

Weather's Moving Energy

Trace how sunlight, air, and ocean water shape storms and climate.

8.10 "Earth and space. The student knows that interactions between Earth, ocean, and weather systems impact climate. The student is expected to: describe how energy from the Sun, hydrosphere..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that explains an energy or water exchange. Circle phrases that describe air movement, then write 1, 2, or 3 beside each circle for global circulation, local weather movement, or tropical cyclone movement.

Energy in Motion

- ① The Sun powers weather by heating Earth unevenly. Land and ocean surfaces absorb energy at different rates, and warm water can store heat longer than land. Heated air expands, becomes less dense, and rises. As it rises, it cools, and water vapor condenses into clouds or rain. Evaporation moves water from the hydrosphere into the atmosphere, carrying energy with it. When vapor condenses, that energy is released, helping air rise and storms grow. These exchanges shape daily weather and long-term climate.
- ② Earth's rotation and unequal heating create broad belts of moving air. Near the equator, strong sunlight warms moist air, causing it to rise. Higher in the atmosphere, this air moves toward cooler latitudes, then sinks in many subtropical regions. Surface winds return toward the equator and are bent by Earth's rotation. In middle latitudes, prevailing westerlies often carry weather systems from west to east. These global circulation patterns guide air masses, so a community's weather depends partly on which air mass arrives.
- ③ Tropical cyclones form over warm tropical ocean water, where evaporation adds water vapor to the air. A low-pressure center draws in warm, moist air. As the air spirals inward and rises, its vapor condenses and releases heat. This released energy strengthens rising air and lowers pressure. Earth's rotation helps organize the spinning circulation, but cyclones do not form right at the equator. A cyclone is called a hurricane in the Atlantic and eastern North Pacific, and a typhoon in the western North Pacific. Cooler water or dry air can weaken it.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 How does energy move from the Sun and ocean water into a growing storm?

2 Why can land and ocean surfaces lead to different weather or climate effects after they are heated?

3 How do prevailing westerlies influence weather in many middle-latitude communities?

4 Describe two interactions between the warm ocean and atmosphere that strengthen a tropical cyclone.

3 YOUR TURN _____ Your own words

Invent a coastal town and write four sentences explaining how sunlight, warm ocean water, and moving air could affect its weather. Include either a global wind pattern or one condition that could strengthen or weaken a tropical cyclone.

PART 1 • READ AND MARK

Underline each sentence that explains an energy or water exchange. Circle phrases that describe air movement, then write 1, 2, or 3 beside each circle for global circulation, local weather movement, or tropical cyclone movement. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does energy move from the Sun and ocean water into a growing storm?	The Sun heats Earth and ocean water. Evaporation carries energy with water vapor into the atmosphere. When vapor condenses, it releases energy that helps air rise and storms grow.
2	Why can land and ocean surfaces lead to different weather or climate effects after they are heated?	Land and ocean absorb energy at different rates, and warm ocean water stores heat longer than land. These differences affect weather and long-term climate.
3	How do prevailing westerlies influence weather in many middle-latitude communities?	They often carry weather systems from west to east. They help guide air masses, so the air mass that arrives affects local weather.
4	Describe two interactions between the warm ocean and atmosphere that strengthen a tropical cyclone.	Warm ocean water causes evaporation, adding water vapor to the air. As warm, moist air rises and its vapor condenses, released heat strengthens rising air and lowers pressure.

PART 3 • YOUR TURN (SAMPLE ANSWER)

On a summer afternoon, the Sun heats the water near Port Isla. Water evaporates, and warm moist air rises over the coast. As the air cools and condenses, clouds and rain may form. If a tropical cyclone reaches the area, warm ocean water can supply energy while cooler water could weaken the storm.

Accept scientifically accurate cause-and-effect explanations using equivalent wording. For the open response, look for sunlight heating water, evaporation or condensation, air movement, and an accurate wind pattern or cyclone condition.