MATATAG
Bansang Makabata Batang Makabansa
BAGONG PILIPINAS

School Logo

Name of School:		*Quarter:*	*4th Quarter*
Grade Level & Section:	*Grade 7*	*Week:*	*Week 8 Day 4*
Subject:	*SCIENCE*	*Date and Time:*	
Topic:		*Teacher:*	

I. CONTENT, STANDARDS AND LEARNING COMPETENCIES		*ANNOTATIONS*
A. CONTENT STANDARDS	The learners learn that: 1. Solar energy influences the atmosphere and weather patterns	
B. PERFORMANCE STANDARDS	By the end of the quarter, learners will use reliable scientific information to identify and explain how solar energy influences the atmosphere and weather systems of the Earth. They will also use such information to appreciate and describe the dominant processes that affect the climate of the Philippines.	
C. LEARNING COMPETENCIES	**Make a physical model or use drawings to demonstrate how the tilt of the Earth relative to its orbit around the Sun affects the intensity of sunlight absorbed by different areas of Earth over a year.** **Explain how solar energy contributes to the occurrence of land and sea breezes, monsoons, and the Intertropical Convergence Zone (ITCZ).** Lesson Objectives: 1. Explain how topography affects climate. 2. Differentiate the windward and leeward sides of the mountains. 3. Explain the occurrence of land breezes and sea breezes. 4. Explain the role of solar energy in driving processes that contribute to the formation of ocean currents.	

I. CONTENT	
The Tilt of the Earth and Its Effect on Earth's Climate	
II. LEARNING RESOURCES	
A. REFERENCES	
B. OTHER LEARNING RESOURCES	● Pavico, Josefna et.al (2013). Exploring Life Through Science. Phoenix Publishing Inc. ● Pepito, Leah Joy Desamparado-Walan, (2020). Science – Grade 7 Learner's Module First Edition. DepEd – Instructional Materials Council Secretariat (DepEd-IMCS. Pasig City ● See, D. A., & See, D. A. (2019, February 7). Baguio's temperature dips to 9.0 degrees Celsius. HERALD EXPRESS | News in Cordillera and Northern Luzon. https://baguioheraldexpressonline.com/baguios-temperature-dips-to-9-degrees-celsius/ ● Stewart, M. (n.d.). orographic effect. Flickr. https://www.flickr.com/photos/megstewart/8644087724 ● Category:Sea and land breezes - Wikimedia Commons. (n.d.). https://commons.wikimedia.org/wiki/Category:Sea_and_land_breezes#/media/File:Sea_Land_Breeze.svg ● Category:Sea and land breezes - Wikimedia Commons. (n.d.). https://commons.wikimedia.org/wiki/Category:Sea_and_land_breezes#/media/File:Sea_Land_Breeze.svg ● Category:Sea and land breezes - Wikimedia Commons. (n.d.). https://commons.wikimedia.org/wiki/Category:Sea_and_land_breezes#/media/File:Bryza_dzienna.svg ● Bryza nocna.svg - Wikimedia Commons. (2006, October 3). https://commons.wikimedia.org/wiki/File:Bryza_nocna.svg ● Corrientes-oceanicas.png - Wikimedia Commons. (2007, August 10). https://commons.wikimedia.org/wiki/File:Corrientes-oceanicas.png

III. TEACHING AND LEARNING PROCEDURE		
BEFORE/PRE-LESSON PROPER		
ACTIVATING PRIOR KNOWLEDGE	Homework **Directions:** Answer the following questions based on your understanding of land and sea breezes. Be sure to provide complete and clear explanations. 1. Explain why land heats up faster than water during the day. 2. Describe how a sea breeze forms during the day. Use the concepts of temperature differences and air movement in your explanation. 3. What happens at night that causes a land breeze to form? Explain the temperature differences between land and water. 4. How do land and sea breezes help regulate the climate in coastal areas? 5. Why do areas near large bodies of water experience milder temperatures compared to inland areas?	CHECK YOU STUDENTS HOMEWORK
LESSON PURPOSE/INTENTION	**Understand** how solar energy influences ocean currents by heating Earth's surface unevenly. **Explain** how temperature differences, wind patterns, and the Coriolis effect contribute to the movement of ocean currents. **Describe** the role of convection in distributing heat within ocean waters. **Analyze** real-world examples of ocean currents and their effects on climate, marine life, and human activities **Illustrate** the connection between solar energy, ocean currents, and global weather patterns through diagrams or models.	

LESSON LANGUAGE PRACTICE	Vocabulary **Solar Energy** – The energy from the Sun that heats Earth's surface, including the ocean. **Ocean Currents** – Large-scale movements of seawater driven by various factors, including solar energy, wind, and Earth's rotation. **Convection** – The process of warm water rising and cooler water sinking, creating movement in ocean waters. **Surface Currents** – Ocean currents that flow on the ocean's surface, primarily driven by wind and the Sun's heat. **Deep Ocean Currents** – Slow-moving currents found deep in the ocean, caused by temperature and salinity differences. **Thermohaline Circulation** – The "global conveyor belt" of ocean currents driven by variations in temperature (thermo) and salt concentration (haline). **Coriolis Effect** – The deflection of moving objects, including ocean currents, due to Earth's rotation. **Trade Winds** – Consistent winds near the equator that help drive surface ocean currents. **Gyres** – Large circular ocean current systems formed by global wind patterns and the Coriolis effect. **Upwelling** – The movement of cold, nutrient-rich water from deep in the ocean to the surface, driven by wind and currents. **Downwelling** – The process where surface water sinks due to cooling or increased salinity. **Equatorial Currents** – Ocean currents near the equator that flow due to trade winds and solar heating. **Density** – A measure of how compact a substance is; in ocean currents, denser (colder, saltier) water sinks, while less dense (warmer, fresher) water rises.	

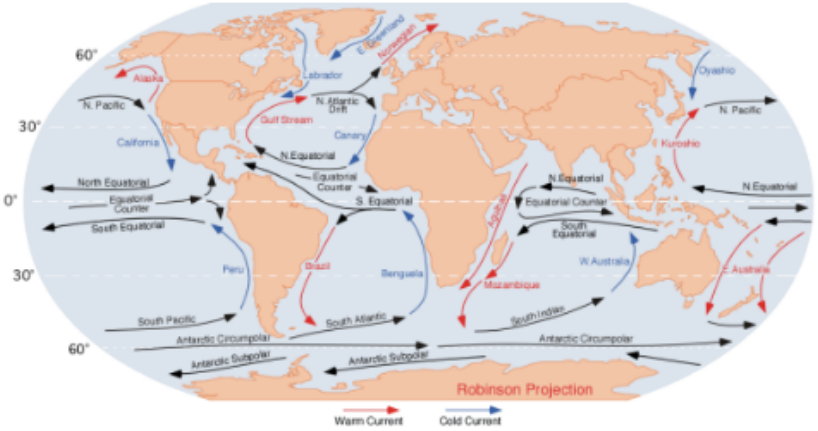
	Heat Transfer – The movement of heat energy from one place to another, often through ocean currents distributing warmth across the planet. **Climate Regulation** – The way ocean currents influence global temperatures and weather patterns by redistributing heat.	
DURING/LESSON PROPER		
READING THE KEY IDEA/STEM	The Sun is the primary source of energy for Earth's systems, including the ocean. Solar energy drives the movement of air and water, creating wind patterns and ocean currents. These currents play a crucial role in distributing heat across the planet, influencing climate, marine life, and weather patterns. **How Solar Energy Affects Ocean Currents** 1. **Uneven Heating of the Earth's Surface** ○ The Sun's energy does not heat the Earth evenly. ○ The **equator** receives more direct sunlight, making it warmer, while the **poles** receive less sunlight, making them colder. ○ This temperature difference creates **pressure variations** in both the atmosphere and the ocean, leading to movement. 2. **Formation of Surface Ocean Currents (Wind-Driven)** ○ Warm air at the equator rises, and cooler air from higher latitudes moves in to replace it. This movement creates **wind patterns**, such as **trade winds and westerlies**. ○ The wind pushes surface water, forming **surface currents** like the **Gulf Stream, Kuroshio Current, and Equatorial Currents**. 3. **Convection and Deep Ocean Currents (Density-Driven)** ○ Solar heating causes **warm water to rise** and **cold water to sink** in a process called **convection**. ○ In polar regions, seawater becomes **colder and saltier**, making it **denser** and causing it to sink.	

This process helps drive the **thermohaline circulation**, also known as the **global conveyor belt**.

4. **Coriolis Effect and Ocean Currents**
    - Due to Earth's rotation, moving water is deflected:
        - To the **right** in the Northern Hemisphere.
        - To the **left** in the Southern Hemisphere.
    - This effect helps shape large rotating current systems called **gyres** (e.g., North Atlantic Gyre, Pacific Gyre).
5. **Upwelling and Downwelling**
    - **Upwelling**: Winds push surface water away, allowing cold, nutrient-rich water to rise from the deep ocean, supporting marine life.
    - **Downwelling**: Warm water sinks due to wind-driven accumulation, helping transport oxygen to deep-sea organisms.

Importance of Ocean Currents in Climate and Human Activities

1. **Climate Regulation**
    - Ocean currents transfer heat from the equator to the poles, regulating global temperatures.
    - For example, the **Gulf Stream** warms Europe, while the **California Current** keeps the U.S. West Coast cooler.
2. **Weather and Storm Patterns**
    - Warm ocean currents contribute to hurricanes and typhoons by providing energy.
    - Cold currents influence rainfall and coastal fog (e.g., the Benguela Current near Africa).
3. **Impact on Marine Life**
    - Upwelling zones, such as off the coast of Peru, bring nutrient-rich waters that support fisheries.
    - Ocean currents affect migration patterns of whales, fish, and sea turtles.
4. **Effects on Human Activities**
    - Fishing industries depend on nutrient-rich currents.
    - Shipping routes use ocean currents to reduce travel time and fuel consumption.

	○ Climate patterns caused by ocean currents influence agriculture and water availability. **Solar energy is the driving force** behind ocean currents by creating temperature differences in the ocean. **Surface currents** are mainly driven by wind, while **deep ocean currents** are driven by density differences. The **Coriolis effect** deflects moving water, forming gyres. **Upwelling and downwelling** impact marine ecosystems and fisheries. Ocean currents help **regulate climate, weather, and human activities** like fishing, shipping, and agriculture.	
DEVELOPING and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM	show to the video on ocean currents https://www.youtube.com/watch?v=p4pWafuvdrY then ask the learners to answer the questions below: a. What is an ocean current? b. What are the factors affecting ocean currents Activity: Use the illustration of ocean currents (red = warm, blue = cold) to answer the question below.  **Guide Questions**	a. An ocean current is a continuous, directional movement of water that flows horizontally within the ocean. It is driven by various factors such as wind, temperature, salinity, the Earth's rotation, and the shape of the ocean basins. b. wind, temperature, salinity, earth's rotation and shape of the ocean basins. Corrientes-oceanicas.png - Wikimedia Commons. (2007, August 10). https://commons.wikimedia.org/wiki/File:Corrientesoceanicas.png

a. What is the general direction of ocean currents in the Northern Hemisphere?

b. What is the general direction of ocean currents in the Southern Hemisphere?

c. Look at the pattern of cold and warm water currents. What seems to determine if a current carries warm or cold water?

d. How does cold current water affect the continental coastline it borders?

e. Which warm ocean current flows along the eastern coast of the Philippines, contributing to the country's humid climate and providing favorable conditions for coral reefs and marine biodiversity?

Answers:

a. Clockwise

b. Counterclockwise

c. Warm water comes from the equator, and cold water comes from the poles.

d. It brings a cooling effect.

e. The Philippine or Mindanao Current

Complete the Ocean Currents' Cloze by choosing the correct answer from the word bank.

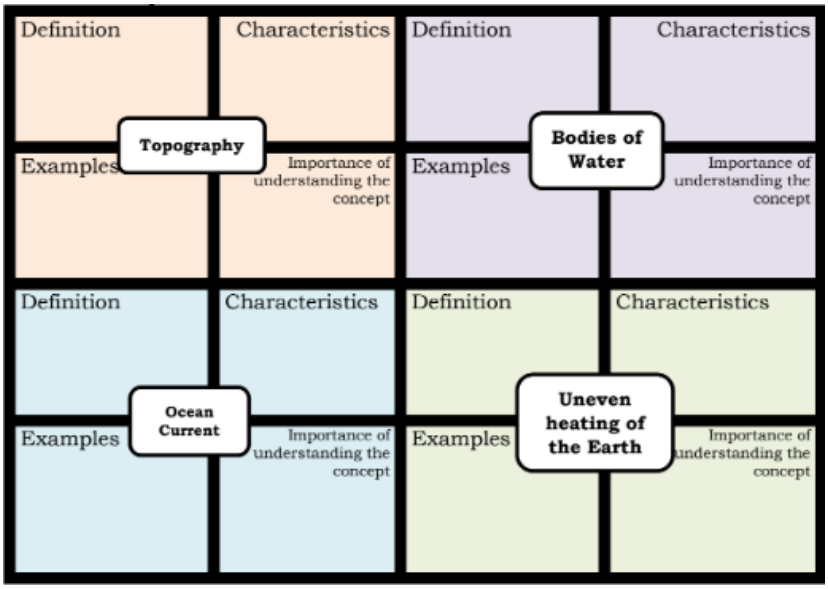
Ocean currents are continuous, directional movements of ocean water that flow horizontally within the **1)** _____. These currents are driven by various factors such as **2)** _____, **3)** _____, salinity, the Earth's rotation, and the shape of the ocean basins. Surface currents, which occur in the upper layer of the ocean, are primarily driven by **4)** _____. They play a crucial role in redistributing **5)** _____ around the Earth, influencing **6)** _____, weather patterns, and marine ecosystems. Deep ocean currents occur in deeper layers and are driven by density differences caused by variations in temperature and salinity. Overall, ocean currents are dynamic and complex systems that have an impact on the Earth's **7)**_____ and the organisms that inhabit them.

Word Bank

climate heat wind ocean temperature

Answers:

1. ocean
2. wind
3. temperature
4. wind
5. heat
6. climate
7. climate

AFTER AFTER/POST-LESSON		
MAKING GENERALIZATIONS AND ABSTRACTIONS	Complete the fryer model by applying the given variables, such as the definition of the word, characteristics, examples, and importance of the concept.  Instruct the learners to read the statement and assess their skills and knowledge using the emoticons. After the lesson, ask them to draw the appropriate number of emoticons that describe their skills and understanding of the concepts.	The teacher may use online tools or applications to facilitate this activity. The teacher may ask the learners to share their answers.

		
EVALUATING LEARNING	**Directions:** Read each question carefully and choose the best answer. Write the letter of the correct answer. **1. What is the primary source of energy that drives ocean currents?** A. The Moon's gravitational pull B. Solar energy from the Sun C. Heat from underwater volcanoes D. Human activities like fishing and shipping **2. Why does solar energy cause ocean currents to form?** A. It creates temperature differences in the ocean, causing water to move. B. It increases salt levels in the ocean, making the water sink. C. It melts icebergs, which creates waves and currents. D. It pulls water toward the Sun due to gravitational force. **3. What happens when the Sun heats ocean water near the equator?** A. The water expands and moves toward the poles. B. The water sinks immediately. C. The ocean freezes and stops moving. D. The ocean currents slow down. **4. Which type of ocean current is mainly driven by wind?** A. Surface currents B. Deep ocean currents C. Tidal currents D. Upwelling currents **5. What causes deep ocean currents to move?** A. Wind blowing on the ocean surface B. The rotation of the Earth C. Differences in water temperature and salinity D. The gravitational pull of the Moon	**ANSWER** **1.B** **2.A** **3.A** **4.A** **5.C**

ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)		
REMARKS		
REFLECTION		

Prepared by:

_____

_____

Subject Teacher
Teacher

Reviewed by:

Master Teacher/Head