When Fronts Meet

Trace how moving air changes the weather

ESS.7.c "Construct an explanation of how air masses, source regions, fronts, weather changes associated with frontal passage (including cold, warm, occluded, and stationary fronts), air pressure, air density, temperature, cloud types..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline clues about where air masses form, circle pressure and temperature changes, and number the steps that connect air movement to clouds or precipitation at one front.

A Changing Forecast for Cedar Falls

1. At a bus stop in Cedar Falls, a warm, humid morning can turn into a chilly evening when different air masses meet. An air mass gains its temperature and moisture from the region where it forms, called its source region. Air forming over a warm ocean is usually moist and warm; air forming over a cold continent is usually colder and drier. Cold air is generally denser than warm air, so it tends to stay near the ground and push beneath warmer air. Surface pressure measures the weight of the air above a location, not temperature alone. A front is the boundary where two air masses meet.

2. Before a cold front reaches Cedar Falls, pressure often falls as a low-pressure system approaches. At the front, denser cold air wedges under warm air, lifting it quickly. Rising moist air cools, and water vapor condenses into clouds; towering cumulonimbus clouds can bring brief, heavy rain or thunderstorms. After the front passes, temperature usually drops and pressure often rises. At a warm front, advancing warm air glides more gradually over retreating cold air. Layered stratus and nimbostratus clouds may spread across the sky, bringing steady precipitation. Temperatures usually rise after this front passes.

3. A front does not always keep moving. Along a stationary front, neither air mass pushes the other far, so layered clouds and rain can linger for days if moist air keeps rising. In an occluded front, a cold front catches a warm front, lifting the warm air off the ground. Widespread clouds and precipitation often form as that air rises and cools. A passing low-pressure system commonly connects these fronts: pressure is often lowest near its center and tends to rise after it departs. Pressure patterns help forecast changes, but cloud type and rainfall also depend on available moisture and how fast air rises.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why can air from a cold continent push beneath air from a warm ocean when the two air masses meet?

2. Compare how air rises at cold and warm fronts. How does that difference help explain the clouds and precipitation each can bring?

3. Explain why rain can linger at a stationary front and why an occluded front can bring widespread precipitation.

4. A town's pressure falls, then rises as its air becomes cooler. How could the passage help you explain this change?

3 YOUR TURN

Your own words

A town sits near a stationary front between moist air from a warm ocean and cold air from an inland plain. Write a five-sentence forecast for the stalled front and for what happens if the colder air begins advancing as a cold front; include air density, pressure, temperature, a cloud type, and precipitation.

ANSWER KEY

When Fronts Meet

PART 1 · READ AND MARK

Underline clues about where air masses form, circle pressure and temperature changes, and number the steps that connect air movement to clouds or precipitation at one front. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why can air from a cold continent push beneath air from a warm ocean when the two air masses meet?	**The cold continent produces colder, generally denser air, which tends to stay near the ground and push beneath the warmer ocean air.**
2	Compare how air rises at cold and warm fronts. How does that difference help explain the clouds and precipitation each can bring?	**At a cold front, dense cold air lifts warm air quickly, which can produce towering cumulonimbus clouds and brief, heavy rain. At a warm front, warm air rises gradually over cold air, which can produce layered stratus or nimbostratus clouds and steady precipitation.**
3	Explain why rain can linger at a stationary front and why an occluded front can bring widespread precipitation.	**At a stationary front, neither air mass moves far, so moist air can keep rising and producing rain. At an occluded front, a cold front catches a warm front and lifts warm air off the ground; the rising air cools and can produce widespread precipitation.**
4	A town's pressure falls, then rises as its air becomes cooler. How could the passage help you explain this change?	**Pressure often falls as a low-pressure system and cold front approach. After the cold front passes, colder air arrives and pressure often rises.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Moist air from the warm ocean meets denser, colder air from the inland plain near town. While the front stalls, moist air rises slowly, forming layered stratus clouds that may bring lasting light rain, while pressure may change little. If the cold air begins advancing, pressure may fall ahead of the approaching cold front. The denser air then pushes under the warm air, lifting it quickly into cumulonimbus clouds and possibly heavy showers. After the cold front passes, the town gets cooler, and pressure often rises.

Accept other plausible cloud and precipitation forecasts if students connect them to how moist air rises. Pressure changes should be described as tendencies, not certainties.