

Winds on Our Big Blue Balloon: Analyzing Global and Local Wind Patterns
Earth Science Mr. Traeger

Name: _____ Period: _____ Date: _____

Purpose

The purpose of this activity is to become familiar with the global and local wind patterns that influence weather.

Materials

• Round Balloon	• 6 strips of construction paper
• Felt-tip pen (Sharpie)	• Textbook pages 561-564

Part A: Global Winds

Procedure

1. Get together in groups of 2 or 3. Obtain a balloon, a Sharpie pen, and some tape.
2. Blow your balloon up. Be careful not to blow it up too big and pop it! You will only get one balloon!
3. Using the Sharpie pen, draw a line around the center of your balloon. Mark this as Equator.
4. Now refer to one of the classroom globes. Draw parallel lines north of the Equator that correspond to 30°N, 60°N, and 90°N. Draw parallel lines south of the Equator that correspond to 30°S, 60°S, and 90°S.
5. In general, Low pressure occurs over the equator or near the Equator, High pressure occurs near 30°N and 30°S, Low pressure occurs again near 60°N and 60°S, and High Pressure occurs near 90°N and 90°S (The Poles). Mark these areas on your balloon as being either Low or High Pressure.
6. Now, draw and label the wind directions and patterns for each sector. Winds are named for the direction that they come from. Remember that High always blows towards Low. Don't forget the Coriolis Effect! See page 562 for help with this.
7. Draw the approximate location and wind direction of the Northern Polar and Southern Polar Jet Stream. Label this.
8. Obtain 6 strips of paper or construction paper. Roll these so that they fit in between each pressure sector. Now tape these on to the side of the balloon as seen in the diagram on page 562. These are called Hadley Cells.
9. Draw arrows on the sides of the paper strips to indicate where air is rising vertically and where it is descending vertically. Remember that air rises at Low pressure areas. Air falls at High pressure areas.
10. **Copy the pattern on your balloon on to the map that is attached.**
11. **Answer the following questions.**

Questions

1. What would happen to global wind patterns if the Earth did not rotate? Would we have the Coriolis Effect? Sketch the diagram on page 422 to explain.

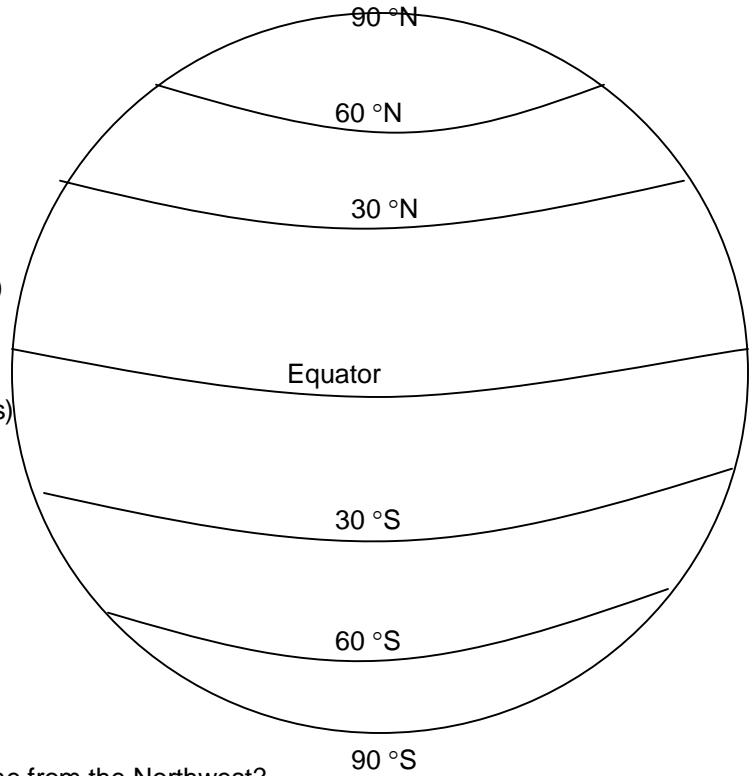
2. How does the Coriolis Effect explain the three-celled circulation model that you made with your balloon?

3. What is the polar front and how does it create the Jet Stream?

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4. Describe each of the following surface wind patterns. Which direction does each wind blow from?

- a. Polar Northeasterlies
- b. Prevailing Southwesterlies
- c. Prevailing Northeasterlies (Northeast Trade Winds)
- d. Prevailing Southeasterlies (Southeast Trade Winds)
- e. Prevailing Northwesterlies
- f. Polar Southeasterlies



5. Why do most of our storms here in California come from the Northwest?

6. American Airlines publishes the following timetable on aa.com for flights to and from New York. How much time does it take to go to New York? How much time does it take to fly back to LA? If the times are different, what could explain this adjustment in the timetable? New York is 3 hours ahead of LA.

Departing

Select	Carrier	Flight Number	Departing		Arriving		Aircraft Type	On Time	AAAdvantage Base Miles Earned	Flight Details
			City	Date & Time	City	Date & Time				
<input type="checkbox"/>	AMERICAN AIRLINES	10	LAX Los Angeles	06/08/2003 10:00 PM	JFK New York	06/09/2003 06:12 AM	762	90%	2475	

Returning

Select	Carrier	Flight Number	Departing		Arriving		Aircraft Type	On Time	AAAdvantage Base Miles Earned	Flight Details
			City	Date & Time	City	Date & Time				
<input type="checkbox"/>	AMERICAN AIRLINES	1	JFK New York	06/09/2003 09:00 AM	LAX Los Angeles	06/09/2003 11:58 AM	762	80%	2475	

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7. It is said that **sailors** of old used to throw their horses overboard in areas called Horse Latitudes (around 30° N and 30° S latitude) to save on food while they drifted at sea. Looking at your balloon model, why do you think they would do such a silly thing?

8. Sailors also had difficulty sailing near the equator, also known as the doldrums or intertropical convergence zone (ITCZ). Why?

9. If you wanted to **sail** from Marina Del Rey here in California to Honolulu, Hawaii, how would you do it? You have a small outboard engine that is only good for short distances! See page 426.

10. Now, how would you get back from Hawaii?

For the following questions, note where air is rising *vertically* and where air is falling *vertically*!

11. What kind of climate would you expect to find along the Equator (Intertropical Convergence Zone)? Why?

12. What kind of climate would you expect to find at 30° N or S latitude? Why?

13. What kind of climate would you expect to find at 60° N or S latitude? Why?

14. What kind of climate would you expect to find at 90° N or S latitude? Why?

15. Is the three celled model that you just investigated accurate? Why or why not?

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Part B: Local Winds

1. Why is it that the Indian landmass experiences most of its rainfall during the summer? Explain how pressure patterns influence the monsoon rains.



2. What causes the low pressure of the Intertropical Convergence Zone (ITCZ) to move north over India in the summer?

3. What causes a sea breeze? Draw and label a diagram showing the sea breeze.

4. What causes a land breeze? Draw and label a diagram showing the land breeze.