**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ PERIOD: \_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_**

**LAB PARTNERS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ LAB #6**

**LOCATING POSITIONS ON THE EARTH USING LATITUDE AND LONGITUDE**

**INTRODUCTION**

To determine locations on the Earth’s surface, you must have points of reference. A coordinate system, which is a system of imaginary lines, has been developed. The latitude-longitude coordinate system is the most commonly used system to locate places on the Earth’s surface. Latitude is the angular distance north or south of the equator. Longitude is the angular distance east or west of the prime meridian. In this lab you will be using different views of the Earth’s latitude-longitude system to locate and describe locations on Earth’s surface.

**MATERIALS**

World map

Globe

Pencil with eraser

**APPROXIMATE TIME** 2 periods

**OBJECTIVES**

To determine positions on the earth using the coordinate system of latitude and longitude.

**PROCEDURES:**

1. Answer questions 1 and 2 in Part I.
2. Using the coordinates of latitude and longitude provided in Part II; plot these on the attached world map.
3. Find letters I-P on the world map and determine the latitude and longitude for each location.
4. In Part 4, find the cities listed and determine their latitude and longitude by using the world globe.
5. Answer lab questions in Parts 5, 6, and 7.

**PART 1**

1a. From what reference line on the earth is latitude measured? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1b. What is the latitude of this line? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2a. From what reference line on the earth is longitude measured? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2b. What is the longitude of this line? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2c. Through what city does this line pass? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART 2**

On the world map (page 40), place a letter at the following coordinates. Then use a highlighter or colored pencil to color over the letter.

A 10° N, 50° E

B 30° N, 10° E

C 40° S, 25° E

D 55° S, 100° E

E 60° N, 135° W

F 65° N, 120° W

G 70° S, 115° W

H 75° S, 75° W

**PART 3**

On the world map, find the following points and determine their latitude and longitude.

|  |  |  |
| --- | --- | --- |
|  | LATITUDE | LONGITUDE |
| I |  |  |
| J |  |  |
| K |  |  |
| L |  |  |
| M |  |  |
| N |  |  |
| O |  |  |
| P |  |  |

**PART 4**

Using a globe, determine the latitude and longitude of the following cities?

|  |  |  |
| --- | --- | --- |
| CITY | LATITUDE | LONGITUDE |
| San Francisco |  |  |
| New York City |  |  |
| Mexico City |  |  |
| Paris |  |  |
| Moscow |  |  |
| Tokyo |  |  |
| Sydney |  |  |
| Cape Town |  |  |
| Buenos Aires |  |  |
| Baghdad |  |  |

**PART 5**

**QUESTIONS**

1. What is the latitude of the North Pole? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Explain why any two lines used to determine latitude never can touch each other.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. You are on a boat which is crossing the Prime Meridian. The altitude of Polaris is 50º. Explain how you know the boat's location is 50º North latitude and 0º longitude.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain why the distance between two meridians at the North Pole is 0 miles.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the maximum number of degrees of longitude possible? \_\_\_\_\_\_\_\_\_\_\_\_



**P**

**O**

**N**

**L**

**M**

**I**

**J**

**K**

# PART 6

## PROBLEM SOLVING

(Answer these questions in complete sentences)

1. Is it possible for a city to be located at 115º S latitude and 25º W longitude? Explain.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. What is located at the following coordinates?

40° South Latitude

80° East Longitude

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What happens to the distance between longitude lines as one moves from the North Pole to the Equator? Explain.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Using your ESRT, what is the approximate latitude and longitude of your school?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. There is an old phrase “Digging a hole through the Earth’s center would bring you out in China.” If you could drill a hole from Long Island straight through the Earth’s core, where would you in fact come out?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### PART 7

#### LATITUDE/LONGITUDE IN NEW YORK STATE

Using the map on page 3 of your Earth Science Reference Tables entitled “Generalized Bedrock Geology of New York State,” answer the questions below.

1. What city is located at the following coordinates?

|  |  |  |
| --- | --- | --- |
| LATITUDE | LONGITUDE | LOCATION |
| 40°45’N | 74° W |  |
| 43°15’N | 77°37’W |  |

1. Give the latitude and longitude, to the nearest minute, of the following locations:

|  |  |  |
| --- | --- | --- |
| LOCATION | LATITUDE | LONGITUDE |
| ELMIRA |  |  |
| MASSENA |  |  |

### PART 8

Views of the Earth’s northern or southern hemisphere can be represented by showing a polar view of the Earth’s latitude and longitude system. In this type of map, for the northern hemisphere, the North Pole is in the center of the map representing a latitude of 90º N. The rest of the latitude lines are drawn as circles. Longitude lines are shown drawn from the pole to the outside of the map. Use the map on the next page to learn to interpret plotted points as well as plot points using a polar version of the latitude-longitude system.

#### LATITUDE/LONGITUDE POLAR VIEW



Using the map above, answer the questions below:

1. What is the latitude and longitude of point A?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the latitude and longitude of point B?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Plot point C using the following coordinates: 45°N 30°E
2. Plot point D using the following coordinates: 75°N 120°W
3. Which of the two lettered points have same solar time? Explain.

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART 9**

**TELLING TIME ON EARTH**

**Use the diagram to the right to answer questions 1 through 5.**



1. What is the rate of the Earth’s rotation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. For every 15˚ of longitude time changes by \_\_\_\_\_\_\_\_ hour(s).
3. In this diagram of the Earth longitude lines are \_\_\_\_\_\_\_\_\_\_\_\_ degrees apart.
4. If it is 3 PM at point X, what time is it at point Y? \_\_\_\_\_\_\_\_\_

Point Z? \_\_\_\_\_\_\_\_\_\_\_

1. If it is 4 AM at point Z what time is it at point X? \_\_\_\_\_\_\_\_\_\_

**Use the diagram below to answer questions 6 through 9.**

1. In this diagram of the Earth longitude lines are \_\_\_\_\_\_\_\_\_\_\_\_\_ degrees apart.
2. If it is 9 AM at Point D, what time is it at Point C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Point E? \_\_\_\_\_\_\_\_\_\_\_
3. Which two lettered locations have the same time?

Explain:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain why the time zones are 15˚ of longitude apart.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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