Name: _____ Laboratory Section: _____

Date: _____ Score/Grade: _____

Video
Exercise 9
Pre-Lab Video
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LAB EXERCISE 9
Temperature Maps

SECTION 1

Working with Isotherms and Temperature Maps

1. The 0°C (32°F) isotherm is already drawn for you (highlight it to make it distinctive). You may find it helpful to use colored pencils to "group" the temperature intervals (5 C° intervals, above and below 0°C). Use a pencil to lightly sketch the isotherms, then use a pen to darken the lines, which should be smooth curved lines. (See your geography text or the weather page of the newspaper for examples of isothermal maps.) Begin with the 5°C isotherm, then draw the 10°C and 15°C isotherms. Continue by completing the +5°C, +10°C, +15°C, +20°C, and finally, +25°C isotherms.

2. List and briefly describe the principal temperature controls on average annual temperatures and temperature ranges.

   Latitude is responsible for controlling average temperature as well as temperature range. Continentality controls temperature range. High latitudes have lower averages and higher ranges. Inland regions have higher ranges than coastal regions.

3. Describe the temperature pattern from Louisiana northward through Arkansas, Missouri, Iowa, and Wisconsin, to Canada. Which temperature controls are producing this pattern?

   Temperatures decrease from the coast to Arkansas and up through Canada. While the isotherms follow the east coast, the main control on temperatures is latitude.

4. Describe and explain the temperature gradient over Nevada and Utah. (How rapidly are the temperatures changing from one place to another?) Which temperature controls are producing this pattern of temperatures.

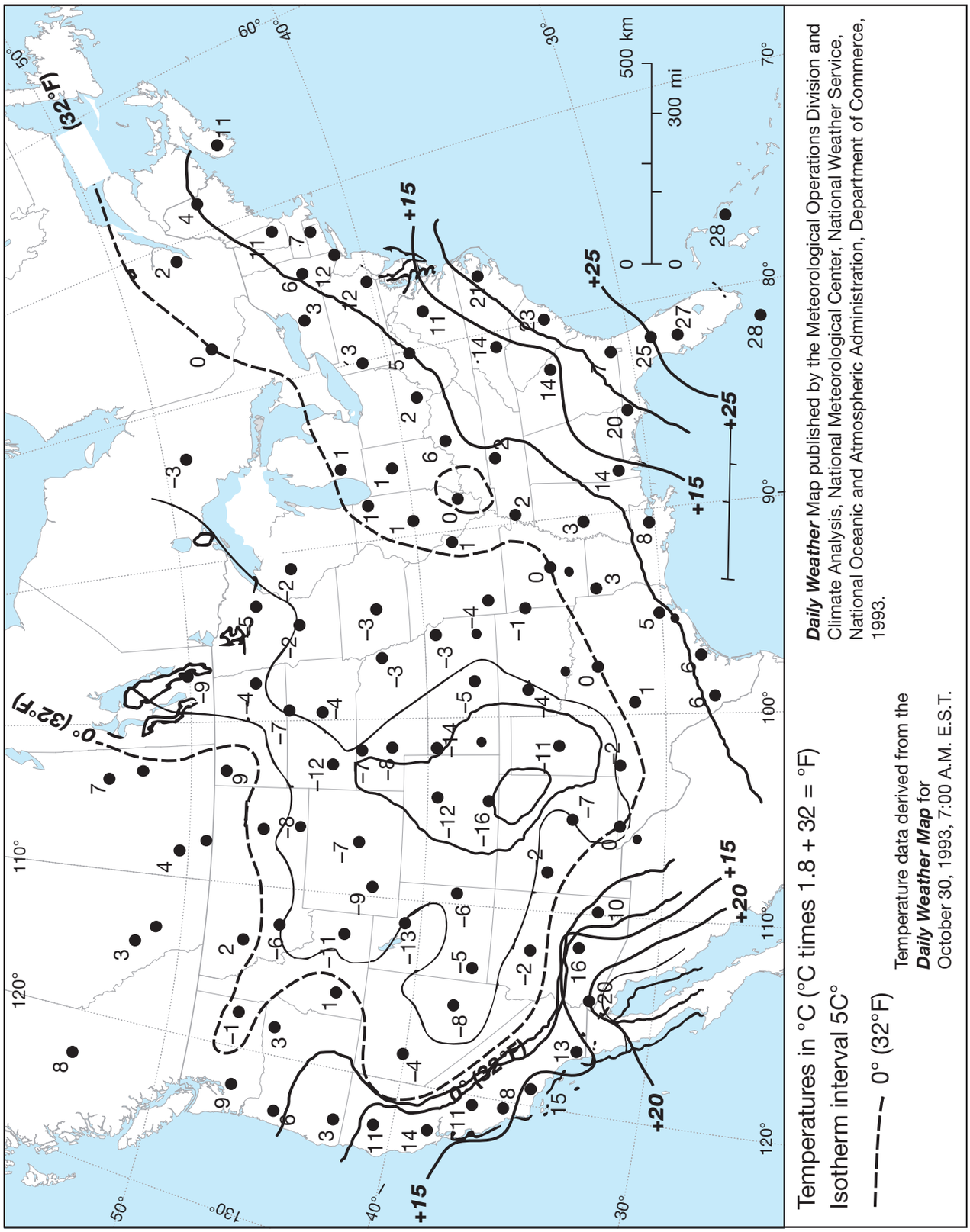
   Flat temperature gradient; similar temperatures dominate the region.

5. What is the temperature range on this map? Calculate the difference between the maximum (highest) and minimum (lowest) temperature readings. In the spaces below, fill in the readings; use a map or an atlas to determine the city (station) where the data were collected.

   Maximum temperature: ***28°C*** Station (city) ***Key West, FL/Nassau, Bahamas***

   Minimum temperature: ***−16°C*** Station (city) ***Pueblo, CO***

   Range (express in C° and F°): ***44 C°, 79.2 C°***



▲ **Figure 9.1** Isotherm map

SECTION 2

Global Surface Temperature Map Analysis

1. Temperature profiles, like topographic profiles (Lab Exercise 23), illustrate how rapidly temperatures change over Earth's surface. Use the four graphs in Figures 9.3a, 9.3b, 9.4a, and 9.4b to plot temperature data along two parallels and two meridians as noted; then complete the temperature profiles with a line graph connecting the plotted data points:

   a) January (Figure 9.2a), along 50°N parallel (already plotted and drawn for you)

   b) January (Figure 9.2a), along 90°W meridian (already plotted and drawn for you)

   c) July (Figure 9.2b), along 40°N parallel

   d) July (Figure 9.2b), along 60°E meridian

   After completing the two graphs in Figures 9.4a and 9.4b, shade the parts of your plots that are over land in brown and over water in blue along the bottom row or two of boxes or the left column or two of boxes (done for you in Figure 9.3b), then complete the following.

2. Describe the pattern of average temperatures as you travel from west to east at 50°N in January and 40°N in July. Where are temperatures higher/lower? Contrast temperatures over the land and over the oceans.

   a) January:

   Temperatures over the Eastern Pacific are warmer than over North America. The same pattern repeats over Eurasia with warmer temperatures over the oceans and colder temperatures over the land.

   b) July:

   Temperatures over the Eastern Pacific are cooler than over North America. The same pattern repeats over Eurasia with cooler temperatures over the oceans and warmer temperatures over the land, with the exception of the much cooler Tibetan Plateau.

3. Using these maps and graphs, describe and explain the patterns of temperature gradients on Figures 9.4a and 9.4b: Where are gradients steep or gentle?

   a) January:

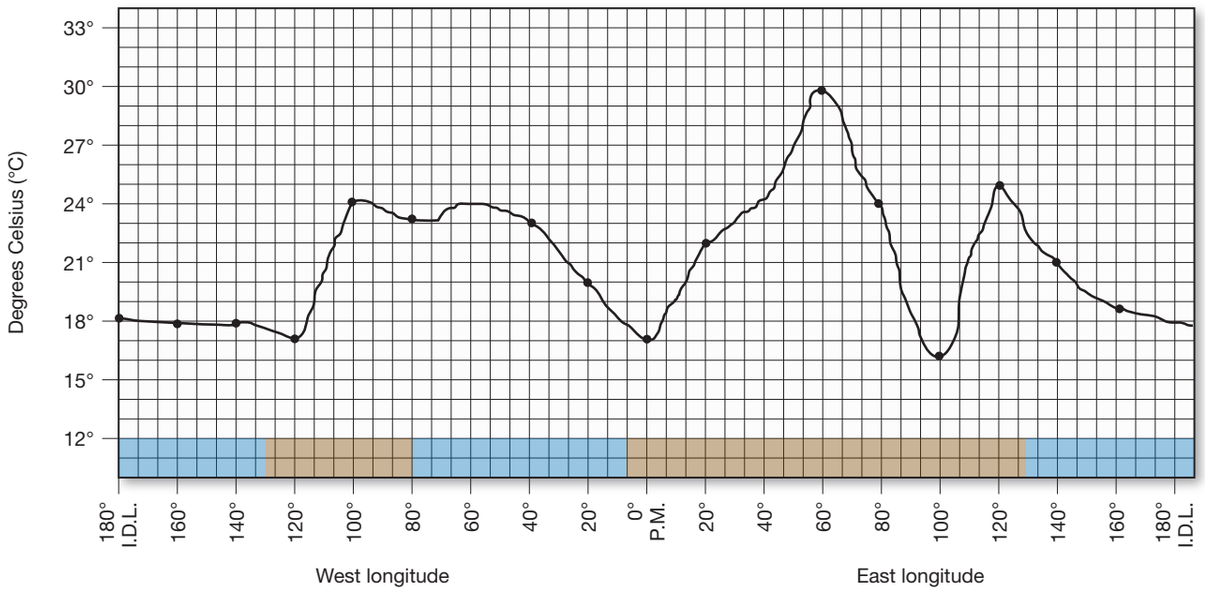
   Northern Hemisphere oceans are warmer than the landmasses in winter; Southern Hemisphere oceans are cooler than landmasses in the summer.

   b) July:

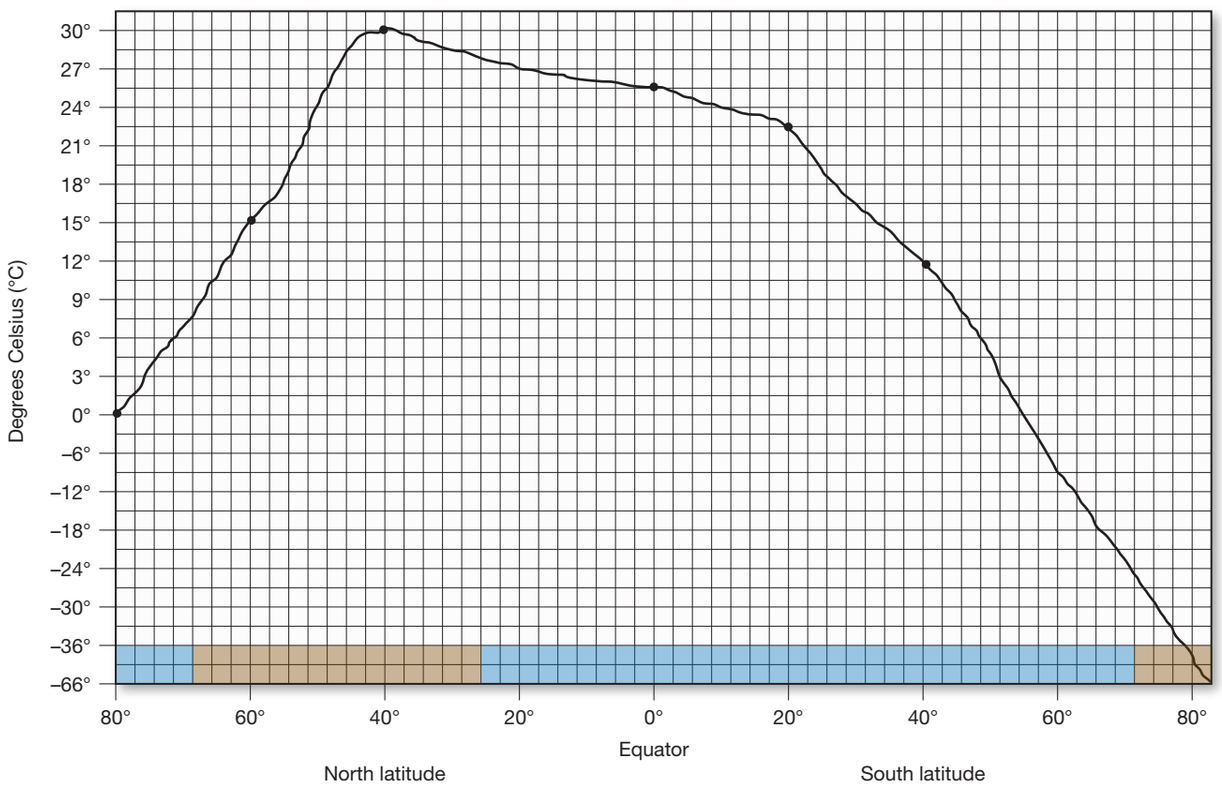
   Northern Hemisphere oceans are cooler than landmasses in summer; Southern Hemisphere oceans are warmer than landmasses in winter.

4. Describe and explain the differences in temperature patterns between the Northern and Southern Hemispheres in January and July. What is the general pattern of isotherms? What are the extreme highs and lows in each hemisphere in January and July? Which hemisphere has the least amount of seasonal change?

   January: Extremely cold temperatures due to size of Asian landmass that cools rapidly and to a great extent. July: Extremely warm temperatures due to size of Asian landmass that heats rapidly and to a great extent.



▲ **Figure 9.4a** Plot of average temperatures along 40°N latitude for July



▲ **Figure 9.4b** Plot of average temperatures along 60°E longitude for July