

NAME _____ DATE _____
INSTRUCTOR _____ PERIOD _____ PARTNER _____

UNIT 6: Weather

LAB 6-5: WEATHER PATTERNS

INTRODUCTION: A basic principle in the Earth sciences is that energy is constantly bringing about changes. In order to understand the changing Earth, we must understand the energy systems at play within the environment which cause those changes.

The study of energy interactions within the atmosphere leads to the identification of systems that can be mapped as field quantities. A series of composite maps showing these atmospheric variables provides a picture of past and present conditions. Such a composite map is called a **synoptic** map. Weather forecasting is based on a series of synoptic maps.

OBJECTIVE: You will construct field maps and learn to identify patterns that can be used to predict weather.

VOCABULARY:

synoptic weather map:

isotherm:

barometric (atmospheric) pressure:

isobar:

convergence:

divergence:

cyclone:

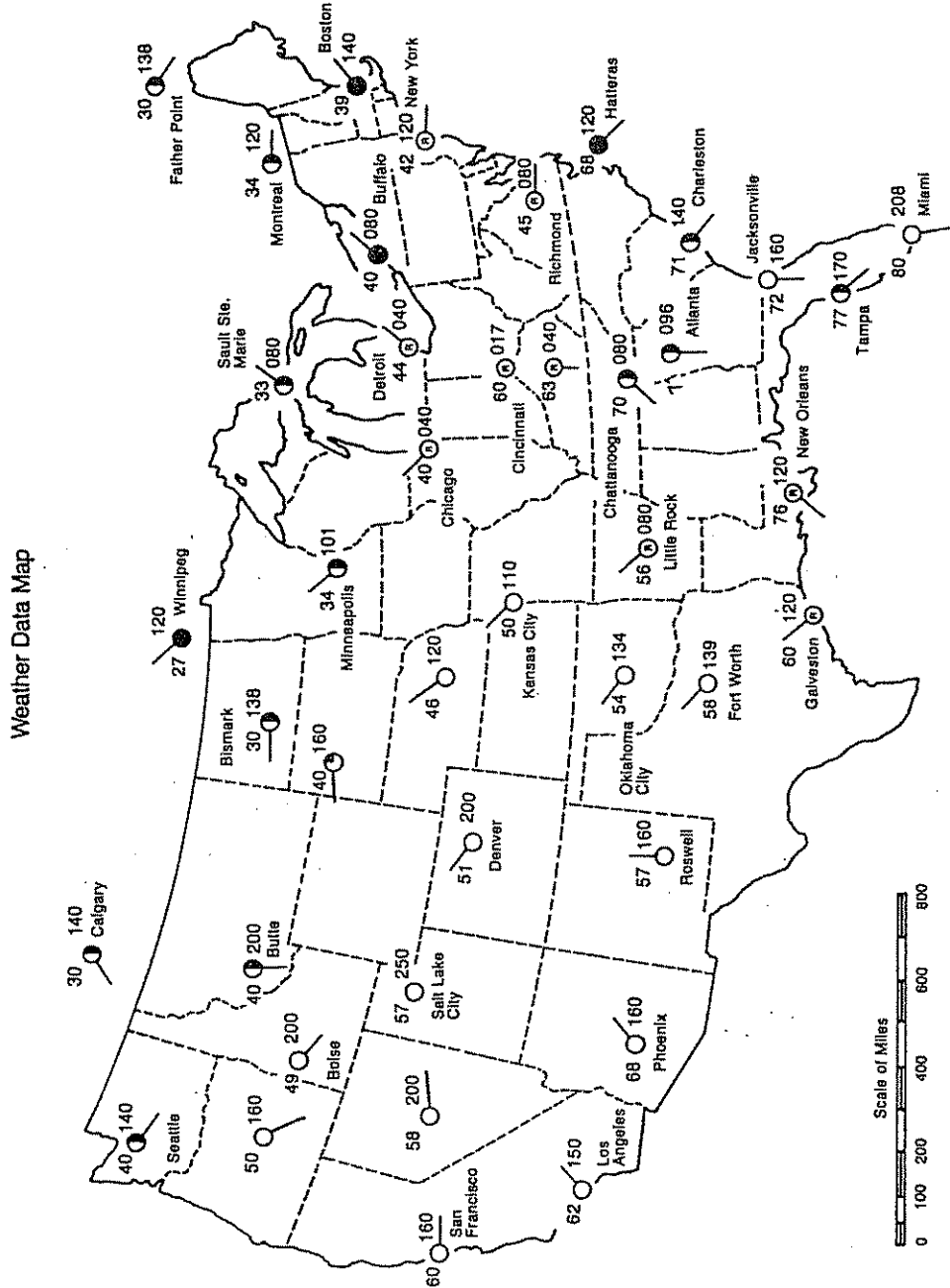
anticyclone:

air mass:

source region:

front:

MAP A: TEMPERATURE PATTERNS



PROCEDURE A:

1. On Map A use a pencil to lightly draw isotherms at 10-degree intervals.
2. Check carefully to be sure that the isotherms are correct, then darken them.

DISCUSSION QUESTIONS: (*Answer in Complete Sentences*)

1. What is the general appearance of the isotherms on this map?
2. How does the temperature change from north to south on this map?
3. Near which cities is the temperature gradient the greatest?
4. Calculate the temperature gradient between Galveston and Kansas City. **SHOW ALL WORK AND LABEL PROPERLY.**
5. Calculate the temperature gradient between Cincinnati and Chicago. **SHOW ALL WORK AND LABEL PROPERLY.**

PROCEDURE B

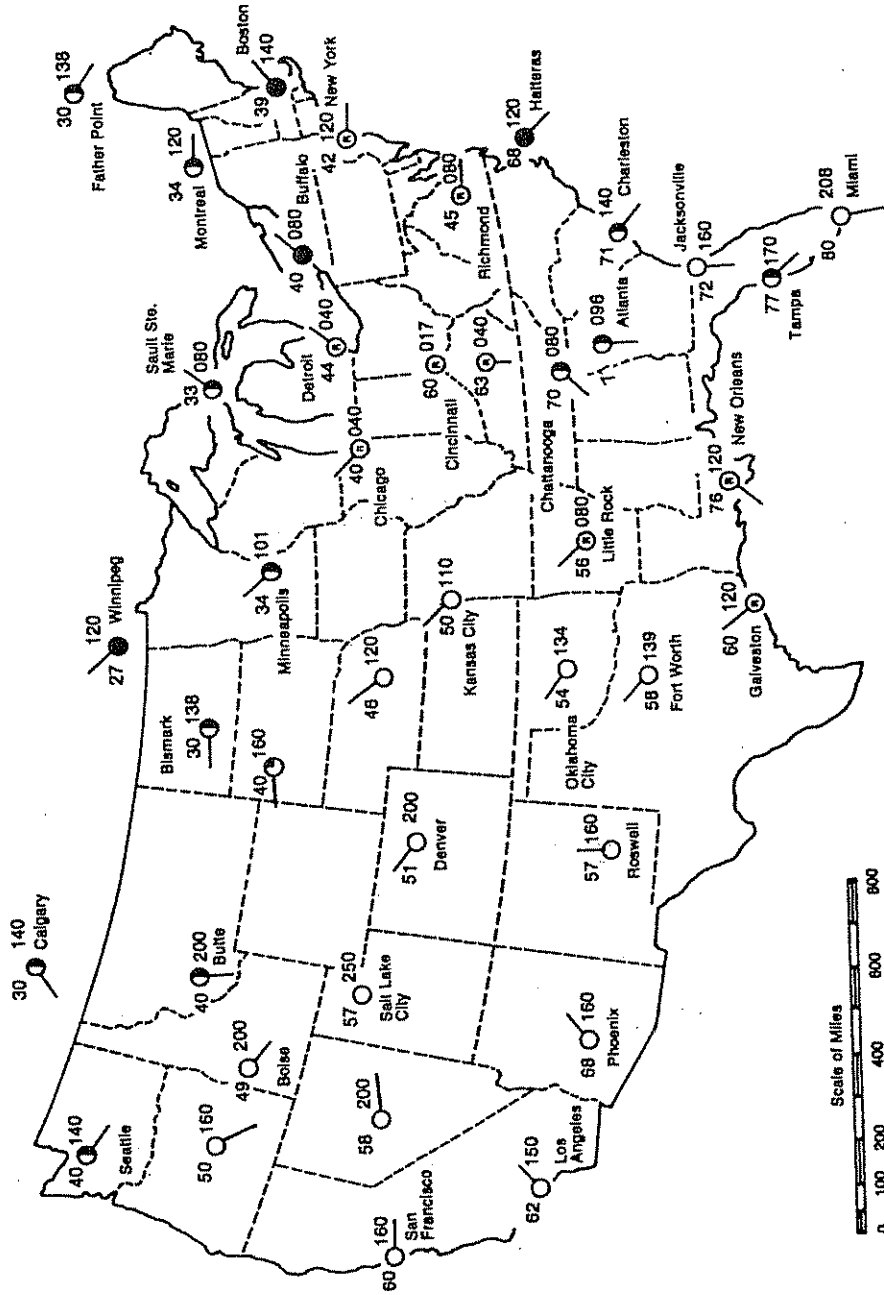
1. On Map B use a pencil to lightly draw isobars between points of equal atmospheric pressure. Use a 4-millibar interval. Start counting at 1000.0 millibars (000).
2. Check carefully to be sure that the isobars are correct and then darken.
3. Label the centers of high and low pressure areas using a capital H and L respectively.

DISCUSSION QUESTIONS: *(Answer in Complete Sentences)*

1. What is the general appearance of the isobars on this map?
2. The low pressure center is near which city?
3. The high pressure center is near which city?
4. What is the highest air pressure on the map?
5. What is the highest value for an isobar on Map B?
6. As you travel from Salt Lake City to Los Angeles, what change in atmospheric pressure would you observe?
7. Calculate the pressure gradient between Little Rock and Galveston. **SHOW ALL WORK AND LABEL PROPERLY.**

MAP C: SURFACE WIND PATTERNS

Weather Data Map



PROCEDURE C:

Use Map C.

1. At each station model extend the shaft of the wind arrow through the station model and draw the head of the arrow to show the direction the wind is blowing.
2. Draw larger arrows to show the general pattern of air flow around the high and low pressure centers.

DISCUSSION QUESTIONS: (*Answer in Complete Sentences*)

1. Where is the greatest change in wind direction in the eastern part of the country?
2. Describe the general surface wind pattern around the low pressure area.
3. Are surface winds around a low pressure area convergent or divergent?
4. Describe the general surface wind pattern around the high pressure area.
5. Are surface winds around a high pressure area convergent or divergent?

PROCEDURE D:

The standard symbol for rain on a weather map is a "dot" (●) below the temperature on a station model. In this exercise an "R" is placed inside the circle to make it less confusing.

1. Draw a line around the area on this map where there is precipitation.
2. Lightly shade in the area where precipitation occurs.
3. On Map D label the location of the continental polar and the maritime tropical air masses using the appropriate symbols.

DISCUSSION QUESTIONS: *(Answer in Complete Sentences)*

1. Where is precipitation occurring relative to the continental polar and maritime tropical air masses on this map?
2. Describe, step by step, how clouds form over a low pressure center?
3. Compared to areas of low pressure, why do areas of high pressure have fewer clouds?

PROCEDURE E:

1. Refer to maps B, C and D and draw isobars, wind patterns, and the area of precipitation on Map E.
2. Using that information, draw in the cold and warm fronts with the proper symbols.

DISCUSSION QUESTIONS: (*Answer in Complete Sentences*)

1. With respect to the cold front, where does precipitation occur?
2. With respect to the warm front, where does precipitation occur?
3. What are the two characteristics that are used to describe an air mass?
4. Compare the characteristics of an air mass to its source region.
5. Compare the following conditions on either side of the cold front:
 - a) temperature:
 - b) air pressure:
 - c) wind direction:

CONCLUSION QUESTIONS:

1. Describe the general weather conditions associated with a high pressure area in terms of:

a) temperature:

b) wind patterns

c) cloud development:

d) precipitation:

2. Describe the general weather conditions associated with a low pressure center in terms of:

a) temperature:

b) wind patterns:

c) cloud development:

d) precipitation: