

Rain or Snow: the Line

Name: _____

Date: _____

Class: _____

Read the lesson at myweatherrock.com/journal/explainers/rain-or-snow-line (or the printed copy), then answer below.

Remember

What reaches the ground, rain, snow, sleet, or freezing rain, is decided by the temperature of the whole column of air the precipitation falls through, not just the reading at your porch. Everything starts as snow aloft in winter storms. A column below freezing top to bottom delivers it as snow. A warm layer partway down, the warm nose, melts it: refreeze the drops in a deep cold layer beneath and you get sleet; keep the cold layer shallow and the drops arrive still liquid, freezing on contact with everything, and that is freezing rain, the dangerous one. The four outcomes can be separated by a hundred miles or a few hours in the same storm.

Questions

1. What actually decides whether you get rain, snow, sleet, or freezing rain?

- ☐ A. The surface temperature alone
- ☐ B. The temperature layering of the whole column the precipitation falls through
- ☐ C. How heavy the precipitation is

2. What is the warm nose?

- ☐ A. The mild edge of a cold front
- ☐ B. An above-freezing layer sandwiched into a cold column, often warm-front air riding over cold surface air
- ☐ C. The warmest hour of a winter day

3. Sleet and freezing rain share the same warm nose. What separates them?

- ☐ A. The depth of the cold layer beneath it
- ☐ B. The size of the original snowflakes
- ☐ C. Wind speed at the ground

4. Which precipitation type is the dangerous one, and why?

- ☐ A. Sleet, because the pellets strike hard
- ☐ B. Freezing rain, because it glazes roads and loads power lines and trees with ice
- ☐ C. Snow, because it accumulates deepest

5. It is 35 degrees and steadily raining into fairly dry air. An hour later it is snowing, with no front having passed. What most likely happened?

- ☐ A. The forecast changed
- ☐ B. Evaporation cooled the column toward its wet-bulb temperature and the profile flipped
- ☐ C. Snow cannot fall at 35 degrees, so it must be sleet

In your own words

Your thermometer says 30 degrees but rain is falling and freezing onto the trees. Describe what the air above your house must look like, and why this is more dangerous than snow.

Answer key (for the teacher)

1. What actually decides whether you get rain, snow, sleet, or freezing rain?

B. The temperature layering of the whole column the precipitation falls through — Nearly everything starts as snow aloft; the layers below write the ending. Your porch thermometer reads only the last six feet of a twenty thousand foot trip.

2. What is the warm nose?

B. An above-freezing layer sandwiched into a cold column, often warm-front air riding over cold surface air — On a temperature-height chart it bulges warm partway up and tucks back cold below, the signature of warm air gliding up a front's shallow ramp over entrenched cold air.

3. Sleet and freezing rain share the same warm nose. What separates them?

A. The depth of the cold layer beneath it — A deep cold basement refreezes the melted drops into pellets: sleet. A shallow one leaves them liquid and supercooled, freezing on contact instead: freezing rain.

4. Which precipitation type is the dangerous one, and why?

B. Freezing rain, because it glazes roads and loads power lines and trees with ice — Glaze looks like wet pavement, grips like nothing, and its weight across line spans and limbs takes the grid down with the trees. Ice Storm Warnings commonly key on around a quarter inch of accretion.

5. It is 35 degrees and steadily raining into fairly dry air. An hour later it is snowing, with no front having passed. What most likely happened?

B. Evaporation cooled the column toward its wet-bulb temperature and the profile flipped — Precipitation falling into dry air spends heat on evaporation, dragging the air toward the wet-bulb reading. Storms routinely cool themselves across the line, which is why forecasters watch wet-bulb profiles.