

# TO WHAT DEGREE?

**RECOMMENDED GRADES: 4-8**



**TIME NEEDED: 30-45 MINUTES**

### Description

Students walk on lines of latitude and longitude on the map and compare these to lines on a globe. They then locate places using coordinates.

### Learning Objectives

Students will:

- observe how a map projection shows a spherical Earth on a flat map
- discover latitude and longitude, and their characteristics
- find coordinates on a map

### Materials

- Globe (inflatable or other)
- To What Degree? Cards
- Colored cones (28 total: 7 red, 7 yellow, 7 green, 7 blue)

### Preparation

*10 minutes*

- Read over the activity, make adaptations for student grade level, and gather materials.
- Distribute colored cones and To What Degree? Cards.

### Rules



Have students remove shoes before walking on the map.

## DIRECTIONS

### PART ONE: EXPLORE LATITUDE AND LONGITUDE

#### Latitude

1. Have all students begin on the southern yellow border of the map. Direct seven students to take a big step forward and line up on 10° north latitude and to face the teacher at the North Pole.

### Modification

Have younger students hold hands to assure continuity of movement.

Have all seven students take steps to the next line (20° north latitude) and stop. Then, take steps to the next line of latitude line (30° north latitude) and stop. Repeat to the next line (40° north latitude).

2. Tell student that they are measuring distance from the Equator. Have students look for the Equator on the map. Explain that only a tiny bit of it is visible; most of it is just south of what is shown on the map. Latitude is a way we can measure distance going north and south. These lines do not really appear on Earth, only on a map. They allow us to accurately measure distance.
3. Ask students to return to the yellow border. Select four new students and have them start on the red circle in the lower right corner of the map. Ask one student to stand on 10° north latitude, another on 20° north latitude, another on 30° north latitude, and one at 40° north latitude. Have students hold hands and step across the map along their line of latitude.
  - *Are these lines getting closer?* [No, they are parallel, like slices of a tomato. Because they measure distance from the Equator, they have to be equal distances from each other.]
  - *What is the Equator's number?* [0°. That is where this measurement begins on all maps.]
4. Tell students that the North Pole is 90° north latitude. The South Pole is located at 90° south latitude (sometimes noted as -90° latitude).
5. Have students return to the southern yellow border.

### Longitude

1. Ask for a new group of seven students to line up along 10° north latitude. Place each student at the "crossroad" with a line coming from the north. This line is called longitude and measures distance from the line known as the prime meridian, also known as the Greenwich meridian.
2. Have students hold hands (or reach out toward their neighbor), walk five steps toward the North Pole and stop. Tell students to make sure they stay on their line of longitude. Walk five more steps and stop. What is happening to the distance between you? A few more steps until all get to 80° north latitude. Now students will be standing shoulder to shoulder.
  - *Are these lines getting closer?* [Yes, lines of longitude all meet at the poles and are like wedges of a lemon.]
  - *Why do lines of latitude and longitude appear to be curved?* [The lines are straight lines drawn upon the curved surface of Earth.]

## TO WHAT DEGREE?

3. Show students these lines of longitude on the globe. Explain that they are straight lines on the surface of the globe, but when drawing these lines on a flat map these lines will be arched, which is the distortion that occurs when representing a sphere on a two-dimensional surface.
4. Tell students Earth is divided into  $360^\circ$  of longitude;  $180^\circ$  of longitude east of the prime meridian, and  $180^\circ$  west of it (sometimes noted with a minus sign). The distance between degrees of longitude is not constant. At the Equator the distance between degrees of longitude is about 69 miles, the same as latitude. A few feet from the poles, they are mere inches apart.

### Coordinates

1. Explain to students that anyplace on the surface of Earth can be identified by its coordinates, a notation of a location's latitude and longitude.

Demonstration: Have students locate a few famous locations in North America using coordinates:

- Approximately  $20^\circ$  N,  $100^\circ$  W [Mexico City]
- Approximately  $40^\circ$  N,  $74^\circ$  W [New York City]
- Approximately  $61^\circ$  N,  $150^\circ$  W [Anchorage]

## PART TWO: TO WHAT DEGREE

1. Divide the class into four teams—red, yellow, green, and blue—and instruct each team to line up on the yellow border behind their “Base Camp” (the colored circles in the corners of the map). As the game is a relay race, each team should have the same number of players. If a team is short a player, one player on that team will play twice.
2. On the circle at each Base Camp, stack colored cones of the corresponding team color, one cone per player. Stack each team's To What Degree? Cards—one per player—face down next to the colored circles at the Base Camps.
3. Tell students that the object of the game is to be the first team to locate and mark each of the coordinates from the game cards. The teacher will be the referee. Instruct the first player in line from each team to stand on his or her Base Camp and take one cone from the stack. Explain that the player on the circle is the “Explorer.”
4. Tell students that each Explorer must draw one card at the beginning of the game. On each card are coordinates to one location on the map. The Explorer must walk along printed lines of latitude and longitude on the map in search of these coordinates, being careful not to step off the line. Players may not walk through a spot marked with a cone, but must find another route to their coordinates. If any Explorer steps off the line, he or she must return to Base Camp and begin again. If any two Explorers touch each other, they must both return to Base Camp and begin again.

## TO WHAT DEGREE?

5. Explain that once an Explorer locates their coordinates, they must mark the spot with a cone and place their card beneath the cone. The player then returns to Base Camp continuing to walk along the lines of latitude and longitude. They must tag the next teammate and rejoin their team members at the end of the line on the border. The teammate who has just been tagged steps into the colored circle, becomes the Explorer, and draws a card.
6. Explain that the winning team is the first to locate and correctly mark all of its coordinates, and return to the yellow border. Have students continue playing until all teams have finished.

**Note:** The game may be a little more difficult for Blue Team and Yellow Team as their Base Camps are at the north end of the map. In addition, as the game progresses, many direct paths to coordinates will become blocked. Players will need to work harder to find a path to their coordinates through the maze of spots already marked.