

2 Understanding a Circumpolar Map

Objectives of this lesson:

- To understand the hemispheres and lines of latitude and longitude, and use this understanding to locate places on a map
- To understand the extreme seasonal changes in the Arctic

Time:

45-60 minutes

Age:

KS2 Years 4-6

Materials:

- Inflatable globe
- Hand-held legends
- Large ball
- An orange (not included in trunk)
- Map examples
- Latitude and longitude worksheets and teacher answer key
- Writing utensils

National Curriculum Objectives KS2:

- Use maps, atlases, globes and digital/computer mapping to locate countries and describe features studied (Geographical skills and fieldwork)
- Identify the position and significance of latitude, longitude, [...] Northern Hemisphere, [...] Arctic [...] Circle, the Prime/Greenwich Meridian and time zones (including day and night) (Locational knowledge)

Starter

If students have not been on the Giant Floor Map in a previous lesson, allow them time to explore the map and make their own connections. Encourage them to look for familiar place names and geographic features. Ask students to determine the type of map they are looking at (physical) and what they think each colour represents.

Explain that the Giant Floor Map is a circumpolar map. Distribute the hand-held legends and allow students time to explore the map again and draw new conclusions.

Using the inflatable globe as a demonstration tool, have students name and locate the continents and find the United Kingdom. Next, turn the globe so that the North Pole is facing students (circumpolar view). Identify some of the countries and points of interest on the globe and have students find these places on the Giant Floor Map.

Explain to students that the Earth is a sphere and that when a map is drawn, the perspective becomes distorted on a flat surface. As an example, hold up an orange and ask students to imagine that the orange is the Earth. Ask a volunteer to peel the orange in one piece and then try to lay it flat. This illustrates the challenges of representing curved surfaces on paper. Ask students who designs maps. Explain that cartography is the study and practice of making maps. Cartographers use science, technique and aesthetics to design maps.

Ask students to name different kinds of maps. Show examples to the class (e.g., road maps, climate maps, topographical maps, economic or resource maps, physical maps, political maps).

Ask students what are the five key elements of most maps (legend, key, title, scale and compass directions). Explain that although compass directions are very important on most maps, they do not work well on circumpolar maps near the North Pole. People need to navigate in other ways, such as satellite navigation.

Using the hand-held legends, ask students to identify the legend, key, title and scale of the Giant Floor Map.





2 Understanding a Circumpolar Map

Understanding latitude and longitude

Ask students to explain what they already know about latitude and longitude. Remind them that latitude and longitude form a coordinate system that helps us to pinpoint locations on the Earth. If students are not familiar with the concept, use the following explanation to assist with their understanding.

Latitude

Lines that run horizontally (east to west) are called lines of latitude or parallels. Show these lines to students on the inflatable globe and then ask a volunteer to walk on a line of latitude on the Giant Floor Map. Ask students what line is at zero degrees latitude (the equator). Have a student locate the equator on the inflatable globe.

Explain that lines of latitude are numbered from 0 degrees to 90 degrees, north and south. The equator is zero degrees, the North Pole is 90 degrees north and the South Pole is 90 degrees south. The equator divides the globe into northern and southern hemispheres. Ask students which hemisphere is shown on the Giant Floor Map.

The Arctic Circle is a line of latitude at around 66 degrees north of the equator. Anything at higher latitudes is known as the Arctic. Have a student locate and walk around the Arctic Circle on the Giant Floor Map.

Longitude

Lines running horizontally (north to south) are called lines of longitude or meridians. They converge at the poles and are spaced widest apart at the equator. Have students locate lines of longitude on the map.

Explain that lines of longitude are numbered from 0 degrees to 180 degrees, east and west of the prime meridian (0 degrees). The prime meridian divides the globe into western and eastern hemispheres and passes through Greenwich, a suburb of London. Explain that when visiting Greenwich, it is possible to jump between the eastern and western hemispheres. Ask a student to locate the prime meridian on the Giant Floor Map and jump between the two hemispheres.

On the other side of the Earth, opposite to the prime meridian, lines of longitude meet at 180 degrees. This line is called the antemeridian. Have students locate this on the map.





2 Understanding a Circumpolar Map

Using latitude and longitude

When finding locations on a map, coordinates are expressed as latitude, then longitude. It is helpful to start at the prime meridian and then move up (north) or down (south) to the correct latitude. Then, move left (west) or right (east) along the line of latitude to the correct longitude. The location is where the lines of latitude and longitude meet. Explain to students that on the circumpolar Giant Floor Map, all of the latitudinal coordinates will read north as the map only depicts the northern hemisphere.

Have students find these locations on the Giant Floor Map:

- What country is found at 65N, 20W? (Iceland)
- What is found at 80N, 50E? (islands belonging to Russia)
- What major city is found at 60N, 10E? (Oslo, Norway)
- Find 70N, 70E. What country are you standing in? (Russia)
- Find 60N, 140W. Where are you standing? (Near the Canada-U.S. border in Alaska)
- What Canadian island is found at 70N, 110W? (Victoria Island)

Once students have located these coordinates, hand out the latitude and longitude worksheets and allow students to work in pairs or small groups to locate the places on the Giant Floor Map. Note: Students should start at different coordinates so that they are not in the same place at the same time.

Understanding extreme seasonal change in the Arctic

Day and night

Complete a short demonstration to model day and night. Hold the inflatable globe vertically and have a student hold another very large ball or torch representing the sun. Ask students what happens as the Earth rotates on its axis. Daytime occurs when the sun is above a point on the globe, and night-time occurs when the same point on the globe is facing away from the sun. The Earth completes a full rotation every 24 hours.

Seasons

Ask students if they know how long it takes the Earth to make its journey around the sun (one year). Explain that Earth's axis of rotation is actually tilted at an angle of 23.5 degrees. Earth is always tilted to one side as it orbits the sun. When the Earth is tilted towards the sun, it is summer in that part of the world. When it is tilted away from the sun, it is winter in that part of the world. Demonstrate this by using the inflatable globe and another object to mimic the sun.





2 Understanding a Circumpolar Map

Explain this concept using hemispheres. When the northern hemisphere is closest to the sun (June, July and August), it is summer there and winter in the southern hemisphere, which is tilted away from the sun. Six months later, the Earth has completed half a revolution, so now the southern hemisphere is tilted closest to the sun (December, January and February) and experiencing summer, and the northern hemisphere is tilted away and experiencing winter. Explain that the poles experience this to the extreme. When the northern hemisphere is tilted towards the sun and spins on its axis to create day and night, the North Pole is always facing the sun. Demonstrate this to students using the inflatable globe. This means that for about half the year, there is always daylight. Then, when the northern hemisphere is tilted away from the sun and spins on its axis, the North Pole is dark for the other half of the year.

The Arctic

The darkest time of year in the Arctic is during the winter solstice, which falls on or near December 21. By then, the sun has not risen in the Arctic since early October. The darkness lasts until early March.

In contrast, during the summer months, the Arctic experiences light all day long, even at night. The summer solstice falls on or near June 21 and is a time of celebration for people who live in the far north and Arctic. There are parties and festivals in Arctic nations, including Canada, Sweden, Norway, United States (Alaska) and Russia.