Across the Cascades

Trace how location shapes climate

ESS.8.a "Analyze temperature and precipitation patterns related to factors that influence climate, including proximity to water, topography, elevation, latitude, and orographic effect."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline causes of climate patterns, circle the temperature or precipitation effects they help explain, and give each linked cause and effect the same number.

From Coast to Rain Shadow

(1) At a beach in western Oregon, a January breeze carries damp air off the Pacific. Farther inland, a town at roughly the same latitude can have colder winter nights and hotter summer afternoons. Water warms and cools more slowly than land, so the ocean limits temperature swings near the coast. The coastal town may still have cool summers because air moving in from the ocean stays relatively cool. These patterns do not mean every coastal day is mild. A passing storm can change the weather quickly, while climate describes patterns measured over many years.

(2) Follow moist Pacific air eastward toward Oregon's Cascade Range. As the air rises over the mountains, it expands and cools. Water vapor condenses into clouds, and much of the moisture falls as rain or snow on the western slopes. Near the high ridges, temperatures are usually lower than in nearby low valleys because air temperature generally decreases with elevation. After crossing the crest, the air sinks, warms, and becomes less likely to produce precipitation. Towns east of the Cascades are often drier than towns on the western slopes. This windward and leeward contrast is called the orographic effect.

(3) Now compare two coastal towns, one in northern Oregon and one in southern Oregon. Both are close to the Pacific, so both can have smaller seasonal temperature swings than places far inland. Yet the northern town is at a higher latitude and generally receives less direct sunlight over a year. This helps explain why it is usually cooler than the southern town. Latitude does not set rainfall by itself: prevailing winds, storm tracks, and mountain barriers also shape where precipitation falls. To explain a climate pattern, compare locations carefully and identify which factors change between them.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why might an inland Oregon town have colder winter nights and hotter summer afternoons than a coastal town at roughly the same latitude?

2. Why are towns east of the Cascades often drier than towns on the western slopes?

3. How does elevation help explain the temperature difference between high Cascade ridges and nearby low valleys?

4. Both Oregon coastal towns are near the ocean. Why is the northern town usually cooler than the southern town?

3 YOUR TURN

Your own words

Imagine a high mountain town on the side facing moist winds and a low valley town on the far side beside a large lake. They are at the same latitude. In four sentences, predict which town is wetter, explain why, and describe one temperature effect of elevation and one temperature effect of the lake.

ANSWER KEY

Across the Cascades

HIGH SCHOOL · ESS.8.a

PART 1 · READ AND MARK

Underline causes of climate patterns, circle the temperature or precipitation effects they help explain, and give each linked cause and effect the same number. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why might an inland Oregon town have colder winter nights and hotter summer afternoons than a coastal town at roughly the same latitude?	**The ocean warms and cools more slowly than land, limiting temperature swings near the coast. Inland temperatures can vary more.**
2	Why are towns east of the Cascades often drier than towns on the western slopes?	**Moist air rises and drops precipitation on the western slopes. After crossing the crest, the air sinks, warms, and becomes less likely to produce precipitation.**
3	How does elevation help explain the temperature difference between high Cascade ridges and nearby low valleys?	**Air temperature generally decreases with elevation, so the high ridges are usually cooler than nearby low valleys.**
4	Both Oregon coastal towns are near the ocean. Why is the northern town usually cooler than the southern town?	**The northern town is at a higher latitude and generally receives less direct sunlight over a year.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The mountain town is likely wetter because moist air rises, cools, and drops precipitation on its slope. The valley town lies in a rain shadow after the air crosses the mountain. The mountain town's high elevation generally makes it cooler than nearby lower ground. The lake limits seasonal temperature swings in the valley, making its summers and winters less extreme than they would be without the lake.

Accept equivalent explanations that connect a geographic factor to a temperature or precipitation pattern. For Part 3, students need not claim that either town is warmer overall.