Name _____ Student #

Date _____ Block # _____

Differences in Climate

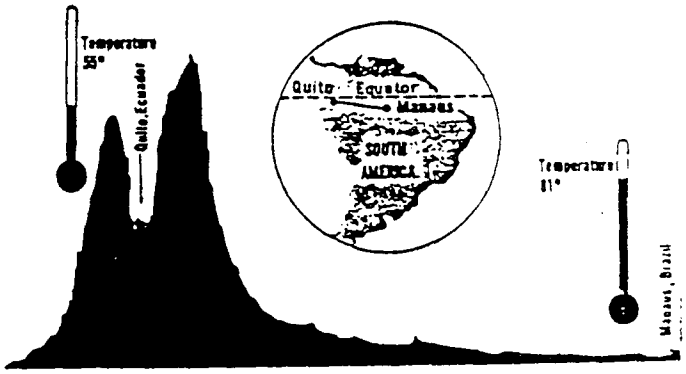
What are the reasons for differences in climate?

1. Throughout the world, there are differences in climate from place to place. Even within our own nation, there is a variety of climate. Why is this so? There are five good reasons for differences in climate.

2. The most important factor that influences climate is *latitude*, or distance from the equator. If two places in the world are the same in all ways and they are the same distance from the equator, they will have the same climate. At the equator, the sun's rays are direct. Thus, they are stronger and hotter. The farther a place is from the equator, the more the sun's rays slant and the weaker they are. In general, the farther a place is from the equator the cooler it is.

3. *Altitude*—the elevation or height of land above sea level—also affects climate. Air grows cooler the higher it is from the surface of the earth. For example, Quito, the capital of Ecuador in South America, has 740,000 people. Yet this city is almost on the equator. Not too far east, the city of Manaus, Brazil, has a lot fewer people. How do you explain the fact that so many people live in one city and so few in another? Part of the answer is that the Andes Mountains cross the equator. Quito is located in the highlands and Manaus is in the lowlands. Quito has a pleasant climate. Manaus is hot and wet. In general, the *higher* a region is, the *colder* it is. Most people prefer to live in a cool climate.

4. *Winds and mountains* also determine climate. If the winds blow in from a warm sea, they will carry moisture with them. Rain will fall when the air cools. If the winds blow from the land out to sea, they will be dry winds because they have had little chance to pick up moisture. The winds that blow from the Pacific Ocean toward the United States and Canada are a good example of this factor in determining climate. The Pacific winds carry moisture with them, for they come from the ocean. As the winds meet the mountains along the west coast, the air rises and is cooled. When the air is cooled, the moisture drops as rain on the western side of the mountains. Here are found thick, green forests and fertile land. After the air has crossed the mountains, it is drier. Thus the land east of the mountains receives little rainfall. The rainy side of the mountains is the *windward* side. The dry side is called the *leeward* (or sheltered) side.



Altitude, as well as latitude, determines climate.

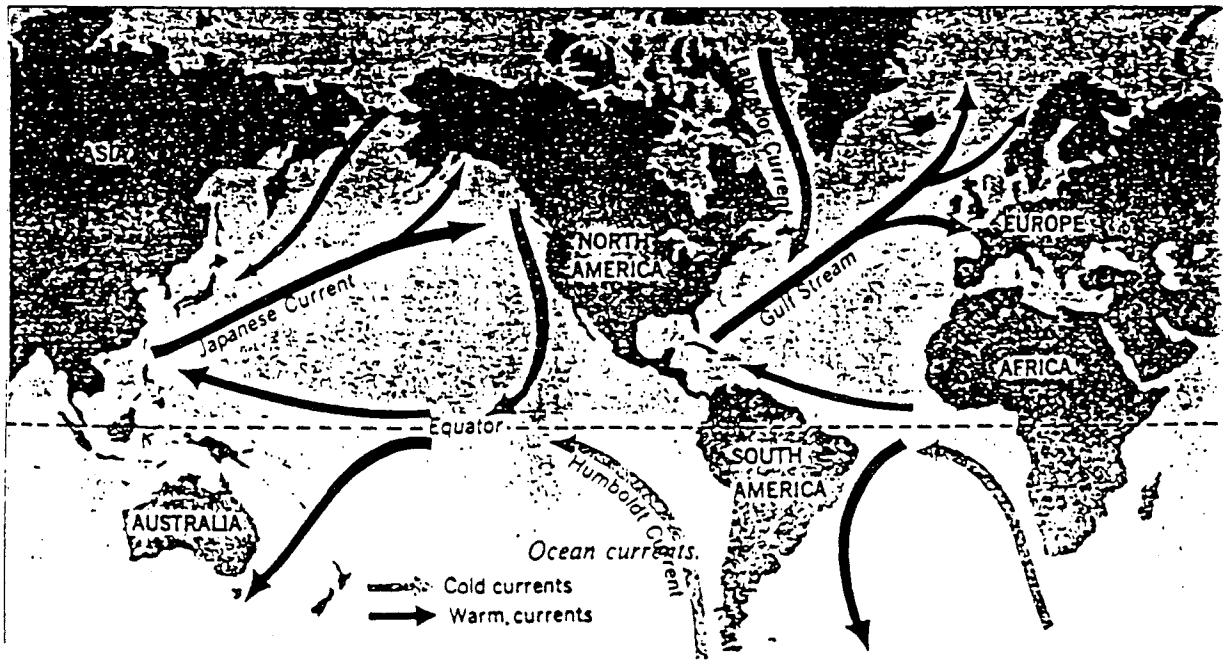
Winds and mountains also determine climate.

5. Not all the winds of the earth blow continually from the same direction. There are shifting local winds caused by the heating or cooling of land. The *monsoon* winds of Asia are an example of this. When the winds blow from the land, they are dry and cold. However, when the winds blow from the Indian Ocean, they are warm and wet, bringing humid weather and heavy rains.

6. *Nearness to water* is another factor that affects climate. Water has the effect of making temperatures "even." Water neither heats nor cools as fast as land. Places near large bodies of water (oceans, seas, and large lakes) have a more "even" temperature than other places in the same latitude. During summer, land heats up faster than large bodies of water. So the air above land far from an ocean will get hotter faster than air above land near the ocean. This happens because the air above the ocean remains cooler and mixes with air along the coastline. In the winter, just the opposite happens. Air above land far from an ocean will get colder faster than air above land near the ocean. This happens because the air above the ocean remains warmer longer and mixes with the air along the coastline.

7. This difference in land and water temperature explains the following fact. Although New York City and Omaha, Nebraska, may have almost the same latitude, there is a difference in temperature throughout the year. Omaha is not near a large body of water. Summer temperatures there often reach 100° and winter temperatures may drop to 10° below zero. New York City is on the Atlantic Ocean. The temperature seldom reaches 100° in the summer or 0° in the winter. Omaha may have a difference of 110 degrees in temperature during a year. New York is likely to have only a difference of 80 degrees throughout the year.

8. *Ocean currents* affect climate in many parts of the world. Ocean currents are like fast-flowing "streams" of water within a large body of water. Some of these currents are cold and others are warm. The winds that blow over them, therefore, are affected by the temperatures of the currents. The Gulf Stream is a warm current that begins in the warm waters of the Gulf of Mexico. It flows northward



Ocean currents.

along the eastern coast of the United States toward Newfoundland. Then it turns eastward across the Atlantic Ocean. This current brings warm waters to the British Isles. The winds blowing over the current become warm winds. These warm winds blow across Ireland, Great Britain, and Western Europe. As a result, the people of those lands enjoy a warmer climate than that of Hudson Bay, Canada. Yet all these regions are about the same distance from the equator.

9. The Japanese Current is another warm current. Warm winds from this ocean stream make it possible to farm along the southern coast of Alaska. This current also warms the coasts of Oregon and Washington. On the other hand, the Labrador Current brings masses of floating ice from the north polar region into the Atlantic Ocean. When the cold air from the Labrador Current meets the warm air of the Gulf Stream in the North Atlantic, dangerous fogs result. The southwest coast of South America is colder and drier because of the Humboldt Current, which flows northward from the Antarctic Ocean.

10. These, then, are some of the important facts about the causes of different climates:

1. In general, the farther a land is from the equator, the colder its climate.
2. The higher above sea level a place is, the cooler temperatures become.
3. The farther from large bodies of water a place is, the greater the difference in temperature throughout the year.
4. Rainfall is greatest where winds blow from a warm part of the ocean to the land.
5. Winds that blow from the land are dry winds.

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Differences in Climate

Listen to the presentations and take notes on each of the following.

1. Explain the most important factor that influences climate.

2. Explain how altitude influences climate.

3. Describe the meaning of windward and leeward.

4. Describe two types of monsoons winds.

5. Describe the effects nearness to water has on climate.

6. Describe the effects of ocean currents on climate.

7. Draw a picture to represent each of the five facts explained in paragraph 10.

1.

4.

2.

5.

3.