

**Cincinnati Public Schools**  
**Remote Learning Plan**  
**Grade 7**  
**SCPA - 7 Science Moraga**  
**Week 3- Ocean Currents**

**Student Name** \_\_\_\_\_ **Bell** \_\_\_\_\_

**Weekly Outcomes:**

- **Learning Outcome -Week 3: Ocean Currents - Explain how energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern**
- **Directions** - Do your Reading and Questions for the week. Then select and complete activities from the menu for that week. **OR** go one Schoology
- **Task** - Complete Reading Comprehension and the Read and Respond Non Fiction for the week and 100 points worth of work from the menu **for the week.**
- **How do I know if my work is good?**
  - Information is accurate.
  - All parts of the question are answered completely.
  - Work is detailed and completes the required task.
  - If applicable, work is colorful and visually appealing.
- **What if I need help?**
  - Visit [www.discoveryeducation.com](http://www.discoveryeducation.com) and read the Engage and Explore tabs for the following lessons (Do this through Schoology on the left hand side bar)
    - 3.6 (Ocean Currents)
  - Visit <http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/waves-and-currents.htm> and explore the slide shows/videos listed below. Once finished, complete the “Test Yourself” activity.
    - Weather & Climate: Ocean Currents

**Reading Comprehension Week 3: Ocean Currents - Explain how energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern**

## Ocean Currents



**Read Works** -Water is vital for our existence. Not only do we drink it for survival, the majority of the human body is also composed of water. The earth’s weather patterns are closely linked to water too, as they are determined by the complex patterns of changes and movement of water in the atmosphere. Since the ocean covers 70% of the earth’s surface, it plays a major role determining what happens in the environment. One of

its most important roles is distributing the heat around the world; it soaks up energy in the form of heat, and releases it more evenly across the earth.

## **Water and Temperature**

Since the ocean is so effective at absorbing heat, the first few meters of the ocean's surface hold as much heat as the earth's entire atmosphere. But how does water control the earth's weather? First, it's important to know that the temperature of the water in the ocean and its salt content affect the water's density. So the saltier or the colder the water, the denser it is. Denser water sinks to the bottom of the ocean, while less dense water floats at the surface. The temperature of water is closely related to ocean currents, since the former affects the latter.

## **Ocean Currents**

Simply put, ice triggers the movement of ocean currents. As water freezes in the North and South Poles, the water surrounding the ice becomes saltier and colder, since the salt leaves the water upon freezing. The ice then cools the water surrounding it. The cold, salty water then sinks due to its increased density. Once it gets to the bottom of the ocean floor, it has to move somewhere, so it travels horizontally to spread out over the surface of the earth. This is cold current. Warm water replaces it on the surface and moves to the North. This motion is called the global conveyor belt. The global conveyor belt is a global-wide current that circulates cold and warm water around the earth. So, the warm water that replaces the cold on the surface travels northward, increasing the temperature of the Atlantic Ocean. That's why countries that border the Atlantic Ocean are relatively warmer than landlocked countries during the wintertime.

However, the cold water doesn't always stay at the bottom of the ocean. Instead, it comes up at different places around the globe called upwelling. Since the ocean floor contains many nutrients important for survival, the cold water that rises to the surface brings these nutrients with it, attracting all forms of life. Usually every level of the food chain is present at these upwellings, making them great spots for fishing. In fact, upwellings are common in areas where winds blow water away from the surface. In coastal areas, sometimes winds (called longshore winds) blow perpendicular to the land over the ocean, pushing the warm water away from the coast. This allows the cold water at the bottom to rise up and replace the warmer water. Therefore, some coastal areas are effective places to fish due to the upwelling that attracts more fish to the area.

## **The Global Conveyor Belt**

As previously mentioned, the global conveyor belt describes the current that runs throughout the earth's waters, driven by the cold waters at the poles. The "belt" starts in the North Atlantic Ocean, where the cold water that surrounds the ice sinks, and starts to flow around the world. A current is created as warm water rushes to the surface to replace the sinking cold water. The cold, dense water moves southward in between the continents toward South America and Africa—and as it passes the equator, the water warms. As the water passes Antarctica, it is re-cooled by the ice near the South Pole. It continues to move on from there and splits into two paths: one that veers off toward the Indian Ocean, and the other toward the Pacific Ocean. These two paths gradually warm up as they travel northward, causing them to rise to the surface (which, as we know, is called an upwelling). The currents eventually return to the North Atlantic, where the journey begins again. Although the path of the global conveyor belt can be quickly explained, the actual travel time occurs very slowly—the waters travel at slow speeds when compared to tidal currents.

## **Ocean Currents and Climate**

The effect that ocean currents have on the earth's climate is still being studied by scientists around the world, but we know a few things for sure. The ocean plays a huge role in redistributing heat around the globe, like we previously explained. However, there are certain ocean currents, like the Gulf Stream (which is part of the global conveyor belt) that have a direct effect on the climates of countries they pass. The Gulf Stream travels past the Caribbean and Florida, carrying warm water, then turns off to the right toward Europe—specifically England and Ireland. That's why the northeastern part of the United States and Canada has a cooler climate; the Gulf Stream doesn't bring warm water to its shores, causing colder temperatures. And since the direction of currents is always affected by wind direction (like we previously described with upwellings), climate is indirectly affected by wind as well.

## **Global Warming**

Scientific evidence has shown that the earth has warmed since 1880. Global warming is caused mainly by an increase in carbon dioxide levels in the atmosphere. The increased temperatures have caused many of the ice caps in the North and South Poles to melt, disrupting the global conveyor belt. Even though the phenomenon is called "global warming," it is more accurately described as climate change—if the ice caps melt, there will be less dense water to move around the globe. And if there's less dense (and therefore cold) water to circulate around the earth, the Gulf Stream will be slowed down. This will result in a cooling of the Caribbean and Western Europe. Thus, global warming can in fact result in colder temperatures in some areas.

# Read and Respond NONFICTION

Article/Author: \_\_\_\_\_

Main Idea: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Three Important Facts or Statistics:

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_

One Opinion From the Article:

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

My Opinion About the Article:

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

Supporting Detail 1:

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

Supporting Detail 2:

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

Supporting Detail 3:

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

Author's Purpose

- Persuade
  - Inform
  - Entertain
  - Explain
  - Describe
- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Text Structure

- Description
  - Problem & Solution
  - Order & Sequence
  - Cause & Effect
  - Compare & Contrast
- \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Comprehension Questions

1. Cold water rises from the bottom of the ocean to the surface of the ocean at different places around the globe. What is this process called?

- A. global warming
- B. climate change
- C. upwelling
- D. cold water current

2. How does the author describe the global conveyor belt?

- A. the cooling of the Caribbean and Western Europe
- B. the role the ocean plays in redistributing heat around the globe
- C. a globe-wide current that circulates cold and warm water around the earth
- D. cold water rising from the bottom of the ocean to the surface of the ocean at different places around the globe

3. Ocean currents have an effect on the earth's climate. What evidence from the passage supports this conclusion?

- A. Some ocean currents, like the Gulf Stream, have a direct effect on the climates of the countries they pass.
- B. The gradual increase of the earth's temperature has been a topic of much debate.
- C. Cold water does not always stay at the bottom of the ocean.
- D. As water freezes in the North and South Poles, the water surrounding the ice becomes saltier and colder.

4. Based on the passage, why is the global conveyor belt important?

- A. It helps the ocean absorb heat from the countries which it surrounds.
- B. It circulates the warm and cold water that regulate the temperature of the earth.
- C. It helps the polar ice caps stay frozen. This ice triggers the movement of ocean currents.
- D. It is the cause of upwellings that provide nutrients to various forms of life in the ocean.

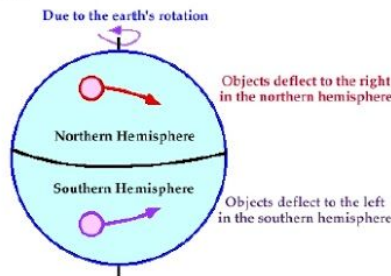
5. What is this passage mostly about?

- A. the effects of global warming on the future of the planet
- B. the human need to stay hydrated
- C. the excellent fishing on the Gulf Stream
- D. the role of the ocean's currents in maintaining the earth's temperature



## Ocean Current Worksheet

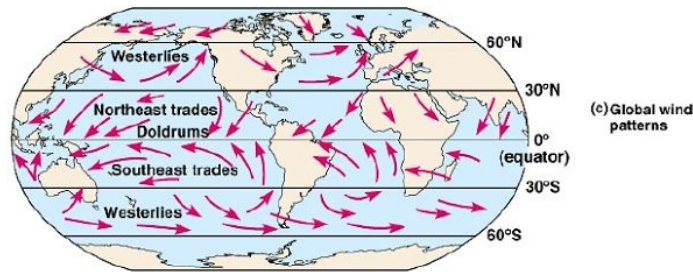
**Temperature Affects and Surface Currents:** Surface waters of the Earth's oceans are forced to move, primarily by winds. Where winds blow in the same direction for a long period of time, currents will develop that transport large masses of water over considerable distances across ocean surfaces. Why do ocean currents and global winds move in a circular pattern? The circular pattern is caused by the **Coriolis Effect**. The Earth's rotation on its axis causes ocean currents and winds to curve to the right (clockwise direction) in the Northern Hemisphere and to the left (counter clockwise direction) in the Southern Hemisphere. As the winds and currents move, the Earth rotates underneath them. The currents appear to curve in relation to the Earth's surface. If the Earth did not spin on its axis then the currents and winds would appear to move in a straight direction.



**Part I:**

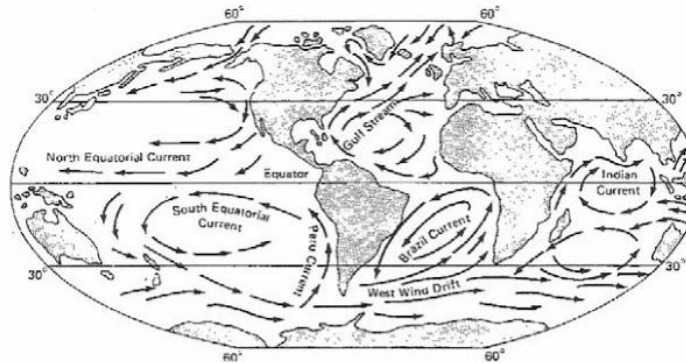
Compare the two pictures below (surface ocean currents and global wind patterns).

### Global Wind Patterns



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### Ocean Surface Current Patterns



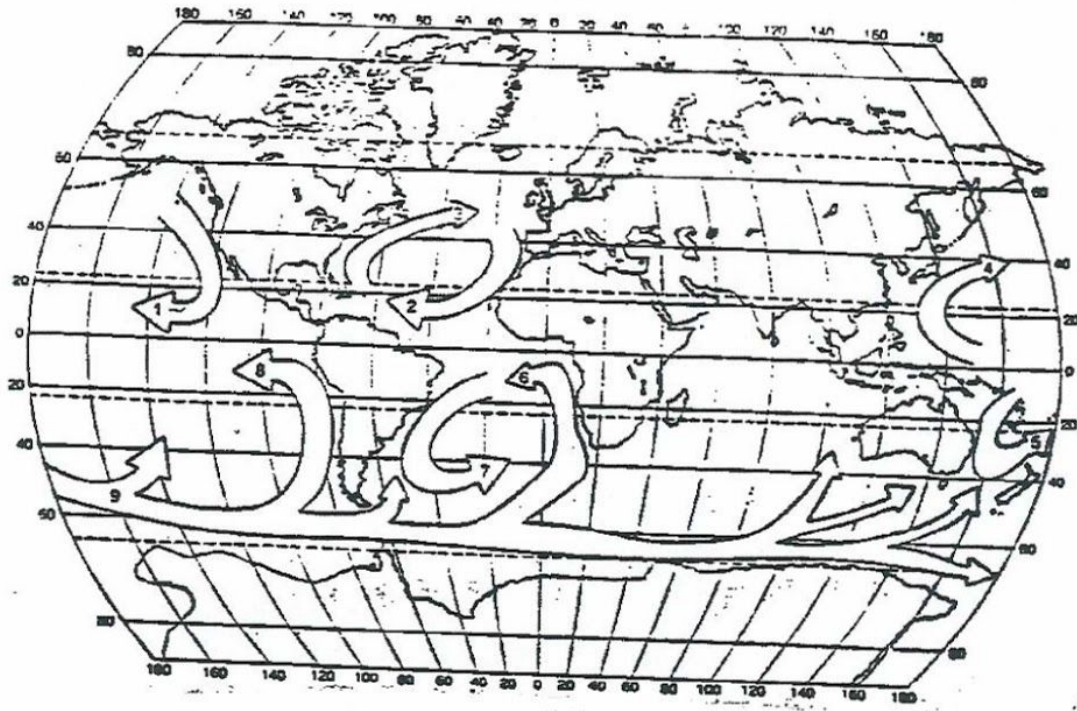
**Questions:**

1. Take a look at the two pictures above. What do you notice about the global wind and surface current patterns? In general, the direction of the wind flows in the \_\_\_\_\_ direction as the ocean surface currents.
2. The global winds in the first map generally travel in either a **clockwise or counterclockwise** direction. Look at the global winds and compare the general direction of flow in the Northern Hemisphere with the general direction in the Southern Hemisphere.
  - a. In the Northern Hemisphere the general direction is \_\_\_\_\_.
  - b. In the Southern Hemisphere the general direction is \_\_\_\_\_.
2. The difference in direction is caused by the \_\_\_\_\_.

**Part II:**

Using the table below label and color the currents in the picture (red = warm, blue = cold).

Number	Name of Surface Current	Characteristic Temperature of Water Transported by Current
1	California Current	Cold
2	Canary Current	Cold
3	Gulf Stream	Warm
4	Kuroshio Current	Warm
5	East Australian Current	Warm
6	Benguela Current	Cold
7	Brazil Current	Warm
8	Peru Current	Cold
9	Antarctic Circumpolar Current	Cold



**Questions:**

- The ocean currents on your map generally travel in either a **clockwise or counterclockwise** direction. Look at the ocean currents and compare the general direction followed by currents in the Northern Hemisphere with the direction of those in the Southern Hemisphere.
  - In the Northern Hemisphere the general direction is \_\_\_\_\_.
  - In the Southern Hemisphere the general direction is \_\_\_\_\_.
- What happens to the direction of an ocean current when it approaches the coast of a large landmass?
- Cold water currents tend to have a cooling affect on the continental coastlines that they border, while warm water currents tend to have a warming effect. Look at the pattern of currents in the Northern and Southern hemispheres and describe the effect the currents have on the temperature of the coastal areas they border.
  - The East coasts generally have \_\_\_\_\_ (warm or cold) water currents.
  - The West coasts generally have \_\_\_\_\_ (warm or cold) water currents.
  - The East coast climates will generally be \_\_\_\_\_ (warmer or cooler) than it's supposed to be.
  - The West coast climates will generally be \_\_\_\_\_ (warmer or cooler) than it's supposed to be.
- Look at the pattern of cold and warm water currents. What seems to determine whether a current carries warm or cold water? Explain why this is so.

## Ocean Currents Menu

Directions: Choose activities from the menu below after finishing your Reading Comprehension and worksheets for the week. You should have a total of 100 points.

### 25 POINTS

**Week 3: Ocean Currents - Explain how energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern**

- Make a facts list(10) on how energy is transferred in oceans and the atmosphere, currents, global climate patterns.
- Define in writing the transfer of energy in oceans and the atmosphere, currents, global climate patterns.

### 50 POINTS

**Week 3: Ocean Currents - Explain how energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern**

- Make a cartoon strip that explains energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern
- Create a poem that depicts the energy that influences the ocean and the atmosphere. Include the role currents have on global climate patterns

### 75 POINTS

**Week 3: Ocean Currents - Explain how energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate pattern**

- What is similar to the energy transfers in oceans and the atmosphere contribute to the formation of currents, which influence global climate patterns. Describe it in any way you would like.
- Describe what do you think could of happen if there were no ocean currents



Ocean Currents Menu Work -Create a one pager. For each box not used color it in

