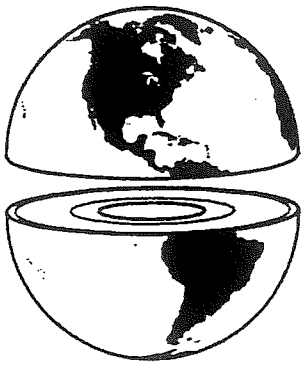
Name ANSWER KEY Date _____

Great Circles and Latitude

A **Great Circle** is a circle on the surface of the earth that divides the earth into two equal halves. If the earth could be sliced along the circle, the earth would be in two equal halves.



Refer to a globe and answer the following questions.

1. Locate the parallel lines on the globe. All of these lines are Circles on the globe. The largest circle is the equator.
2. Each of the parallel lines is a circle whose circumference gets smaller as the lines of latitude get closer to the NORTH and SOUTH Poles.
3. Which line of latitude divides the earth into two equal halves? equator
4. This line is 0 ° latitude.
5. This line is a great Circle.

Fill in the blanks using the terms below:

north **parallel** **equator** **Great Circle** **south** **90**

6. The equator is the only line of latitude that is a Great Circle.
7. Latitude measures distance [circle one] (a) north and south (b) east and west from the equator.
8. In degrees, the distance from the equator to the North Pole is 90 °.
9. In degrees, the distance from the equator to the South Pole is 90 °.
10. Latitude lines are parallel lines that measure distance NORTH and SOUTH from the equator.

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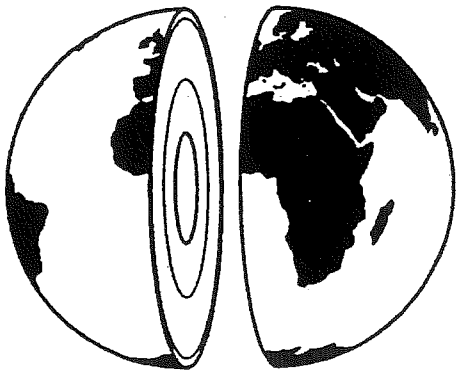
Name _____ Date _____

Great Circles and Longitude

A **Great Circle** is a circle on the surface of the earth that divides the earth into two equal halves. If the earth could be sliced along the circle, the earth would be in two equal halves.



Refer to a globe and answer the following question.

1. True (False) All lines of longitude are Great Circles.

Use these terms to fill in the blanks where needed in the exercise below.

east **180** **west** **meet**

2. Longitude lines measure distance EAST or WEST of the Prime Meridian.
3. If you begin at the Prime Meridian and travel west like you were going to circle the earth and you stop at the International Date Line, you will have traveled (a) 1/2 (b) 3/4 (c) 2/3 of the circle.
4. If you begin at the Prime Meridian and travel east like you were going to circle the earth and you stop at the International Date Line, you will have traveled (a) 1/2 (b) 3/4 (c) 2/3 of the circle.
5. In degrees, the distance from the Prime Meridian west to the International Date Line is 180 °.
6. In degrees, the distance from the Prime Meridian east to the International Date Line is 180 °.
7. Longitude lines are not parallel because they meet at the North and South Poles.

Recognizing Latitude Lines

1. Lines of latitude are imaginary lines that go around the globe in the same east-west direction as the equator. They are like circles, drawn around a ball, that never meet. Which globe shows this, A or B? B

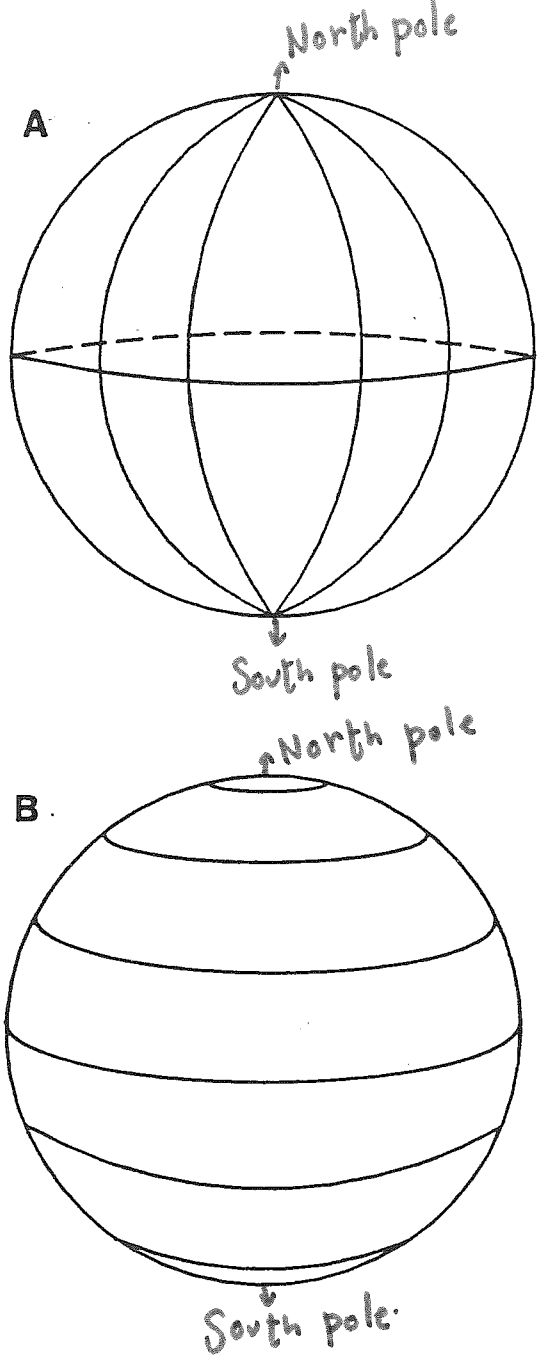
2. Mark the position of the North and South Poles on Globes **A** and **B**.

3. The equator is an imaginary line that divides the earth into two equal parts or hemispheres—northern and southern. The equator is an important line of latitude because from it all other lines of latitude are measured. Show the position of the equator on Globes **A** and **B**.

4. Which line of latitude on the globe is the longest? equator

5. Which line of latitude is farthest north? North Pole

   Which line of latitude is farthest south? South Pole



How Latitude is Measured

During the Age of Exploration, new instruments were developed to measure distance and calculate position. Many were not very accurate.

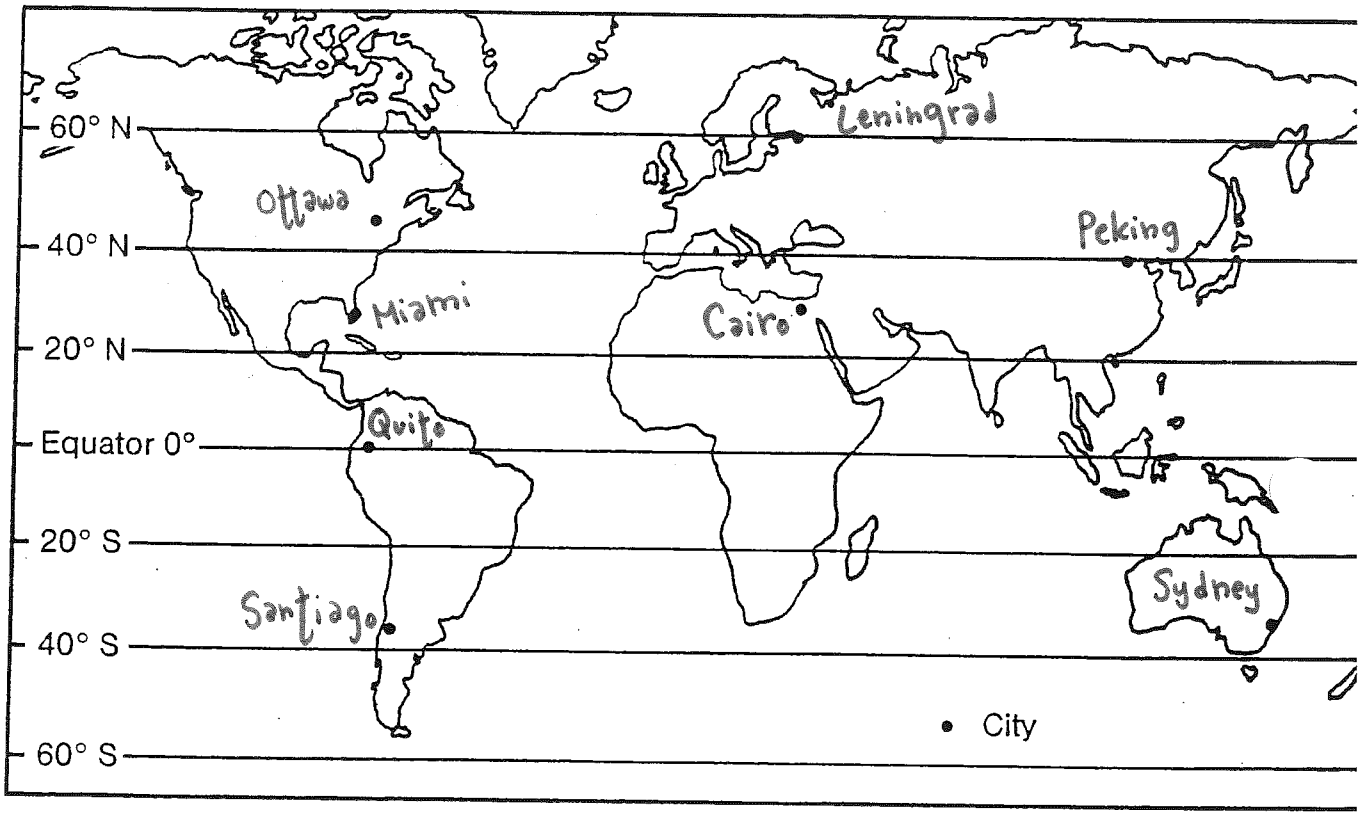
The astrolabe, or "star measurer", had long been used to estimate distance north or south of the equator. From it, the cross-staff was developed. It was used at night to compare the height of certain stars with the horizon and so give the latitude. For day-time readings, the angle between the horizon and the sun's position at noon was measured. The user lined up the three sights on the cross-staff so that the top one pointed directly at the sun, and the bottom one pointed at the horizon. The findings were compared with information in a book on how the earth moved during the year in relation to the sun and the stars. However, a cross-staff could not be used when it was often needed most—during cloudy or stormy weather.

A sextant works in almost the same way. To-day, navigators on ships and planes use an automatic sextant to record their position.

Using Latitude to Find Position

Latitude lines, or parallels of latitude, are imaginary lines running east-west around the earth. They are like parallel circles drawn around the globe and are measured in degrees **north** or **south** of the equator. The equator is 0 degrees.

If a globe is unrolled into a map, lines of latitude might look like the lines on this map. Notice that the distances at the North and South Poles seem to be as wide as the equator. On this kind of map, only the north-south distances are correct.



1. These eight cities are at different latitudes. Put the name of each city in its correct place on the map.

   Cairo, Egypt – 30° North
   Leningrad, U.S.S.R. – 60° N
   Miami, U.S.A. – 25° N
   Ottawa, Canada – 45° N
   Peking, China – 40° N
   Quito, Ecuador – 0°
   Santiago, Chile – 35° S
   Sydney, Australia – 34° S

2. The city nearest the equator is Quito, Ecuador.

3. The city farthest north is Leningrad, USSR.

4. The city closest to the South Pole is Santiago, Chile.

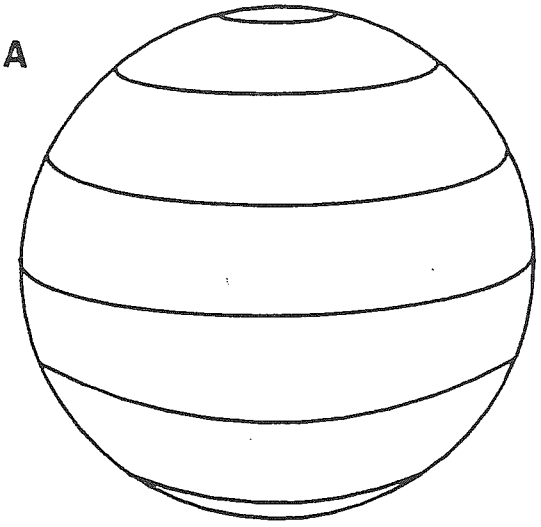
5. The two cities that are at almost the same latitude are Santiago, Chile and Sydney, Australia.

Recognizing Longitude Lines

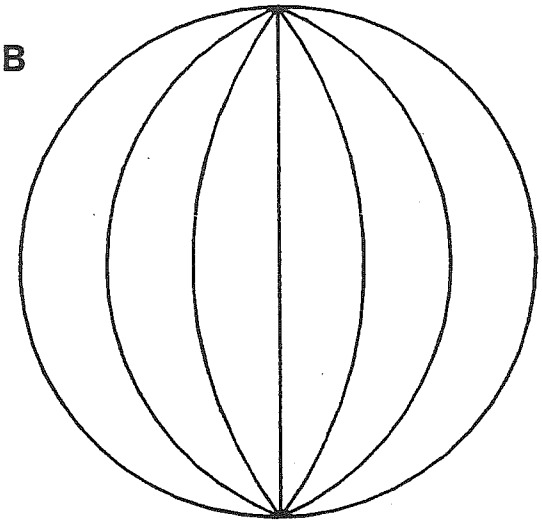
The equator divides the globe into two halves—northern and southern hemispheres. Another line also divides the globe into two equal parts or hemispheres—eastern and western. This line of longitude is called the Prime Meridian. Prime means first or beginning.

All other lines of longitude are measured in degrees east or west of the Prime Meridian. Lines of longitude are like half-circles drawn around the globe that come together at the North and South Poles.

A



B



1. Which globe shows this, A or B? (B?)
2. Which globe shows the position of the Prime Meridian? B
3. Lines of longitude are also called Meridians.

The Origin of the Prime Meridian

As new lands and oceans were discovered, it became more important for explorers to know their exact position. Navigators had found ways to determine their position north or south of the equator. However, they had difficulty establishing lines from which to measure east-west distances. They needed these lines to give them a cross-reference for charting their position and course more accurately. Different countries established longitude lines to measure east-west distance, but could not agree on a common point to begin their measurement.

Finally, in 1759, an English inventor named John Harrison developed the marine chronometer. This instrument gave ship's navigators the exact time from which to calculate their position east or west of a certain point. Because his laboratory was in Greenwich, at that time a suburb of London, a base line was drawn to pass through Greenwich, England. The exact spot marking of this Prime Meridian was a brass strip set in paving and was marked zero degrees longitude.

Since 1884, most countries have agreed to measure time from this line of longitude. To-day, the world's time zones are based on Greenwich Mean (or Standard) Time. The time is kept accurate by six atomic clocks that lose no more than one second each 4000 years! From its radio signals, ships and other moving objects around the world can check their exact east-west position.

Using Longitude to Find Position

A globe can be divided into segments or degrees. These segments, or lines of longitude, are used to measure distance **east** or **west** of the Prime Meridian. The Prime Meridian is an imaginary line, marked 0 degrees, that passes both geographical poles through Greenwich, England.

1. If a globe is unrolled into a map, the lines of longitude might look like those on this map. In what way are the longitude lines on this map different from those on a globe?

   These lines look parallel on this map. On a globe, they are NOT parallel.

2. Show on the map the position of the Prime Meridian.

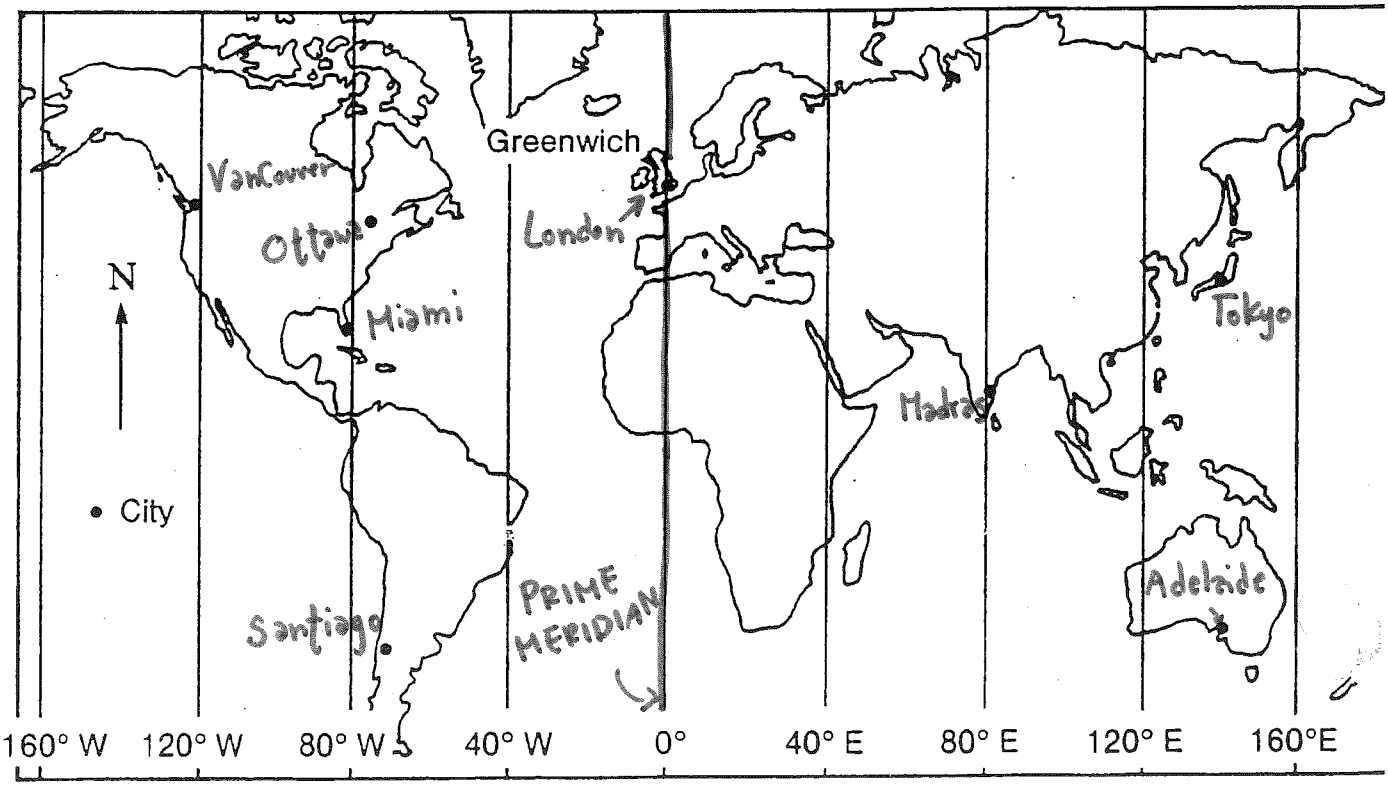
3. These eight cities are at various lin of longitude. Put the name of each city in its correct place on the map.

   Adelaide, Australia – 140° East
   London, England – 0°
   Miami, U.S.A. – 80° W
   Madras, India – 80° E
   Ottawa, Canada – 75° W
   Santiago, Chile – 70° W
   Tokyo, Japan – 140° E
   Vancouver, B.C. – 123° W

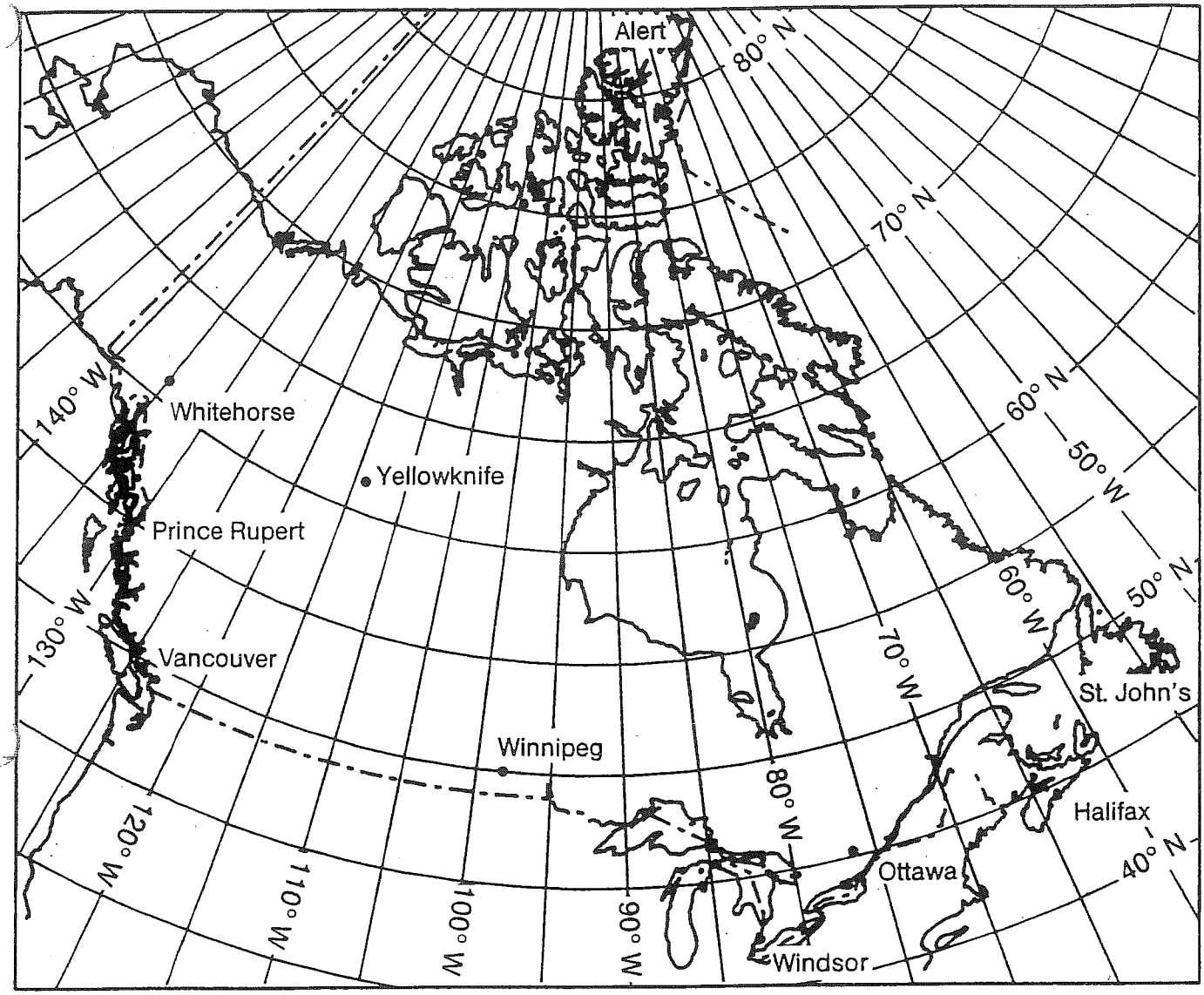
4. The city located on the Prime Meridian is London, England.

5. The city farthest west of the Prime Meridian is VanCouver, BC.

6. The two cities that are on the sam longitude line are Adelaide, Australia and Tokyo, Japan.



Using a Map Grid to Determine Position



Latitude lines give the position of a place in degrees north or south of the equator. Longitude lines give the position of a place in degrees east or west of the Prime Meridian.

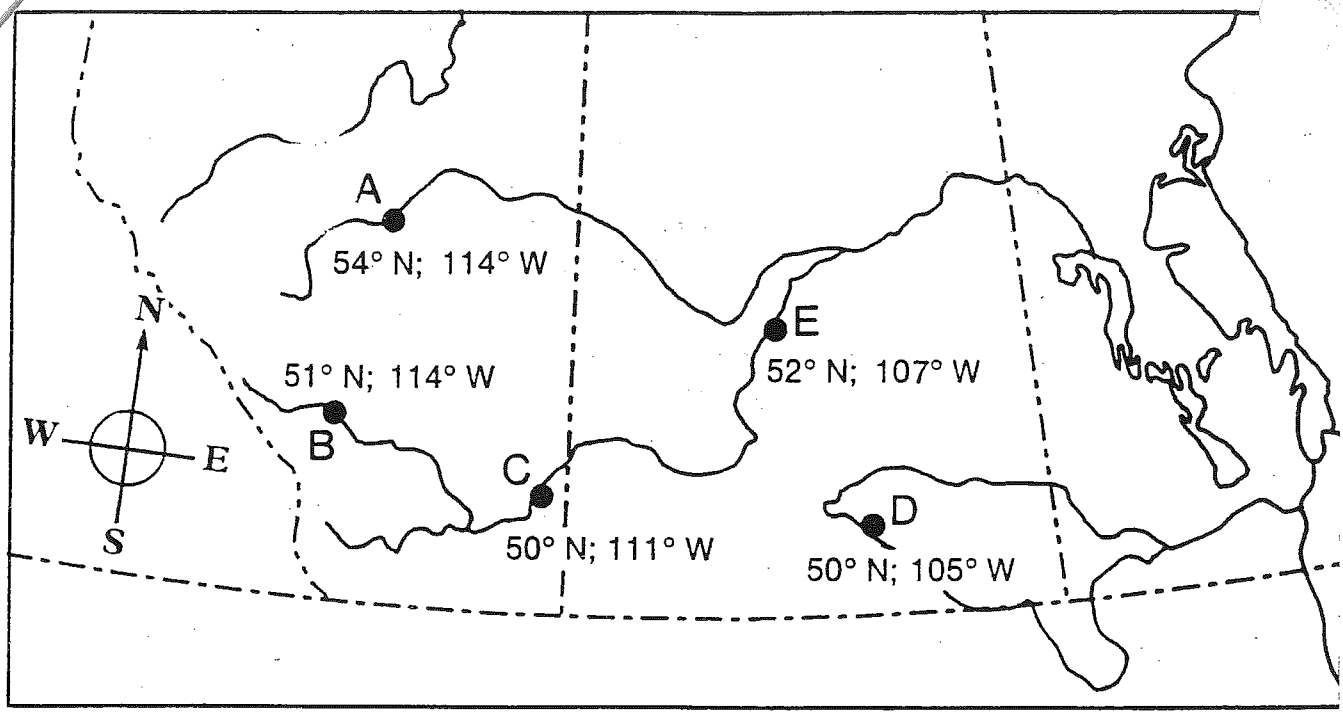
When lines of latitude and lines of longitude are placed together, they form a network of lines or grid. Using such a map grid, it is possible to find the position of any place on the earth's surface. On some map projections, the grid lines are curved like the earth's surface, for greater accuracy.

Use the map grid to complete this chart:

Place		Latitude	Longitude
Alert	1	83° N	63° W
Halifax	2	44°N	63° W
Ottawa	3	43°N	77°W
Prince Rupert	4	54° N	130°W
St. John's	5	48° N	53° W
Vancouver	6	49°N	123° w
Yellowknife	7	62° N	114° W
Whitehorse	8	61° N	135° W
Windsor	9	42° N	83° W
Winnipeg	10	50°N	97° W

NEED ATLAS

Identifying Position



1. The map shows the position of five prairie towns or cities. Use an atlas to help you find the name of each place. Print the correct name beside each letter.

2. Complete each sentence by writing the direction more accurately.

   a) Place **A** is north-__west__ of place **D**.

   b) **D** is south-__east__ of **E**.

   c) **C** is south-__west__ of **E**.

   d) **E** is north-__east__ of **C**.

3. You are a pilot. The six Canadian cities on your flight path are summarized below as reference points. Name each city. Use an atlas to help you.

   You leave from a) 49° N; 123° W (__Vancouver__).
   Your plane lands at b) 51° N; 114° W (__Calgary__) to take on mail.
   Then you fly on to c) 50° N; 105° W (__Regina__) to refuel and take on more mail. You flv over d) 50° N; 97° W (__Winnipeg__) on your way to e) 44° N; 79° W (__Toronto__), which is the end of your flight.

4. In which two main directions was the aircraft travelling as it flew from place (a) to place (e)?

   __South__ and __east__