

Reading a Globe

Overview:

Globes, which are models of Earth, can be useful in learning about the aurora. Many of the lines on a globe represent concepts important to understanding the aurora and the history of aurora research. The aurora forms ovals around Earth's magnetic poles. Usually these ovals are located at high latitudes. During this lesson, students learn the significance of the many lines drawn on globes (including latitude and longitude lines).

Objectives:

The student will:

- differentiate between latitude and longitude;
- find places on a map using latitude and longitude; and
- locate, label and understand the significance of the Equator, Prime Meridian, International Date Line, Arctic Circle, Antarctic Circle, Tropic of Cancer, and Tropic of Capricorn.

Materials:

- Globes
- Dictionary, encyclopedia or geography textbook
- STUDENT WORKSHEET: "Reading a Globe"

Activity Procedure:

1. Photographs taken from space show that the aurora forms an oval around each of Earth's magnetic poles. Use a globe to show students where the aurora oval usually forms. Review latitude and longitude definitions, then explain that the aurora occurs overhead at high latitudes. Locate Alaska on the globe and ask students why they can see the aurora from this state.
2. Divide students into groups of 4 or 5. Distribute one globe to each group and the STUDENT WORKSHEETS: "Reading a Globe" to each student. Explain that globes have many lines in addition to latitude and longitude. Ask students to examine the globe and identify other lines on it.
3. After students have located the Equator, Prime Meridian, International Date Line, Arctic Circle, Antarctic Circle, Tropic of Cancer and Tropic of Capricorn, ask them use a reference book or the Internet to learn what each line means/represents. Students should complete the first part of the worksheet as they learn the purpose of each line.
4. Discuss the significance of each line with your students, then demonstrate how to locate places using latitude and longitude lines.
5. Ask students to practice locating countries using latitude and longitude, and then direct their attention to questions #11 - #16 on the STUDENT WORKSHEET: "Reading a Globe." Ask students to identify the countries belonging to each set of latitude and longitude coordinates. Discuss the region where the aurora ovals are found (at high latitudes).
6. Ask students which country (of those identified) is most likely to have the aurora oval overhead and why. Students should respond that Greenland is the most likely country to have the aurora oval overhead because it is located at the highest latitude.

Reading a Globe

Teacher's Note: *Prime Meridian:* An international committee established the Prime Meridian as passing through Greenwich England in 1884. Prior to that, Prime Meridians were different for different countries. For example, in Italy, the Prime Meridian passed through Rome; in France, it passed through Paris.

Distance between lines of latitude:

1 degree (1°) = 111 kilometers or 69 miles

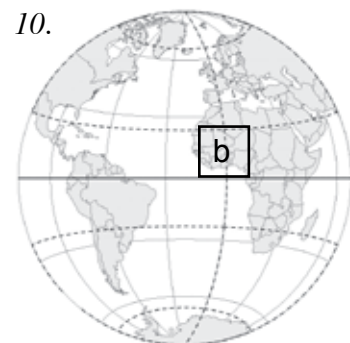
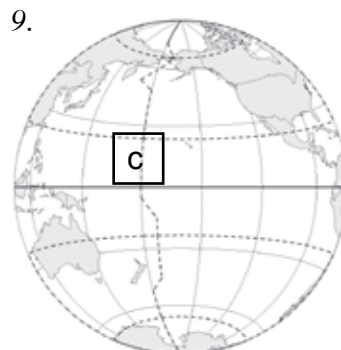
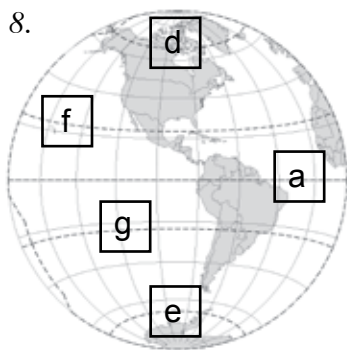
1 minute (1') = 1.85 kilometers or 1.15 miles

1 second (1'') = 30.83 meters or 101.2 feet

Teacher's Note: As you move north or south of the equator, the distance between the lines of longitude gets shorter until the lines meet at the poles. Therefore, the distances between lines of longitude will vary depending on location.

Answers to Student Worksheet:

- | | | |
|----------------------------|----------------------|---------------|
| 1. Arctic Circle | 6. Equator | 13. Norway |
| 2. Prime Meridian | 7. Tropic of Cancer | 14. India |
| 3. Tropic of Capricorn | 8-10. see maps below | 15. Zaire |
| 4. Antarctic Circle | 11. Greenland | 16. Greenland |
| 5. International Date Line | 12. Brazil | |



Reading a Globe

Directions: Although a globe is a model of Earth, there are many lines on a globe which are not present on Earth's surface. The equator is one of the most obvious lines, but there are many others. Take a close look at a globe and locate each of the lines listed in the box. Use the Internet, a textbook, a dictionary or an encyclopedia to learn the importance of each word, then complete questions 1-7 by writing the word that matches each definition.

1. This line marks the northernmost point at which the sun is visible on the northern winter solstice.

2. A line representing 0° longitude that passes through Greenwich, England.

3. The southernmost latitude at which the sun can appear directly overhead.

4. This line marks the southernmost point at which the sun is visible on the southern winter solstice.

5. A line mostly at 180° longitude. When you cross this line going east you go back a day. When you cross it going west you go forward a day.

6. A circle halfway between the north and south poles that divides Earth into the northern and southern hemispheres.

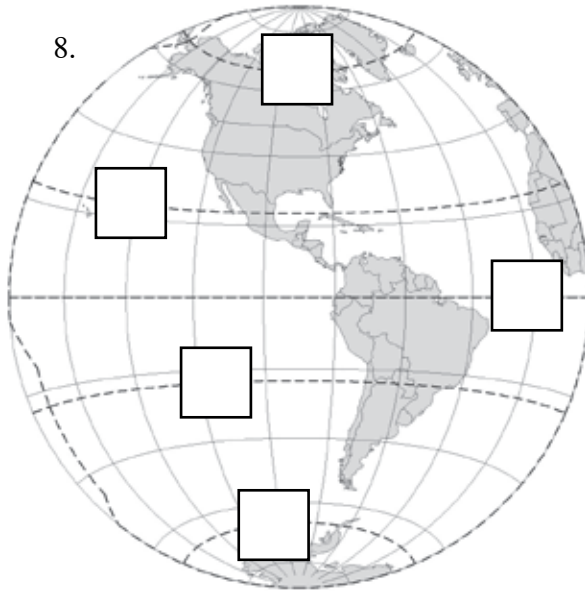
7. The northernmost latitude at which the sun can appear directly overhead.

Equator
Prime Meridian
International Date Line
Arctic Circle
Antarctic Circle
Tropic of Cancer
Tropic of Capricorn

Reading a Globe

Directions: Label the dashed lines on each globe by filling each box with the letter that corresponds to the correct word from the word bank.

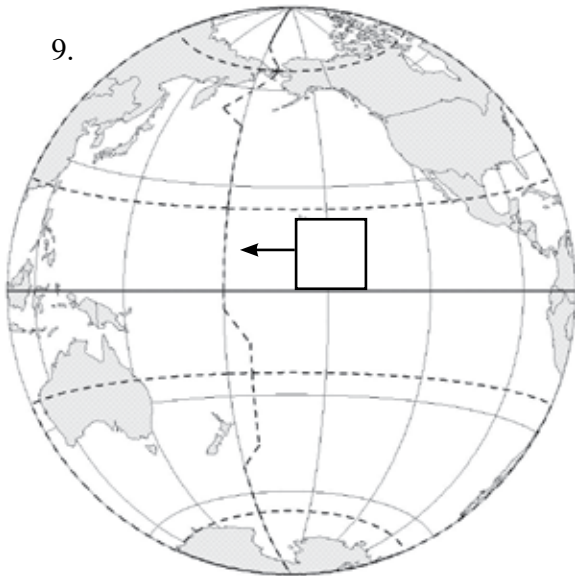
8.



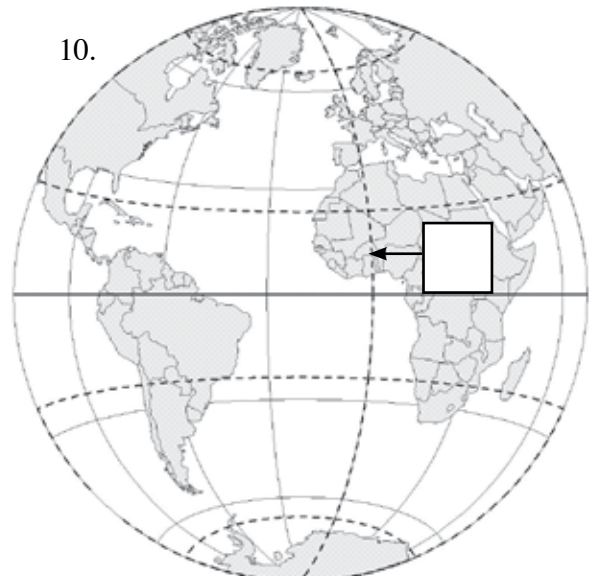
WORD BANK

- a) Equator
- b) Prime Meridian
- c) International Date Line
- d) Arctic Circle
- e) Antarctic Circle
- f) Tropic of Cancer
- g) Tropic of Capricorn

9.



10.



Reading a Globe

Directions: Earth's surface is crisscrossed by imaginary lines known as latitude and longitude. The lines that run parallel to the equator are lines of latitude, and the lines that run perpendicular to the equator are lines of longitude. These lines make up a coordinate system for pinpointing places on Earth's surface. By using latitude and longitude, any place on Earth can be accurately located. The aurora can be seen best at high latitudes because the aurora ovals are centered around Earth's magnetic poles. High latitudes are those that are far from the equator. Using a globe, find the countries located at the following latitudes and longitudes. Fill in the name of the country on the line next to its latitude and longitude below.

11. N 70°, W 40°: _____

12. S 10°, W 50°: _____

13. N 60°, E 10°: _____

14. N 20°, E 80°: _____

15. 0°, E 20°: _____

16. Which of the countries you located is most likely to have the aurora oval overhead?
