Phoenicians came more daring explorers who wanted to explore the waters and lands even further from home. They didn’t know that Earth was round, but eventually Magellan and Sebastian del Cano circumnavigated the globe. Such voyages took years without ways to send messages home.

It is a wonder they found their way to and around land masses.

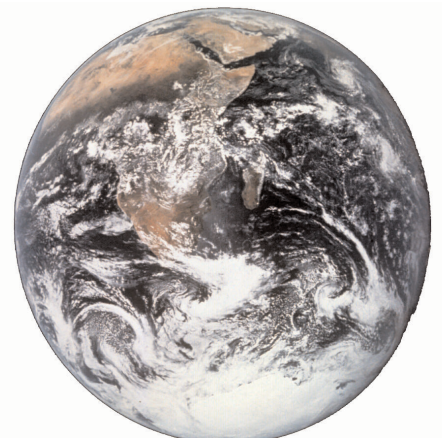
Sometimes they encountered stormy weather. One of these circulating storms is a cyclone. In the Northern Hemisphere the air circulates in a counterclockwise direction. In the Southern Hemisphere the high winds blow in a clockwise direction.

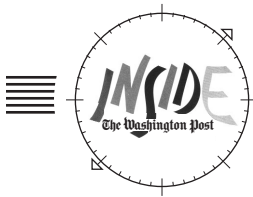
“Cyclone” was formed from the Greek verb *kuklon*, meaning to rotate, and *kyklos*, another Greek word meaning circle.

Have you ever been in a vehicle that has a navigation system? If you want to find how to get to the nearest ice cream parlor, you have to start with your location. Finding one’s way across an ocean is very similar. A navigator usually attempts to find the shortest route between two points. Since the earth is not a flat surface, navigating the sphere requires establishing a fixed position from which other measurements are determined.

Navigators have developed instruments that help them to measure direction and distance and to determine speed. One of the oldest instruments used aboard ships is the magnetic compass. For celestial navigation, navigators use a sextant to measure the distance between two objects. Large modern ships use a gyroscope. Another instrument can help establish direction. It is called the azimuth circle. Another instrument known as the log is used to determine the speed of a ship and distance traveled through the water.

What were the circumstances that encouraged explorers to circumnavigate the globe?





Academic Content Standards

This lesson addresses academic content standards of Maryland, Virginia and the District of Columbia. Among those that apply are:

Maryland

Social Studies

Social Studies Skills (1.0): Students will demonstrate an understanding of historical and current events using chronological and spatial thinking, develop historical interpretations, and frame questions that include collecting and evaluating information from primary and secondary sources. At the end of grade 5, students know and are able to: 1.1.5.3 find, interpret, and organize primary and secondary sources of information including pictures, graphics, maps, atlases, artifacts, timelines, political cartoons, videotapes, journals, and government documents.

Geography (4.0): 4.1 Students demonstrate understanding of the purpose of and are able to use and construct maps, globes, and other geographic tools to acquire, process, analyze, and report geographic information about people, places and environments. At the end of grade 3, students know and are able to: 4.1.3.4 explain why some locations are better than others for specific human activities.

Mathematics

Knowledge of Measurement (3.0): Students will identify attributes, units, and systems of measurements and apply a variety of techniques, formulas, tools and technology for determining measurements. By the end of grade 3, students know and are able to: 3.3.4 use length, capacity, weight, temperature, and time to solve problems.

A complete list of Standards of Learning of Maryland can be found on the Web at <http://www.mdk12.org/mspp/standards/>.

Virginia

History and Social Science

Geography, Grade 3:3.5: The student will distinguish between meridians of longitude and parallels of latitude and use the equator and prime meridian to identify the Northern, Southern, Eastern and Western hemispheres.

Virginia Studies, Grade 4:4.2: The student will use the concepts of absolute location and relative location to locate and identify on maps and globes his/her local city or county, Virginia, the other original states, the United States, Western Europe and West Africa.

Mathematics

Computation and Estimation, Grade 3: 3.8 The student will solve problems involving the sum or difference of two whole numbers, using various computational methods, including calculators, paper and pencil, mental computation and estimation.

Measurement, Grade 3: 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units to measure length, liquid volume and weight/mass.

A complete list of Standards of Learning of Virginia can be found on the Web at <http://www.pen.k12.va.us/>.

Washington, D.C.

History

Scientific, Technological and Economic Change, Content Standard 3: Students recognize scientific, technological and economic changes and understand how they have affected societies, culture and politics throughout history. Grade 5: The student identifies inventions that revolutionized exploration.

Mathematics

Number & Operations, Content Standard 1: The student interprets multiple uses and forms of numbers and how they relate to each other. By the end of Grade 3, the student will describe and use the relationships between addition and subtraction.

Measurement, Content Standard 5: The student selects and uses appropriate tools and units for systems of measurement. Grade 4: The student uses basic ways of estimating and measuring the size of figures and objects in the real world, including length, width.

A complete list of Standards for Teaching and Learning of the District of Columbia Public Schools can be found at <http://www.k12.dc.us/>.