

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Group: \_\_\_\_\_

## The Gulf Stream

(Lexile 750L)

- 1 Do you ever wonder about weather? What makes the climate in one area different than another? The questions seem simple. The answer is a very complicated process. The short version is that uneven heating of Earth's surface creates the weather patterns that occur around the globe. This uneven heating creates temperature differences. You can make predictions about an area's climate based on how far it is from the equator. Areas that lie close to the shore often have a different climate than expected. Weather happens in the atmosphere. The Earth's oceans, however, play a major role in our weather patterns.
- 2 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. Where does this energy come from? Earth gets energy from the Sun. The energy comes in the form of solar radiation. However, the energy from the Sun does not hit the Earth equally.
- 3 Imagine the way that the Earth travels around the Sun. The Earth is tilted  $23^{\circ}$  on its axis. In its yearly revolution, first one pole and then the other points toward the Sun. There are times in winter when each pole gets no solar radiation. Even during the summer, areas near the poles receive sunlight at an angle. This reduces the amount of energy absorbed. The areas near the equator are called the tropics. They receive a constant supply of solar radiation year round. The sunlight also hits the surface at nearly perpendicular angles. More energy can be absorbed. This creates large temperature differences between these two areas. This temperature difference is a major factor in the creation of weather.



- 4 Temperature differences in the atmosphere create air currents. In other words, they make wind. Wind moves energy around in the atmosphere. Winds also drive ocean circulation. Wind blows along the surface of the ocean. The wind pushes the surface water along with it. These surface ocean currents flow in the top 100 meters of the ocean. They transport energy from the tropics to the poles. The planet's wind systems circulate in bands based on latitude. It should come as no surprise that the surface currents also circulate. They flow in huge circular paths. These are called gyres. Ocean currents transport heat energy around the globe. These currents play an important role in global weather patterns. 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.
- 5 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. Let us look at this in more detail.
- 6 The Gulf Stream is a great example of how an ocean current plays a critical role in a regional climate. The Gulf Stream is part of the circulation of warm water in the Atlantic Ocean. It moves warm surface water from the tropics to the north. It also has a very specific route. This warm ocean current begins in the Gulf of Mexico. Then it flows northeast. It follows the coast of the United States and parts of Canada. Finally it moves across the Northern Atlantic to the British Isles. This includes Ireland, Scotland, and England. It is largely a wind-driven current. It is also something called a western-intensified current. This makes the Gulf Stream one of the fastest ocean surface currents in the world. It transports 30 million cubic meters of water per second around the southern tip of Florida. As it reaches northern Canada, this rate speeds up to 150 million cubic meters per second.
- 7 This warm and fast-moving ocean current brings a huge amount of warm water to the British Isles. This is very important to the climate of the British Isles. It also affects the coast of Western Europe. The British Isles and the coast of Western Europe are found in a high northern latitude. Many places found at these latitudes are very cold during the winter. They stay cool during the summer. Imagine northern Canada or Siberia in Russia. All of these places share similar latitudes to the British Isles. Yet the British Isles have mild winters with little snowfall. Why? Yep, you guessed it. It has to do with the Gulf Stream.
- 8 The Gulf Stream carries warm water to the British Isles. The air above the water gets warmed. The air gets moisture as well as heat from the Gulf Stream. This is why it rains so much in the British Isles. This warm water, and the warm air it creates, controls the climate of the British Isles. They are protected from freezing conditions in the winter. The Gulf Stream also affects summer temperatures. British summers are warmer than areas found in similar latitudes, such as Northern Canada.



**1** What creates the weather on the planet?

- A** Wind, precipitation, and clouds.
  - B** Only the water in the oceans.
  - C** The uneven heating of Earth's surface.
  - D** None of the above.
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**2** What other factor(s) play an important role in Earth's weather?

- A** The circulation of air in the atmosphere.
- B** The Earth's path around the Sun.
- C** The circulation of water in the oceans.
- D** All of the above



- 3** 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 big 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.
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- 4** Which of the following is NOT true regarding the Gulf Stream?
- A** Wind is responsible for the Gulf Stream.
  - B** The Gulf Stream carries cool air to the British Isles.
  - C** The Gulf Stream has a very fast flow rate.
  - D** The Gulf Stream carries warm water to the British Isles.

- 5 What does latitude, found in paragraphs 3 and 7, mean?
- A Distance from the equator
  - B Moving in a circle
  - C An area's typical weather patterns
  - D Freedom of action