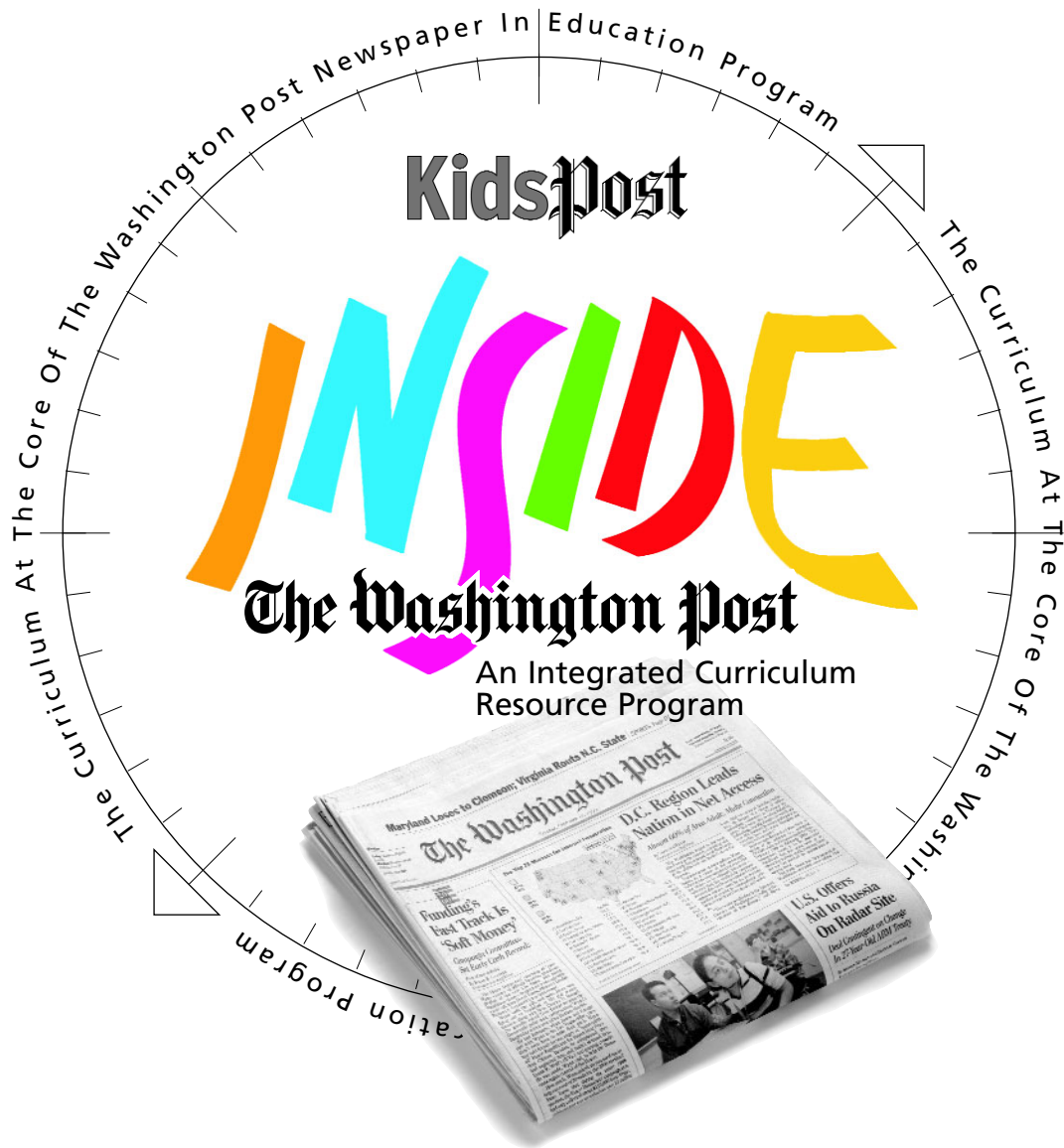


CURRICULUM GUIDE: **WEATHER**



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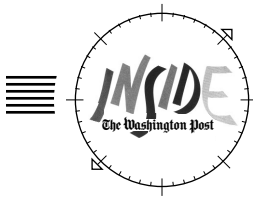
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Weather Wise

KidsPost Article: "Hi, Sky: How Weather Works"

Lesson

Learn how to read and record weather data—using maps, legends, graphs, charts and lists.

Level: All

Subjects: Science, Earth Science

Related Activity: Mathematics, English, Art

Procedure

Read and Discuss

Read "Hi, Sky: How Weather Works" and "Crazy Weather?" During discussion of the content, you may ask students these questions.

1. What are air masses?
2. Why is the air warmer at the equator than at the poles?
3. Which weighs more, cool air or warm air?
4. How does air pressure influence how windy a day will be?
5. Are fast moving or slow moving water molecules in the air most likely to form water droplets and rain? Explain how this happens.
6. What determines whether a water droplet becomes rain, sleet, hail or snow?
7. If you lived in an area that was experiencing drought conditions, would you hope for low or high pressure?
8. What weather conditions are likely to accompany a cold front? How might air temperature affect the weather conditions?
9. The jet stream is best characterized as a) a cloud formation, b) a river of air, c) a sheet of precipitation covering a section of the globe. Explain your answer.

Develop Vocabulary

Read "Word Study: A Look at Weather Words." In addition, you may wish to use "Vocabulary," a list of weather-related terms found in the "Circumnavigation" NIE online lesson.

Read

After reading "The Life of a Weather Forecast," give students "Tools Used to Measure Atmosphere" found in this lesson. Review the different kinds of weather information gathered from each tool. Complete the activity sheet.

Weather How-To

ON THE WEB

<http://www.nws.noaa.gov/education.html>

National Weather Service

The National Oceanic and Atmospheric Administration provides educational material for libraries, educators, students and parents. Many topics are included so take time to check each section. From Owlie Skywarn teaching about hazardous weather to Penn State's weather link to VORTEX, unraveling the secrets of tornadoes. Science with NOAA Research provides middle school experiments using online-resources.

<http://www.sec.noaa.gov/Activities/index.html>

Science on the Web

A Web version of the Space Environment Center's Internet Activities: Using Scientific Data. Activities include "Weather and Climate" and "The Winds" which includes how to read data on a weather map.

<http://school.discovery.com/lessonplans/weather.html>

Weather

Links to a variety of lessons, two of which are listed below. Also available: Weather & Climate video for grades 3–5, available from Discovery.com. Covers the causes of hurricanes, heat waves, lightning storms and global warming to teach the basics of meteorology. \$50

<http://school.discovery.com/lessonplans/programs/weathermaps/index.html>

Weather Maps

A Discovery School lesson for grades K-5 introduces the basic weather maps and how to read them. Internet access required. Excellent vocabulary included.

<http://school.discovery.com/lessonplans/programs/weather/index.html>

Understanding: Weather

Discovery School lesson for grades 6-8 focuses on the greenhouse effect and global warming.

<http://teacher.scholastic.com/activities/wwatch/reporters/central/whatis.htm>

What Is Weather?

Scholastic provides the answer to the question, making a weather forecast and meet our weather expert.

[http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/home.rxml)

The Online Guides

Learn the basics of meteorology, including reading weather maps. Teachers of grades 9-12 should check the projects and activities section.

<http://www.learner.org/exhibits/weather/forecasting2.html>

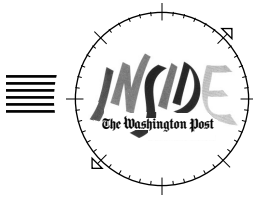
A Meteorologist's Toolbox: Gathering Weather Data

How weather satellites and Doppler radar work

<http://www.pbs.org/wgbh/amex/hurricane38/tguide/index.html>

The Hurricane of '38

The "Timeline of U.S. Storm Disasters" begins in 1635 and the map of the New England Hurricane of 1938 or "Long Island Express" is interactive.



Analyze

Give students “Weather Brought to You by the Post.” This activity requires that each student have the WEATHER page found on the back of the Metro section of The Washington Post. Students are introduced to reading the visual and numerical presentation of the weather forecast.

Give students “Plotting Weather.” This activity requires that each student have the WEATHER page found on the back of the Metro section of The Washington Post. Students are asked to use The Nation chart to gather information and create a stem and leaf plot.

This information was used to prepare a stem and leaf plot. The information gathered can be used also when teaching average, range and mode, as well as provide long-term exposure to a concept that may ordinarily only be taught before end-of-the-year tests.

Use this activity to prepare students to track and record the temperature each day. Create a class temperature notebook for each school day, beginning in September. You may wish to have students record both the forecast for the day and the actual high and low temperatures at your school. On the facing page, clip and paste advertising for clothing and recreation items on sale. Each entry might have the following information:

Date:

Forecast Weather

High ____ °F Low ____ °F

Weather condition:

Actual Weather:

High ____ °F Low ____ °F

Barometric pressure

High ____ °F Low ____ °F

Describe the sky in the morning, noon or afternoon. If it changed during the day, tell about the change.

Other data, such as precipitation.

Read About Meteorology

For Teachers

Farndon, John. *How the Earth Works*. Reader's Digest Association, Inc.

The oversize book could be given to students, but teachers will want it for the discoveries and experiments for topics such as humidity, clouds, weather patterns and wind.

Goldstein, Mel. *The Complete Idiot's Guide to Weather* (2nd Edition). Alpha Books. 2002.

You can go back to the Ice Age or just focus on why weather is the way it is today. Learn why computer forecasting and satellites should take the place of the Farmer's Almanac.

Lyons, Walter. *The Handy Weather Answer Book*. Accord Publishing.

An American Meteorological Society Fellow, Dr. Lyons has easy-to-read chapters full of questions and answers. Great for just about any topic, including careers in meteorology. Lyons' wit makes it fun to read.

Williams, Jack. *The Weather Book*. USA Today.

Graphics, state-by-state guide to weather patterns, and easy-to-read explanations of almost everything there is to know about weather.

For Students

Challoner, Jack. Eyewitness: *Hurricane and Tornado*. Dorling Kindersley.

Models, photographs and information from Ben Franklin's lightning rod to the latest in forecasting the big storms. Ages 9–12.

Cole, Joanna, Bruce Degen. *The Magic School Bus Inside a Hurricane* (Magic School Bus Series). Scholastic Trade.

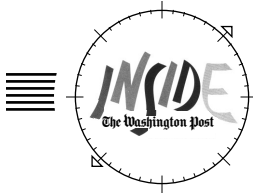
On this field trip the bus transforms into a hot air balloon then a weather plane. From the clouds into the eye of a hurricane, students learn some solid science with a little adventure as they try to find Arnold. Ages 7–9.

Cosgrove, Brian, Karl Shone and Keith Pecival. *Eyewitness: Weather*. Scott Foresman.

Lively layout, great illustrations and weather information on every page. Tracking and understanding weather; projects include a home weather station. Ages 9–12.

Cox, John and Stacy Collins. *Weather for Dummies*. Hungry Minds, Inc. 2000.

This is to supplement your science book. Just have it around the room for pleasure reading—short readings give solid information on why weather is what it is. Keeping a weather diary is encouraged in one chapter. Ages 10 and up.



Use the WEATHER page to get this information if you don't have a school weather station.

Collecting and using this and other weather information on a daily basis will provide consistent and meaningful practice in using the "shape of data" to make decisions and predictions. Students can gain practice in creating many graphs:

Line graph: Used to show change over time. Plotting the temperature all year, as part of the Monday morning routine, for example, will provide a meaningful real-world connection to the study of graphs and charts.

Picto-graph: Help students to make comparisons between areas. What areas have heavy snow storms, hurricanes, tornadoes each year?

Bar graph: Track rainfall totals or other information to establish a pattern, to compare between times of year or compare between cities.

Circle graph: Help younger students to represent how many days in the month were cloudy, sunny, rainy or above and below certain temperatures. Could be used to introduce percentages and fractions.

Advanced students can pose questions related to the patterns of the data collected, as well as make implications about the data that has been gathered. For example, find the relationships between changes in temperature and consumer retail habits.

Write or Draw

Download and make copies of the May 2, 2002, KidsPost article "After the Tornado." In what ways did Maryland's most powerful tornado influence families and their community? For more information on the damage and aftermath of the Maryland Tornado, download "News of Interest to Calvert, Charles and St. Mary's Counties That Was in the Daily Washington Post April 28 to May 4."

Give students "What Should We Do?" reproducible found in this lesson. Read the sidebar "Nature's Most Violent Storms: Tornadoes." Did the

families in "After the Tornado" do what they were supposed to do if a tornado warning was given? For more information on tornadoes, download and read "Fast-Forming Twisters Arrive on Short Notice; Warnings Delivered Only Minutes Ahead."

An assignment has not been printed under the "What Should We Do?" title. Here are some suggestions for assignments.

- Write a public service announcement that tells students and teachers what to do if a tornado warning is declared for the area near your school.

- Write a script for a public service video about weather. Place students in groups for this assignment. Ask students to write, in the space below the title, the message they think is important to communicate. Share their ideas with other group members to decide which to incorporate into their video script. If you do not have equipment to videotape, students can "perform" their scripts before their classmates or another class.

- Use the space below the title to sketch a poster or to list ideas to be communicated in the poster. On poster board, create the finished poster.

Enrichment

1. Create posters to explain and illustrate a water cycle; types of clouds; origin of hurricanes, tornadoes, cyclones and typhoons.

2. For more weather-related Web sites, check out Weather World at KidsPost on [washingtonpost.com](http://www.washingtonpost.com).

3. Forecasting weather is a huge numbers game with serious implications, according to meteorologist Chikage Windler. A meteorologist uses all the information available from thermometers to satellite images, adds knowledge of the area's geography and weather patterns and his or her intuition. Identify an area where drought is taking place. Have students read newspaper coverage of the conditions in that region. Look at weather maps, satellite images and other

Media Weather Info.

Access real-time weather data, forecasts and other weather-related information from these media sites. Weather talks and visits by meteorologists can be arranged by calling the public relations office of most stations.

<http://www.washingtonpost.com/wp-srv/weather/>

Weather

The Washington Post's online weather center provides local, national and world weather, ski and beach weather and links to other weather information.

<http://www.nbc4.com/weather/>

WeatherNet 4

"Weather Feature of the Day" in addition to 4-Day forecasts.

<http://www.wjla.com/weather/>

ABC 7 Forecast Center

In addition to maps, temperature, travel and marine forecast, WJLA provides this day in weather history.

<http://www.wusatv9.com>

Weather

Weather headlines and almanac add to the standard weather coverage. Outside Stories include "All About Pressure," "All About Temperature," and "All About Wind." Each includes possible experiments.

<http://www.weather.com/>

The Weather Channel

Find temperatures around the world, sunrise and sunset times, wind maps and how weather affects your life.

<http://www.usatoday.com/weather/wforcast0.htm>

USA Today Understanding Weather Forecasting

USA Today provides basic information on forecasting, then links to more comprehensive sites.

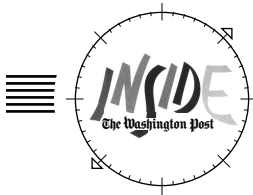
<http://www.groundhog.org/>

Groundhog.org

Visit the site of well known forecaster Punxsutawney Phil. Includes a kids section with activities.

weather data to collect information on current conditions. Is rain likely any time soon? What must happen for rain to fall on this area of the world?

4. Does it get hot enough to fry an



egg on the sidewalk? Give each pair of students a different weather myth. Have them research to find if the statement stands the test of science and experience.

5. In its policy statement on weather analysis and forecasting, the American Meteorological Society states "no verifiable skill exists or is likely to exist for forecasting day-to-day weather changes beyond two weeks. Claims to the contrary should be viewed with skepticism." Even in the 5- to 10-day range daily errors can happen often. Plot the forecast for one month and the actual temperatures. What is the percent of accuracy? To expand on this analysis, students could be assigned different forecasters to record their daily forecasts and the actual temperatures, then plot. Who has the highest accuracy percentage?

6. Experiencing an unseasonable day? Use it to teach the difference between the high and/or low temperature and the average (or normal) temperature on that given day. In statistical terms, that's called the "departure from normal." This would be a very useful data set for relating such trends as a "heat wave" or "cold snap." Compile a weather diary using the Official Weather Data section of the Post's WEATHER page. In addition to the actual high, low, etc., copy down the Normal High and Low. After a week or so, students can look not only at temperature trends, but trends in the "departure from normal."

For example, the average high temperature this time of year is 79° F.

Highs the last 7 days: 60 67 77 86 77 84 84

Departures from norm: -19 -12 -2 +7 -2 +5 +5

Students can plot these departures to very clearly see that in the last 7 days, we started with some VERY cold air for this time of year. Then, by mid week, a gradual warm-up began. The last two days, we've been in a summer-like weather pattern: 84 is the average high

for mid-June, but 5 degrees above normal for this time of May.

Another great resource is the National Weather Service's Baltimore/Washington Web site.
<http://205.156.54.206/er/lwx/>

Answers

Tools Used to Measure Atmosphere:
1. d; 2. c, e; 3. d, f; 4. a (and wind vane for direction); 5. f; 6. c; 7. a, b, e; 8. b, d, e; 9. a (and wind vane for direction); 10. c (measuring relative humidity at different times of day)

Naturally Speaking Puzzle: 1. Comet, 2. Trees, 3. Water, 4. Field, 5. Spots, 6. Earth, 7. Storm, 8. Polar, 9. Drops, 10. Rogue, 11. Egypt.

Half of a Puzzle: 1. Asthma, 2. Desert, 3. Summer, 4. Marine, 5. Fossil, 6. Tropic, 7. Lights, 8. Forest, 9. Cirrus, 10. Freeze.

1. "Hi, Sky: How Weather Works,"
<http://www.washingtonpost.com/wp-dyn/articles/A23365-2002May28.html>

2. "The Life of a Weather Forecast"
<http://www.washingtonpost.com/wp-dyn/articles/A18712-2002May27.html>

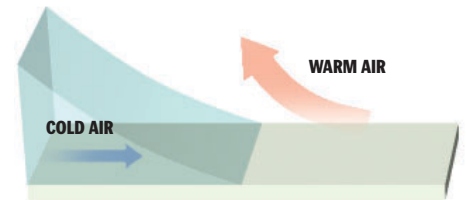
3. "After the Tornado: Kids' Lives Upended by La Plata Twister"
<http://www.washingtonpost.com/wp-dyn/articles/A18453-2002May1.html>

4. "Fast-Forming Twisters Arrive on Short Notice; Warnings Delivered Only Minutes Ahead" <http://www.washingtonpost.com/wp-dyn/articles/A30679-2002May4.html>

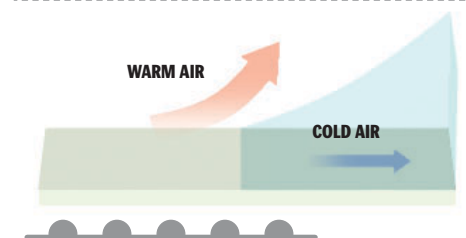
5. "News of Interest to Calvert, Charles and St. Mary's Counties That Was in the Daily Washington Post April 28 to May 4, May 5, 2002"
<http://www.washingtonpost.com/wp-dyn/articles/A30716-2002May4.html>

Fronts

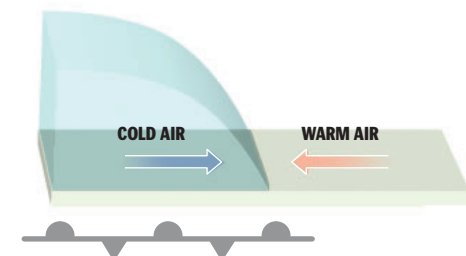
Wind pushes air masses around the world, and sometimes into each other. When air of one temperature runs into air of a different temperature, the warmer (lighter) air is forced up and over the cooler (heavier) air. The rising air can produce clouds and precipitation.



Cold fronts These are areas where cooler air is running into warmer air and pushing it out of the way. On a weather map, these are marked by triangles that point in the direction the cooler air is moving.

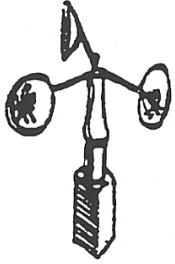


Warm fronts These are areas where warmer air is running into cooler air and pushing it out of the way. These are marked by semicircles that point in the direction the warmer air is moving.

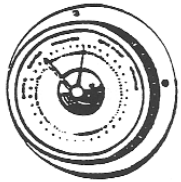


Stationary fronts This is when cooler air and warmer air run into each other, but neither is able to move the other out of the way. These areas are marked by triangles that point in the direction the cooler air is trying to move, and by semicircles that point in the direction the warmer air is trying to move.

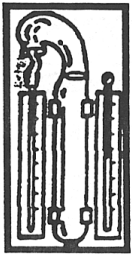
Tools Used To Measure Atmosphere


Anemometer

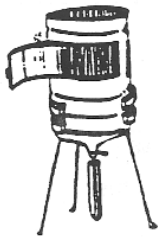
Measures the speed of the wind


Barometer

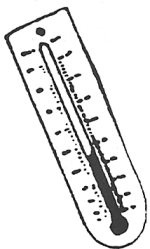
Measures air pressure


Hygrometer

Measures relative humidity


Rain Gauge

Measures the amount of rainfall


Thermometer

Measure air temperature


Weather Satellite

Records cloud formation movement and ocean movement and temperature

Meteorologists use many tools to gather weather information. Parts of weather reports are listed below. What tool or tools were used to get the information?

Match the tool or tools with the weather report. Place the letter of the tool or tools that were used before the number of the partial weather report. There are one to three correct answers for each weather report.

- a. Anemometer
- b. Barometer
- c. Hygrometer
- d. Rain Gauge
- e. Thermometer
- f. Weather satellite

_____, _____, _____ 1. Precipitation measured 1.03 inches of rainfall

_____, _____, _____ 2. High 78 degrees F, humidity 82%

_____, _____, _____ 3. Low pressure between the eastern tip of Honduras and Jamaica, upper winds moving in northward direction toward the Bahamas, .6 inches of rain in Montego Bay

_____, _____, _____ 4. NE, 18 mph

_____, _____, _____ 5. Cool water along the equator, a series of equatorial long waves and evidence of westward flowing South Equatorial Current

_____, _____, _____ 6. Dew point above 0 degrees Celsius

_____, _____, _____ 7. 24.65 inches of mercury, 63 degrees F, 16 mph

_____, _____, _____ 8. 84 degrees F, precipitation 1.53 inches, 30.18 inches of mercury

_____, _____, _____ 9. Southwest, 8-16 mph

_____, _____, _____ 10. 100% at 8:00 p.m. maximum, 48% at 3:00 p.m. minimum

Weather Brought to You by The Washington Post

WEATHER is printed on the last page of the Metro section of The Washington Post. Much information is provided about weather conditions—past, present and future.

Pictures

In the left ear on the KidsPost page, student drawings of expected weather can be found. Similar pictures are found at the top and center of the WEATHER page. Label the picture that represents: Mostly cloudy, Mostly sunny, Snow, Sunny, Thundershower.



1. _____

2. _____

3. _____

4. _____

5. _____

Forecast

A forecast is a prediction of what the weather will be. Meteorologists look at past and present weather, computer models that simulate what might happen, and combine that data with their gut instincts to create a weather forecast that is as accurate as possible. Forecasting is not an exact science. Sometimes, meteorologists may forecast a snowstorm that never happens because of changes in the atmosphere that are difficult to predict.

What are the expected high and low temperatures for each city listed below? In what state is this city located?

CITY	HIGH	LOW	STATE
6. Annapolis	____ °F	____ °F	_____
7. Charlottesville	_____	_____	_____
8. Harrisburg	_____	_____	_____
9. Kitty Hawk	_____	_____	_____
10. New York City	_____	_____	_____

11. What influences the weather in these East Coast cities?

Maps

Look at the North American Forecast map.

12. What color indicates the hottest temperature? _____

13. What color indicates 50°–59° temperatures? _____

14. Where in North America is rain predicted? _____

15. Where in North America are the coldest temperatures predicted? _____

Fronts

16. The boundary where cooler air is running into and taking the place of warmer air is called a cold front. On many weather maps, these are marked by blue triangles that point in the direction the cooler air is moving. Where is a cold front on the map?

17. The boundary where warmer air is running into and taking the place of cooler air is called a warm front. On many weather maps, these are marked by red semicircles that point in the direction the warmer air is moving? Where is a warm front on the map?

18. What is a stationary front?

19. Where is a stationary front located on the map?

The Nation

20. In this section of WEATHER, cities that represent different parts of the United States are listed. Who wants to know? List three people who would want to know the weather conditions in another city and why they would want to know.

WHO	WHY
a. _____	_____
b. _____	_____
c. _____	_____

Plotting Weather

1. Read the chart to find the city that fits the description. Record the temperature that is forecast, list the city and name the state in which the city can be visited.

DESCRIPTION	TEMPERATURE	CITY	STATE
a. Highest temperature today	_____ °F	_____	_____
b. Lowest temperature today	_____ °F	_____	_____
c. In two days, coldest city	_____ °F	_____	_____
d. Tomorrow, the warmest city	_____ °F	_____	_____

2. Read the chart to find cities that fit the description. Record the temperature that is forecast for today and list the cities.

DESCRIPTION	TEMPERATURE	CITY	TEMPERATURE	CITY
a. Highest temperature above 90°F	_____ °F	_____	_____ °F	_____
b. Forecast 90°F	_____ °F	_____	_____ °F	_____
c. Highest temperature between 80°–89°F	_____ °F	_____	_____ °F	_____
d. Lowest temperature between 80°–89°F	_____ °F	_____	_____ °F	_____
e. Highest temperature between 70°–79°F	_____ °F	_____	_____ °F	_____
f. Lowest temperature between 70°–79°F	_____ °F	_____	_____ °F	_____
g. Highest temperature between 60°–69°F	_____ °F	_____	_____ °F	_____
h. Lowest temperature between 60°–69°F	_____ °F	_____	_____ °F	_____
i. Highest temperature between 50°–59°F	_____ °F	_____	_____ °F	_____
j. Lowest temperature between 50°–59°F	_____ °F	_____	_____ °F	_____
k. Highest temperature between 40°–49°F	_____ °F	_____	_____ °F	_____
l. Lowest temperature between 40°–49°F	_____ °F	_____	_____ °F	_____
m. Highest temperature between 30°–39°F	_____ °F	_____	_____ °F	_____
n. Lowest temperature between 30°–39°F	_____ °F	_____	_____ °F	_____
o. Lowest temperature below 30°F	_____ °F	_____	_____ °F	_____

3. Use the data collected in #2 to create a stem and leaf plot below:

TEMPERATURE	1	2	3	4	5	6	7	8	9
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

4. What conclusions might be made about the weather forecast for today in the United States?

Tornadoes

Nature's Most Violent Storms

How Do Tornadoes Form?

Most tornadoes form where cold, dry air meets warm, moist air. The moist air is lifted rapidly, and strong winds combine to form a spinning column of air that reaches from a thunderstorm down to the ground.

If conditions are just right, winds speed up as they near the center of the tornado, similar to a figure skater who spins faster when she pulls her hands in close to her body.

Tornadoes turn brown or gray because of the dirt and other material sucked up from the ground.

How Strong Are They?

Tornadoes are nature's most violent storms, with winds even stronger than those of a hurricane. The Fujita scale measures a tornado's strength. Scientist Ted Fujita knew that tornadoes usually ruined the devices that were used to measure wind speed. Fujita's scale measures how much damage the twister does.

The scale goes from F0 (40-72 mph winds; light damage, broken tree branches) to F5 (261-318 mph winds; incredible damage; strong houses lifted off their foundations and carried considerable distances; automobile-size missiles thrown more than 100 yards).

How Can You Be Safe?

Meteorologists and media inform the public when tornadoes may be near. Learn what their warnings mean.

■ **Tornado watch:** A tornado is possible

■ **Tornado warning:** A tornado has been spotted or indicated on Doppler radar. Seek shelter immediately.

The Storm Prediction Center issues about 1,000 severe thunderstorm or tornado watches a year. Local National Weather Service offices issue the warnings. "This is a particularly dangerous situation" wording is to be used only when the most violent tornadoes are possible.

If you are **INSIDE**: Stay away from windows—you don't want to be cut by shattered, flying glass. Do not open windows or doors. Go to the lowest floor or an interior room. Basements, closets or bathrooms provide shelter. Get under a sturdy piece of furniture, into the bathtub or crouch low with your hands covering your head. If you have a helmet, put it on. Cover yourself with a mattress or blanket.

If you are **OUTSIDE**: Find a ditch or culvert. Lie flat and face down on low ground, protecting the back of your head with your arms.

If you are in a **VEHICLE** or **MOBILE HOME**: Get out. Seek shelter in a sturdy building or ditch. Recent studies do not advise going under a bridge.

What Should We Do?

NAME _____

DATE _____

Half of a Puzzle

Enter your answers in the numbered spaces, reading down. When you are done, the shaded row will spell the answer to the question: What is created when a sphere is divided in half?

Clues

1. You may have _____ if you have difficulty breathing.
2. Land lacking water
3. Warmest season of the year
4. Examples of _____ life are shrimp, swordfish and whales.
5. Remains of once-living thing found in rocks
6. An area that is very hot and wet
7. Turn on _____ to see what is happening at night
8. Large area of land covered mainly by trees and plants
9. A kind of cloud, found at high altitudes
10. To change from liquid to solid state without heat

1	2	3	4	5	6	7	8	9	10

NAME _____

DATE _____

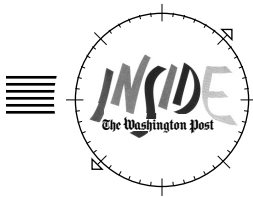
Naturally Speaking Puzzle

Enter your answers in the numbered spaces, reading down. When you are done, the middle row will spell the answer to the question: What is the science that deals with the Earth's air, weather and atmospheric phenomena?

Clues

1. Large chunk of rock and ice in elliptical orbit
2. They are conifers and deciduous.
3. Without it, life could not exist.
4. Open land where corn is planted or baseball is played
5. The sun and Dalmatians have these.
6. Third closest planet to the Sun
7. A heavy snowfall or violent wind is called a _____.
8. _____ bears live in arctic regions.
9. Rain_____ fall from the sky to earth.
10. An extremely large, unexpected wave or a river in Oregon
11. Ancient country where people farmed the fertile land created by the flooded Nile River

1	2	3	4	5	6	7	8	9	10	11



Word Study: A Look at Weather Words

Aurora borealis, cirrus, sleet, rainbows and typhoons. We have different words to express all kinds of atmospheric events, types of clouds and weather conditions. It wasn't always this technical.

A Greek philosopher and teacher named Aristotle (384–322 B.C.) collected the knowledge of his teachers, Greek society and his observations in books and lessons. In *Meteorologica*, Aristotle explained what he had studied about meteors, the objects and events found in the sky. “Meteor” is made up of *meta*, which means beside, and *aoros*, which means lifted or to lift up. So meteors were all the things above us and beside each other in the sky. A few had special names. For example, raindrops were called hydrometeors.

It probably doesn't surprise you that the people who study and report on weather conditions are called meteorologists. They do much more than study meteors or meteorites. Meteorologists have studied chemistry, mathematics, and physical sciences in college; they know how to use technology to explain and forecast what happens in the atmosphere. Meteorologists work for the National Weather Service and other federal government agencies, universities and the media. If knowing weather is crucial to success, some businesses hire meteorologists.

You hope for sunny weather when you are planning outdoor recreation or travel. You check the weather report to see how warm the temperature will be or if rain is expected. You can predict that some months will not be good for a picnic or swimming in a lake. This is because of the climate. (“Climate” comes from the Greek word *klima* that means slope or the sloping surface of the earth. *Klima* was used to indicate the height of the sun above the hori-



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A lightning bolt cuts through the sky as a thunderstorm rolls over the Caloosahatchee River, in Fort Myers, Fla.

zon.) The day-after-day weather conditions that have been collected and studied create a pattern for a place. This is its climate.

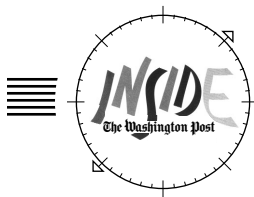
You may not want it to rain, but farmers and gardeners may hope for rainy weather. Your “bad” weather may be someone else’s beneficial weather. Water is needed by all living organisms. Lack of water can lead to droughts and death. Some countries look forward to summer monsoon season to bring refreshing rain. Too much water or torrential rains can lead to floods that can be destructive.

Descriptions of stormy weather can paint visual pictures. The big fluffy clouds that seem like cotton candy floating by and close enough to touch are named cumulus, from the Latin word that means “pile” or “heap.” The Latin word for shower is *nimbus*. So when these two Latin words are combined to create “cumulonimbus,” we have the word for thunderstorm. Hail,

floods, lightening, tornadoes and wind are known as the five horsemen of thunderstorms. Can’t you picture the dark, gray lumpy clouds with immense horses racing out of them across the sky? Some race so fast that the air rushes past you.

Think about windy weather in the Pacific and Indian oceans and you may think of typhoons. Words for this tropical cyclone were used in Greek, Arabic and Chinese languages for centuries. The Greek father of winds was *Typhon*, a monster with many heads. The Greek word for a whirlwind was *typhon*. When Arabic-speaking Muslims invaded India, they brought their variation of the word, *tufan*. In 1588, a British colonist used *tufan* in writing about weather in India. The Chinese Cantonese word *toi fung* came from two Mandarin words: *tai*, meaning great, and *feng*, meaning wind.

Just like the air and weather, words can move from one country to another, influencing people.



Academic Content Standards

*This lesson addresses academic content standards of Maryland, Virginia and the District of Columbia
Among those that apply are:*

Maryland

Science

Earth Science (2.0): Students will use scientific skills and processes to explain the chemical and physical interactions (i.e., natural forces and cycles, transfer of energy) of the environment, Earth, and the universe that occur over time.

Interactions of Hydrosphere and Atmosphere. By the end of grade 3, students will describe weather using observations, age appropriate tools (i.e., thermometers) and measurements, and predict weather patterns for each season. By the end of grade 5, students use weather measurements (e.g., temperature, wind direction and speed, and precipitation) to explain that each season has different weather patterns. By the end of grade 8, students analyze Earth (i.e., land and water) data collected from space-based instruments and relate it to weather patterns. Describe and model large-scale and local weather systems.

Materials and Processes That Shape a Planet. By the end of grade 8, students explain that some changes in a planet's surface are due to slow processes and some are due to rapid processes (i.e., landslides, tornadoes, hurricanes, volcanic eruptions, earthquakes, flooding and tsunamis).

A complete list of Standards of Learning of Maryland can be found on the Web at <http://www.mdk12.org/mspp/standards/>.

Virginia

Science

Grade 4: 4.6, The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include

- weather factors (temperature, air pressure, fronts, formation and type of clouds, and storms); and

- meteorological tools (barometer, hygrometer, anemometer, rain gauge, and thermometer).

Earth Science, Standard 3: The student will investigate and understand how to read and interpret maps, globes, models, charts and imagery Key concepts include

- maps (bathymetric, geologic, topographic and weather) and star charts.

Earth Science, Standard 13: The student will investigate and understand that energy transfer between the sun, Earth and the Earth's atmosphere drives weather and climate on Earth. Key concepts include

- observation and collection of weather data;

- prediction of weather patterns; and

- weather phenomena and the factors that affect climate.

A complete list of Standards of Learning of Virginia can be found on the Web at <http://www.pen.k12.va.us/>.

Washington, D.C.

Science

Earth and Space Sciences, Content Standard 4: Observe, investigate, describe and explain the properties, structure and origin of the earth system, the solar system and the universe. The student

- collects weather information during different types of weather to determine the relationship between air temperature and fog, snow, hail, etc.;

- constructs weather instruments and a weather station. Gathers data and compares weather and its effects on areas in different parts of the country.

By the end of grade 3, the student will observe and keep daily records of weather and seasons to know that some events in nature have a repeating pattern. By the end of grade 5, the student will determine effects of weather to know waves, wind, water, and ice shape and reshape the earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers.

A complete list of Standards for Teaching and Learning of the District of Columbia Public Schools can be found at <http://www.k12.dc.us/>.