# Breezes in Motion

Trace how solar energy moves air and shapes conditions near a coast.

**E.7.9A.5** "Analyze models to explain the cause-and-effect relationship between solar energy and convection and the resulting weather patterns and climate conditions."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline where energy from the Sun starts a change, circle each place air rises or sinks, and number the steps that lead to a daytime breeze. Use your marks to trace how one change causes the next.

### Why the Beach Gets Breezy

1. At a sunny beach, the sand heats faster than the nearby ocean water. Sunlight supplies energy to both surfaces, but water warms more slowly. The sand warms the air touching it. That air expands, becomes less dense, and rises. Cooler air over the water flows toward the beach to replace it. Higher up, some air moves back toward the water and sinks, completing a convection loop. In this model, uneven solar heating starts the loop, and the flow of air at ground level is a sea breeze.

2. After sunset, the sand loses heat faster than the water. The ocean stays relatively warm, so the air above it can become warmer than the air over land. Warm air rises over the water. Cooler air near the ground then flows from land toward the ocean, making a land breeze. Air moving higher up can return toward land and sink. This nighttime loop is often weaker than the daytime loop because the temperature difference may be smaller. Wind can also change if a larger weather system moves through.

3. These loops help explain more than wind direction. If moist air from the ocean is pushed upward over warm land, it cools as it rises. Water vapor may condense into clouds, and showers are possible. On a cloudy afternoon, less sunlight reaches the sand, which can weaken the heating difference and the breeze. Over many years, the ocean's slow warming and cooling help give nearby land cooler summer afternoons and milder winter nights than places far inland. One breeze is weather; patterns measured over many years describe climate.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. Trace how sunlight causes a sea breeze on a sunny afternoon. Include the movement of air near the ground.

2. Why can the breeze reverse direction after sunset? Explain what happens to the land, water, and air.

3. In the passage's model, how could a sea breeze lead to clouds or showers?

4. How can the ocean affect climate on nearby land, not just one day's weather? Use the passage's temperature examples and explain their cause.

## 3 YOUR TURN

Your own words

Imagine a grassy field beside a large lake. In four to six sentences, model air movement on a sunny afternoon and a cloudy afternoon, then predict one possible weather effect and one long-term climate pattern near the lake.

ANSWER KEY

# Breezes in Motion

GRADE 7 · E.7.9A.5

## PART 1 · READ AND MARK

Underline where energy from the Sun starts a change, circle each place air rises or sinks, and number the steps that lead to a daytime breeze. Use your marks to trace how one change causes the next. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | Trace how sunlight causes a sea breeze on a sunny afternoon. Include the movement of air near the ground. | **Sunlight heats the sand faster than the water. Air above the sand warms and rises, so cooler air flows from the ocean toward the beach near the ground.** |
| 2 | Why can the breeze reverse direction after sunset? Explain what happens to the land, water, and air. | **Sand cools faster than ocean water. Air over the relatively warm water rises, and cooler air flows from land toward the ocean near the ground.** |
| 3 | In the passage's model, how could a sea breeze lead to clouds or showers? | **The breeze can bring moist ocean air over warm land. As that air rises and cools, water vapor may condense into clouds, making showers possible.** |
| 4 | How can the ocean affect climate on nearby land, not just one day's weather? Use the passage's temperature examples and explain their cause. | **Because ocean water warms and cools slowly, nearby land can have cooler summer afternoons and milder winter nights than places far inland. Repeated over many years, these conditions are part of its climate.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

On a sunny afternoon, the field warms faster than the lake water. Air above the field rises, and cooler air from the lake flows toward the field near the ground. That breeze may bring moist air inland, where rising air could form clouds. On a cloudy afternoon, less solar energy reaches the field, so the temperature difference and breeze may be smaller. Over many years, the lake's slow warming and cooling may make nearby summers cooler and winter nights milder than those farther inland.

Accept models that correctly connect uneven solar heating to rising air and surface wind. Weather and climate predictions should be plausible, with climate described as a pattern over many years.