

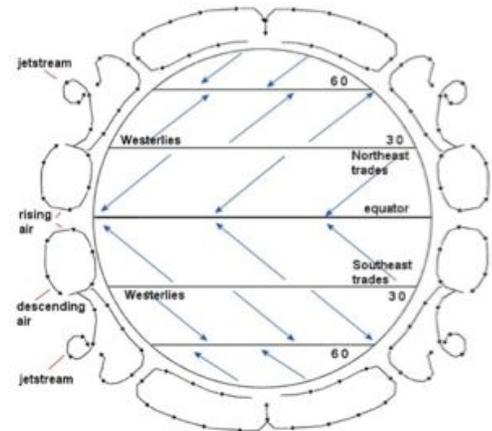


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Name: _____ Date: _____

Why Do Different Areas Have Different Climates?

- 1 Climate is defined as the common weather conditions in one area over a long period of time. Temperature, humidity, rainfall, and wind contribute to climate. Climate around the world can be divided into five general types. The types are tropical, dry, moderate, continental, and polar. Have you ever wondered about the climate where you live? Latitude, terrain, altitude, and closeness to a large body of water all play a role in the climate of a given location. Let's find out more about how latitude, air circulation, and oceans affect climate.



- 2 Latitude is the distance of a location from the equator. Imaginary horizontal lines are drawn parallel to the equator across the globe. Zero latitude is located at the equator. Each pole is 90 degrees latitude. Latitudes north and south of the equator are given as the angle, followed by the direction. All of the North American continent is north of the equator. For example, Miami, Florida, lies at 25 degrees north. Anchorage, Alaska, lies at 61 degrees north. Latitude affects the amount of sunlight a given area receives. Within 30 degrees of the equator, the Sun shines nearly perpendicular to Earth's surface. These areas receive the maximum amount of energy from the Sun. They get the most heat. On the other hand, the angle of the Sun's rays is much shallower at higher latitudes. These latitudes receive much less energy.
- 3 The rotational speed of Earth also changes based on latitude. Earth rotates about its axis once each day. At the equator, Earth's circumference is 40,079 km. The day is 24 hours long. Therefore, the rotational speed is 1,670 km/hr. Near the poles, Earth's circumference is much less. The day is still 24 hours long. So the speed decreases to about 290 km/hr. Rotational speed affects air circulation. Air moves from an area of high pressure to an area of low pressure. High pressure comes from cooler air sinking toward the ground. Low pressure comes from warm air rising from the ground. Air moving from high to low pressure is known as wind. The rotation of Earth keeps the wind from blowing in a straight line. The wind is deflected. Its path becomes curved. In the northern hemisphere, wind is deflected to the right. In the southern hemisphere, wind is deflected to the left. Strong winds are deflected more than weak winds. The force responsible for the deflection is called the Coriolis effect. It is a result of Earth's rotation.



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- 4 Each hemisphere has three bands of circulating air masses. Each is generally confined to 30 degrees latitude. This means that one band is between 0 and 30 degrees. The middle band is between 30 and 60 degrees. A third is between 60 and 90 degrees. Climate is stable close to the equator. Temperature varies little between day and night or at different times of year. Warm air rises making low pressure. High in the atmosphere, the air starts to flow toward the poles. As the air mass moves northward in the northern hemisphere, it cools. Some of the air sinks and flows back towards the equator along the earth's surface. In summary, air rises at the equator, flowing toward the poles. Then air sinks at higher latitude, flowing back to the equator.
- 5 Rising air at the equator makes clouds and rain. Tropical rain forests thrive near the equator. The descending air near 30 degrees latitude makes persistent high-pressure systems that circle Earth called the subtropical ridge. Few clouds and little rain result in deserts. Many major deserts lie along this latitude. In the mid latitudes, another mass of air circulates. The wind blows between 30 and 60 degrees latitude. These westerly winds are strongest in winter and weakest in summer. The climate in the mid-latitudes tends to be temperate. Temperature and precipitation vary with the seasons. Above 60 degrees latitude are the polar regions where cold air sinks. This makes high pressure. Strong winds are common near the poles. They blow south at the north pole and north at the south pole. There is little precipitation at the poles.
- 6 At each latitude, landforms also affect climate. Usually, temperature decreases with altitude. At higher altitude, air pressure is lower, leading to lower temperatures. Precipitation depends on both the altitude and the direction of wind. As air rises, it gets colder. Moisture trapped in the air falls as rain. Seattle, Washington is an example of how this affects climate. Wind blowing from west to east near Seattle picks up moisture from the Pacific Ocean. The wind blows over Seattle. After they blow over Seattle, the winds hit mountains. Higher elevations on the western side of the mountains in Washington still get lots of rain. The air rises over the top of the mountains, leaving moisture behind. Areas on the east of the mountains receive little rain. The wind cannot pick up moisture as it travels. So land further inland tends to get less precipitation.
- 7 Earth's oceans cover over 70% of Earth's surface. They contain 97% of all of the water on Earth. Water has some unique properties. It is a critical part of Earth's weather patterns. Water can store and release huge amounts of energy. Earth gets energy from the Sun in the form of solar radiation; however, the energy from the Sun does not hit Earth equally. Temperature differences in the atmosphere create wind. Wind moves around everywhere. Winds also drive ocean circulation. Ocean currents transport energy from the tropics to the poles. Ocean currents also transport heat energy around the world. Ocean currents can move warm water into an area. Warm water means more evaporation. Moisture and energy will move into the atmosphere. In this way, ocean currents increase the temperature and humidity in the area. If cold water is moved into an area by ocean currents, it can lower surface air temperatures. Cold water means less evaporation. This leads to colder and drier conditions in the areas nearby.
- 8 The circulation of ocean currents plays a major role in the climates of certain areas of the globe. All ocean currents affect ocean temperatures in different regions. The heat energy in the water is transferred to the air. All ocean currents have a set route. They will affect the climates of islands and coastal areas. General weather patterns can be predicted.



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1. Which statement correctly describes the relationship between air temperature and air pressure?
 - A. Warm air rises, creating an area of low pressure.
 - B. Cool air sinks, creating an area of low pressure.
 - C. Warm air sinks, creating an area of low pressure.
 - D. Cool air rises, creating an area of low pressure.

2. At which latitude would tropical rain forests be most likely?
 - A. 10 degrees North
 - B. 30 degrees South
 - C. 60 degrees North
 - D. 90 degrees North

3. Which of the following variables has the LEAST influence on climate?
 - A. Latitude
 - B. Longitude
 - C. Altitude
 - D. Terrain



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4. Which of the following is mainly responsible for weather on Earth?
- A. Wind, precipitation, and clouds
 - B. The water found in the oceans
 - C. The uneven heating of Earth's surface
 - D. None of the above
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5. In paragraph 7, what is the best definition of **solar radiation**?
- A. Storing of energy in Earth's oceans
 - B. Energy from the Sun that reaches Earth
 - C. Moisture and heat energy in the atmosphere
 - D. Increased evaporation due to warm water
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6. Which of the following statements is true regarding most ocean currents?
- A. Warm water is more dense than cold water.
 - B. Ocean currents have a great effect on air temperature.
 - C. Ocean currents have little to do with regional climates.
 - D. The amount of salt in the ocean has no effect on ocean currents.