

# EARTH SCIENCE REGENTS

## Reading Isobars

NAME \_\_\_\_\_

Period \_\_\_\_\_

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The accompanying map shows the Gulf of Mexico as Hurricane Georges passed over Key West and headed for New Orleans on Sept. 26, 1998. The gray areas are land areas. The small dots surrounded by numbers and letters are station models. The data was collected at land based weather stations, aboard ships and oil rigs, and remotely sent by radio from weather buoys anchored in the Gulf. Radio waves are absorbed by water, so data transmitted from remote stations can be lost in high seas and/or heavy rain. The most reliable information comes from manned, land based stations. The isolines are isobars.

1. Label Florida (FL) in small letters at Lat. +29 Long. -82.
2. Label Cuba (CUBA) at Lat. +22.5 Long. -81.
3. Label the Texas coast (TX) at Lat. +29 Long. -97.
4. Label Louisiana (LA) at Lat. +30.5 Long. -91.
5. Label the Yucatan Peninsula (YUC) at Lat. +19.5 Long. -89

Examine the station models and the isobars on the map.

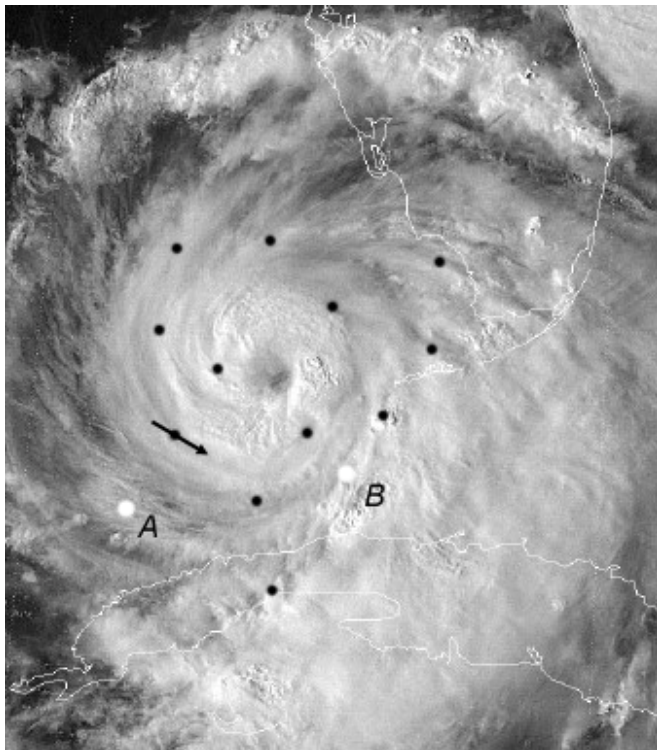
6. Are the pressures at the station models coded? \_\_\_\_\_

7. Describe the wind direction in the area between by Lat +22 and Lat. +28 and Long -82 and Long. -90.

\_\_\_\_\_

8. Is that description in agreement with what you know about the movement of air around low pressure systems?

\_\_\_\_\_



8A. The image to the left was made on 9/25/1998 (a day before the map was made) and several points have been added to the image for this lab. At each of the points, draw a small (1 cm length) arrow to indicate the direction of air flow at that point. One arrow has already been drawn.

Is the air flow pattern you've drawn consistent with your answer to # 7 above? \_\_\_\_\_ If not, examine the map again and re-write your answer to # 7.

8B. Mark the area of lowest pressure with the letter "L"

8C. Draw possible station models at points "A" and "B"

8D. Write a sentence describing the direction of air flow around a Low pressure system

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

See the web address below for a radar loop of Georges

[http://weather.unisys.com/hurricane/atlantic/1998H/GEORGES/rad\\_loop-0927.gif](http://weather.unisys.com/hurricane/atlantic/1998H/GEORGES/rad_loop-0927.gif)

9. Look at your map again. Are the isobars on the map coded? \_\_\_\_\_

On the map, locate the isobar labeled "10" (at Lat. +21 Long. -85).

10. What is the decoded pressure along that isobar? \_\_\_\_\_

Notice the labels on the isobars surrounding the "10" isobar.

- 11. What is the isobar interval of this map? \_\_\_\_\_
- 12. What is the highest wind speed reported on the map? \_\_\_\_\_
- 13. What is the lowest pressure reported on the map? \_\_\_\_\_
- 14. What is the location of the station reporting the highest wind speed and lowest pressure?  
(To the nearest 0.1 degree)

Lat. \_\_\_\_\_ Long. \_\_\_\_\_

1° of latitude = 60 NM (nautical miles). On the right margin of your map, write "0" directly next to 18N. Write "60" next to 19N, "120" next to 20N, "180" next to 21N, "240" next to 22N, and "300" next to 23N. You have just created a "SCALE OF NAUTICAL MILES". Label it!

- 15. Determine the pressure gradient from the center of the storm (Lat. +25 Long. -85, pressure 974 mb) to the Florida coast at Lat. +27.5 Long. -82.5.

Rise = \_\_\_\_\_ mb

Gradient = \_\_\_\_\_ mb/NM

Run = \_\_\_\_\_ NM

- 16. Determine the pressure gradient from the center of the storm (Lat. +25 Long. -85, pressure 974 mb) to the "10" isobar on the Yucatan coast at Lat. +21 Long. -90. Make sure you record units, too!

Rise = \_\_\_\_\_

Gradient = \_\_\_\_\_

Run = \_\_\_\_\_

- Draw a line from Lat. +18 Long. -96 to Lat. +28 Long. -80. Label the appropriate ends of the line "NE" and "SW"
- 17. Use a sheet of graph paper to construct a profile of the storm from SW to NE. Keep the Y axis between 3 and 4 inches high. Label everything and paste your graph here: (fold the excess over)

PASTE YOUR GRAPH HERE

Carefully and thoughtfully answer/do the following:

18. According to your graph, on which "side" of the storm is the pressure gradient steepest? \_\_\_\_\_

19. According to your graph, on which "side" of the storm is the pressure gradient smallest? \_\_\_\_\_

20. How do those observations compare with the gradients you calculated in questions 15 and 16 above?

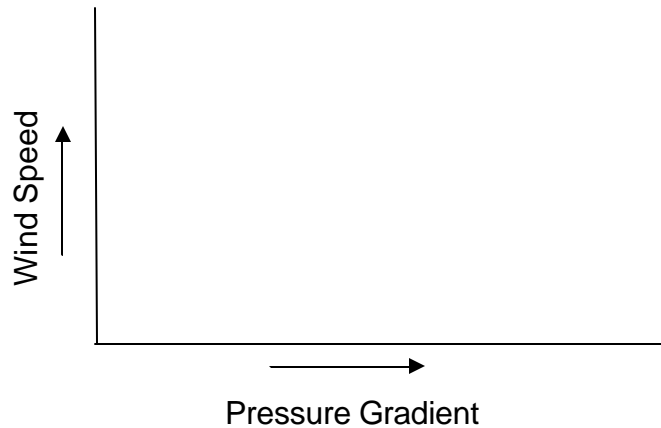
\_\_\_\_\_

21. Does there seem to be a relationship between pressure gradient (as indicated by close spacing of isobars) and wind speed? \_\_\_\_\_. On which "side" of the storm is the wind speed the greatest? \_\_\_\_\_

22. Write a sentence describing how wind speed is related to pressure gradient? \_\_\_\_\_

\_\_\_\_\_

23. Draw the graph below:



**CHALLENGE:**

Go to: [http://weather.unisys.com/hurricane/atlantic/1998H/GEORGES/rad\\_loop-0928.gif](http://weather.unisys.com/hurricane/atlantic/1998H/GEORGES/rad_loop-0928.gif)

Answer the following questions:

1. As hurricanes come on shore, on which side of the storm (east or west) is damage from wind and storm surge going to be the greatest? \_\_\_\_\_ EXPLAIN: \_\_\_\_\_

\_\_\_\_\_

2. Notice that the rain associated with the storm is concentrated to the N and E of the storm center, while there is much less rain falling SW of the center of the storm. Explain that precipitation pattern. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Marine Observations Valid for September 26, 1998 09 GMT  
 Aviation Model Pressures Valid for September 26, 1998 06 GMT (6 Hour Forecast)

