

# Predicting the Weather Poster

## Illustrated Teacher's Guide

#35-1345 PAPER

#35-1346 LAMINATED

### Weather Basics

An old weather adage states, "Red sky in morning, sailors take warning. Red sky at night, sailors delight." Each day **meteorologists**, scientists who study weather, predict the conditions we should encounter as we go about our activities. They use colorful **weather maps** with many symbols to illustrate weather patterns and predict their movement. What do the different symbols mean, and how do you interpret them? What causes weather? How difficult is it to accurately predict the weather?

### Fronts

A **weather front** is the leading edge of a **weather system**. A solid red or blue line shows the location of a front on a weather map. There are two main types of weather fronts, **warm fronts** and **cold fronts**, and these interact to form other types of fronts. A red line represents a warm front, and semicircular bumps point in its direction of movement. A blue line represents a cold front, and triangular bumps indicate its direction of movement. A third type of weather front is a **stationary front**. This type of front is indicated by single line composed of red and blue sections. A stationary front is an area where the air masses are not moving, just as its name suggests. An **occluded front** is created when a cold front collides with a warm front. The warm, moist air of the warm front *occludes* or blocks the movement of the cooler, drier air of the cold front. Since the air mass of the cold front is denser than that of the warm front, the cold air plows below the warmer air, which is forced upward. As the warm, moist air rises, it cools and **precipitation** (rain, snow, hail, sleet, fog, etc.) forms. The type of precipitation produced depends on the temperature and other conditions.

### Atmospheric Pressure

As air particles collide with surfaces of an object, a force called **atmospheric pressure** is exerted on the object. Atmospheric pressure is measured with a **barometer**. Uneven heating of parts of the atmosphere causes localized **air masses** (areas of air) to contract or expand and create areas of **high pressure** and **low pressure**. An area of high pressure tends to be cold, so its air mass is relatively dense and tends to sink. An area of high pressure typically has clear skies and fair weather. On the other hand, an area of low pressure tends to be warm and of relatively low density. This causes the air mass to rise as it is displaced by cooler, denser air. An area of low pressure tends to be associated with clouds, rain, and storms.

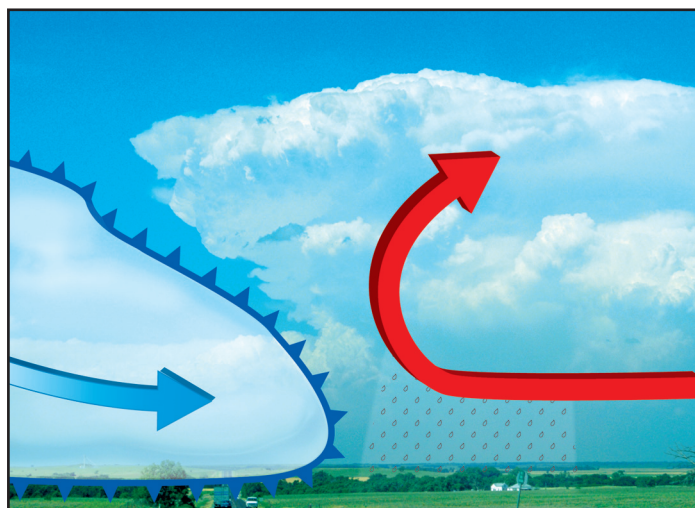


Figure 2 - What happens when a cold front and a warm front meet?










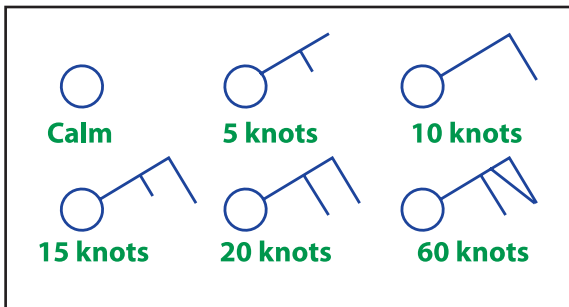
		Light Rain		Ice
		Heavy Rain		Fog
		Light Snow		
		Heavy Snow		

Figure 1 - Symbols for Types of Fronts and Precipitation

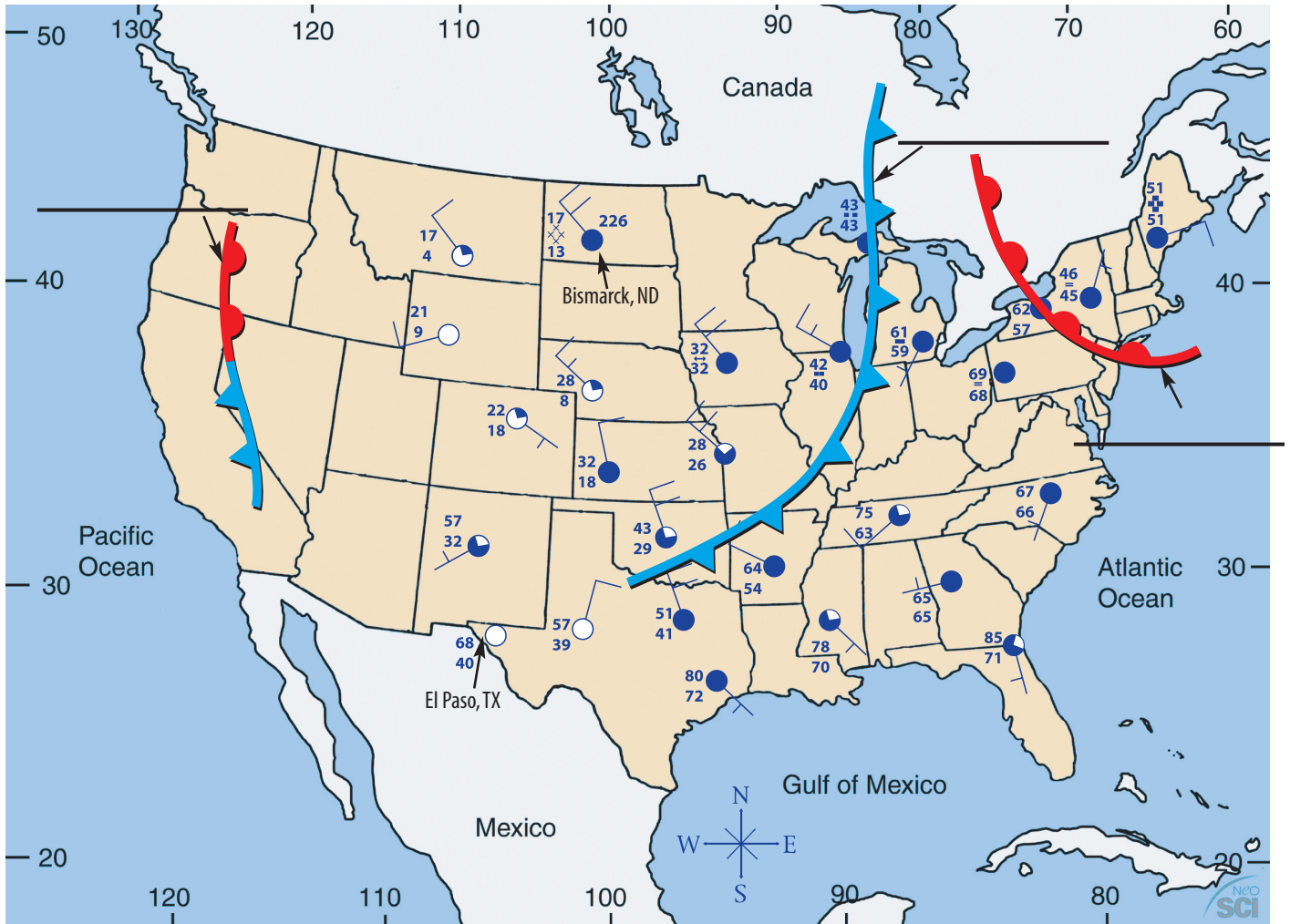
## Wind

When high and low pressure air masses interact, they produce wind. Wind is the flow of air as an air mass moves. Scientists label a wind by the direction from which it originates. For example, a northeaster or *nore-aster* is a wind that blows from the northeast. An anemometer is an instrument that is used to measure wind speed. Wind speed is typically measured in knots. One knot equals 1.85 kilometers/hour or 1.15 miles/hour. Wind that blows at 20 knots from the west equals  $20 \times 1.85 = 37$  kilometers/hour or  $20 \times 1.15 = 23$  miles/hour. A small circle represents calm conditions on a weather map. A line with a side branch added to the circle indicates wind. The size and shape of the side branch indicates the direction and the wind speed. The poster shows the progression of wind speed and its corresponding symbols. The circle also shows the amount of cloud coverage. An open, white circle represents a clear sky and a solid blue circle represents an overcast sky with 100% cloud cover. Observers often report cloud cover in tenths of coverage (i.e., 0%, 10%, 20%, etc.) and represent it by the partially shading the circle blue.



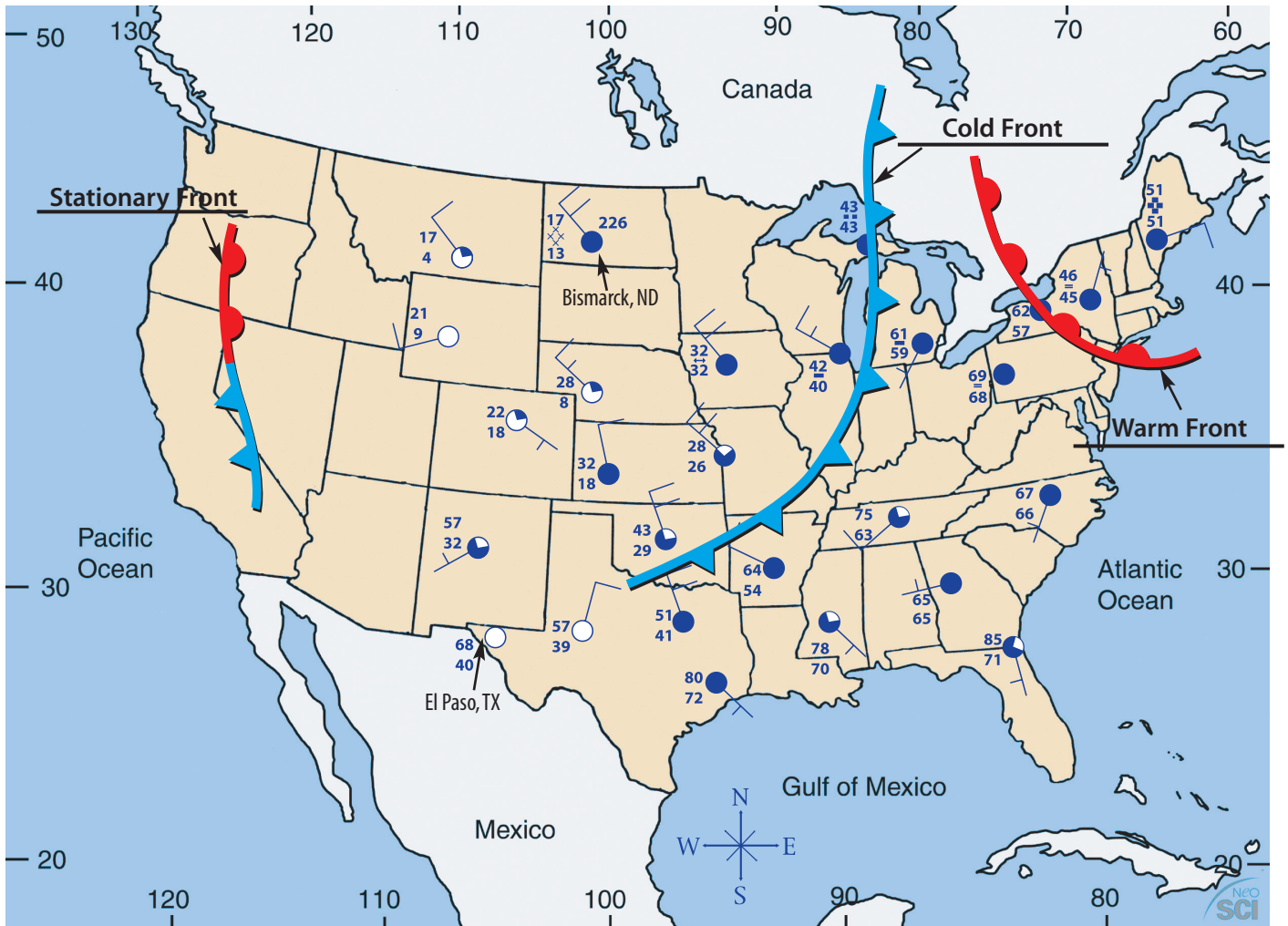
**Figure 3 - Wind speed symbols - What are their speeds in miles per hour?**

# Worksheet #1 – Interpreting a Weather Map



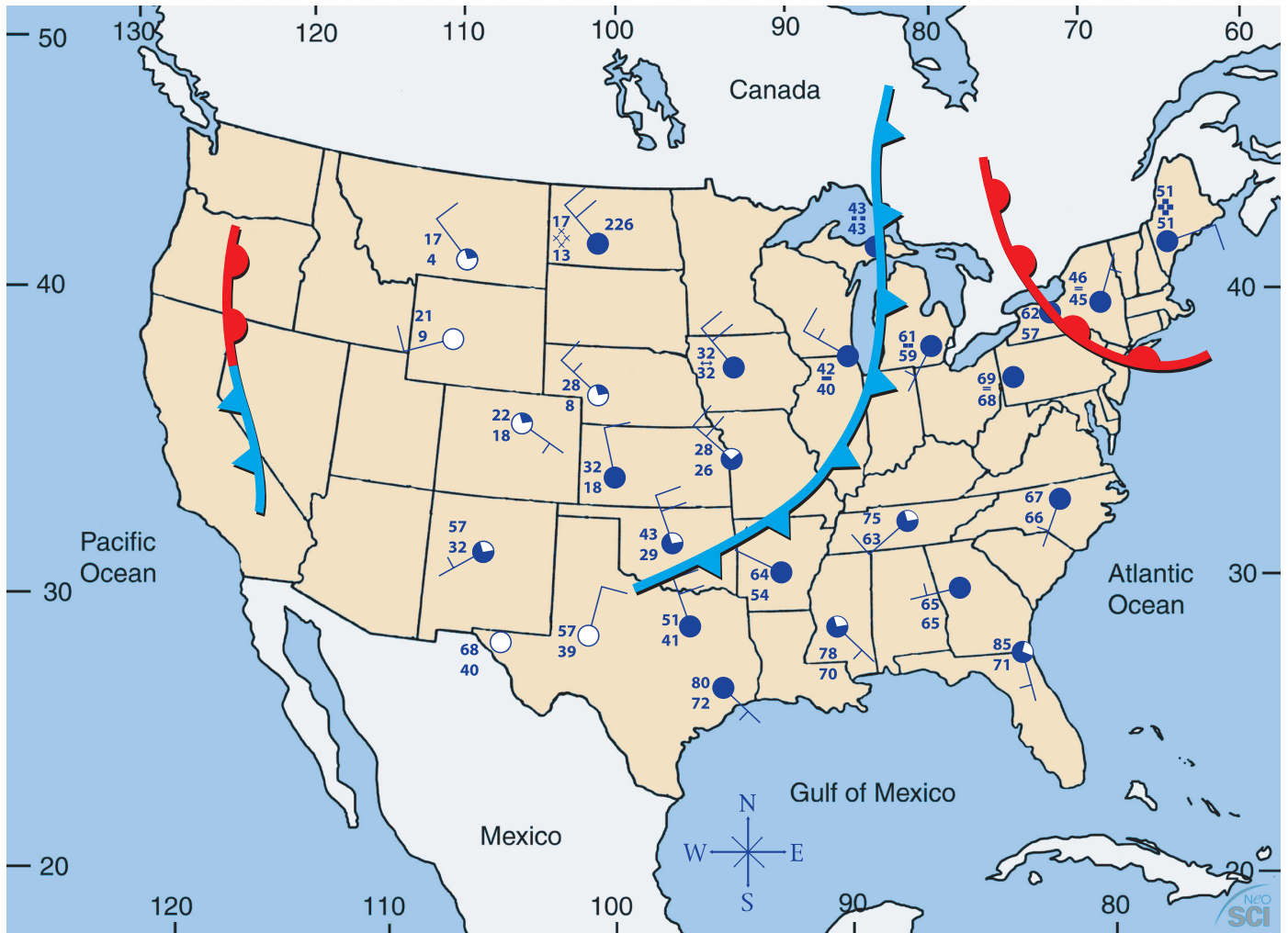
1. Label the types of the three weather fronts shown on the weather map illustrated above.
2. El Paso is a city in the westernmost tip of Texas. Based on the weather map above, what is the wind condition in El Paso? What is the approximate percentage of cloud cover indicated on the map for El Paso?  
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3. Bismarck is located in the south-central part of North Dakota. As shown in the map above, North Dakota borders Canada and is south of two large lakes in Canada. According to the above weather map, what is the wind speed and approximate percentage cloud cover in Bismarck, North Dakota?  
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# Worksheet #1 – Interpreting a Weather Map



1. Label the types of the three weather fronts shown on the weather map illustrated above.
2. El Paso is a city in the westernmost tip of Texas. Based on the weather map above, what is the wind condition in El Paso? What is the approximate percentage of cloud cover indicated on the map for El Paso?  
**It is calm and clear in El Paso, Texas.**
3. Bismarck is located in the south-central part of North Dakota. As shown in the map above, North Dakota borders Canada and is south of two large lakes in Canada. According to the above weather map, what is the wind speed and approximate percentage cloud cover in Bismarck, North Dakota?  
**The wind is at 60 knots. There is a total cloud cover in Bismarck.**

# Worksheet #2 – Predicting Weather



As a reward for high attendance and high achievement among students in your school, the principal has scheduled a school-wide field day with a variety of outdoor activities for tomorrow afternoon. Based on the weather map shown above, would you advise the principal to have the field day as scheduled, or would you advise the principal to reschedule the event? Explain your logic.

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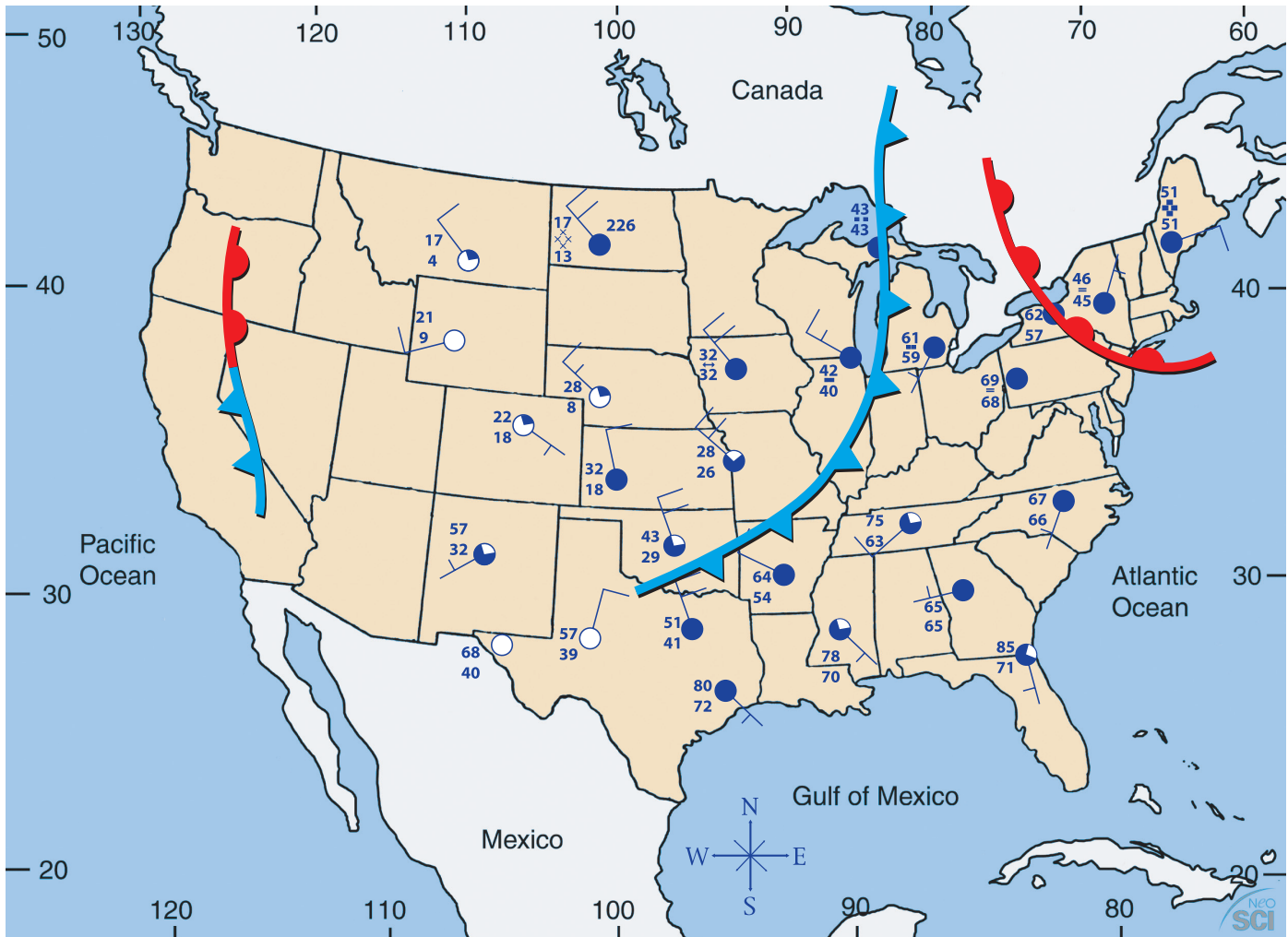
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**The answer to this question depends on your location.**