

# Forecast Fever

*Leesa Wolfe Wood* for Blue Ridge Public Television (WBRA, WMSY, WSBN)  
Tazewell High School, Tazewell, VA

**Grade Level:** 9

**Time allotment:** Two 45-minute class periods

## **Overview:**

Since the dawn of civilization, humans' lives have revolved around the weather; even in the modern high tech world, many daily decisions hinge on the age-old cycle of sun, wind, and rain. Farmers need to know how much rainfall to expect when planning their weekly irrigation schedules. Airport traffic controllers need to know about impending weather patterns to set up alternate flight routes, schedule departure delays, and set up flight cancellations. Vacationers need to know what chance exists for afternoon thunderstorms before planning a trail ride on horseback. Athletic coaches need to know whether the chance of rain is significant enough to merit packing the rain gear for their teams.

Predicting the weather affects nearly every walk of life, yet we take the basics of this science for granted. We see the Channel 6 weather girl or the weather guy from Channel 10 almost every night, yet often we fail to notice that many of these people aren't just television news reporters, but trained meteorologists. The science of meteorology deals with observations, collections of weather data, and their analysis. In this lesson, we'll cover various aspects of meteorology and attempt to do a little predicting ourselves.

**Subject Matter:** Earth Science

## **Learning Objectives:**

Students will be able to:

- Learn the essential factors necessary for making long-term forecasts
- Discover the high-tech tools essential to gathering weather data
- Learn how computers enhance weather knowledge
- Determine how weather forecasts help emergency services crews
- Explore new ways for using weather-related data
- Practice making real weather forecasts

## **State Standards:**

The lesson addresses the following Virginia Standards of Learning found at

<http://www.pen.k12.va.us>

ES.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

- a) observation and collection of weather data;
- b) prediction of weather patterns;
- c) severe weather occurrences such as tornadoes, hurricanes, and major storms; and
- d) weather phenomena and the factors that affect climate.

### **Media Components:**

- Video  
*Passport to Weather and Climate: Program 8*
- PowerPoint Presentation  
“Clouds”
- Web Sites
  1. <http://web2.airmail.net/danb1/clouds.htm> This site contains an invaluable collection of cloud photos labeled by category and describing the weather they foretell. The images can be downloaded to use in custom-made presentations, PowerPoints, etc.
  2. [www.nws.noaa.gov](http://www.nws.noaa.gov) The National Weather Service/NOAA Home Page displays current watches, warnings, statements, and advisories for the United States.
  3. [www.weather.com](http://www.weather.com) This is the home page for The Weather Channel. Students can access specific, current forecast information for their community or see regional/national weather patterns.
  4. [www.weatherclassroom.com](http://www.weatherclassroom.com) Geared specifically to educational purposes, this is another site maintained by The Weather Channel.

### **Materials**

*Per class:*

TV/VCR

Computer with PowerPoint program

Projection device for computer (TV link, projector w/ screen or SmartBoard)

*For each student:*

Pencil and paper

### **Prep for Teachers:**

Prior to teaching this lesson:

1. Teach basics of weather features, including frontal systems, cloud formations, barometric pressure, etc.; this lesson is to be used as a culminating activity after teaching the weather features, not as an introduction to the unit.
2. Bookmark the Web sites listed within on the computer being used for display in your classroom, *or* use WebWhacker or similar software to copy the cloud structures web site (<http://web2.airmail.net/danb1/clouds.htm>) into a folder, then install that folder

into the computer. The teacher could also use Filamentality or a similar program to create a Hotlist of web sites, the URL for which should be bookmarked on the computer.

### **Introductory Activity:**

1. **OPEN** the PowerPoint investigation on cloud formations and display it using a linked TV, projector, or SmartBoard. (see link for Power Point on website.)
2. For each photo, **ASK** students to predict what the weather will be for that day. (An alternative to the PowerPoint presentation is to create your own using the information and images contained in Web Site #1 above.)
3. After all photos are viewed, **SAY**: “Current knowledge of physics allows today’s weather scientists, called meteorologists, to accurately forecast the weather within a two-week span. Today we’re going to learn how they make those meteorological predictions and practice making some on our own.”

### **Learning Activity:**

1. **INSERT** video, *Passport to Weather...* into VCR.
2. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for the most simple way anyone can predict weather.” **START** the video, beginning with the opening credits. **PLAY** for 54 seconds. **STOP** when the narrator says, “...and know what’s going on high above before a storm hits.” **ASK**, “What is the most simple way anyone can predict weather?” (Answer: Reading the sky with the unaided eye.)
3. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for what weather readers watch for.” **RESUME** the video. **PLAY** for 41 seconds. **STOP** when the narrator says, “...you run into the front, so the surface features.” **ASK**, “What do you watch for?” (Answer: They watch for cloud structures and surface features.)
4. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for what a weather watcher needs.” **RESUME** the video. **PLAY** for 9 seconds. **STOP** when the narrator says, “...and enough smarts to take shelter if severe weather is approaching.” **ASK**, “What does a weather watcher need?” (Answer: They need educated eyes and enough knowledge to get out of the way of severe weather.)
5. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for clues as to why meteorology can be an exciting science.” **RESUME** the video. **PLAY** for 26 seconds. **STOP** when the narrator says, “... It’s the most exciting thing going.”

**ASK**, “What makes the study of meteorology exciting?”

(Answer: With meteorology, a person can view principles directly, and it’s an applicable science.)

6. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for the five basic elements necessary for making long-term forecasts.”

**RESUME** the video. **PLAY** for 19 seconds. **STOP** when the narrator says, “... the men and women who put them all to work for you.”

**ASK**, “What are the five basic elements necessary for making long-term forecasts?”

(Answer: Satellites, balloons, radar, ground instruments, and people to interpret the data.)

7. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for how often weather satellites photograph clouds to help forecast the weather.”

**RESUME** the video. **PLAY** for 25 seconds. **STOP** when the narrator says, “... until they take pictures of clouds in the United States and the Northern Hemisphere.”

**ASK**, “How often do satellites photograph clouds to forecast weather?”

(Answer: Continuously, from every minute to an average of every 15 minutes.)

8. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for how new computer tools enhance our knowledge of the weather.”

**RESUME** the video. **PLAY** for 34 seconds. **STOP** when the narrator says, “... to see where the weather actually is.”

**ASK**, “How do new computer tools enhance our knowledge of the weather?”

(Answer: They provide us with thermal pictures of the atmosphere—cold temperatures, clouds, and warm temperatures. They enable us to see where clouds and storms actually are.)

9. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for where data from satellites is sent and what other data is added to it.”

**RESUME** the video. **PLAY** for 59 seconds. **STOP** when the narrator says, “...that project what the weather will be days into the future.”

**ASK**, “Where is data from satellites sent?”

(Answer: Wallops Island, Virginia)

**ASK**, “What other data is added to the satellite data?”

(Answer: Reports of temperature, humidity, wind speed and direction from automated weather stations; data on precipitation and severe storms from Doppler radar; and readings twice a day from sounding balloons in the U.S. and around the world.)

10. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for the relationship between complexity of the computer models and weather forecasts.”

**RESUME** the video. **PLAY** for 30 seconds. **STOP** when the narrator says, “... to your newspapers or TV screens.”

**ASK**, “What is the relationship between complexity of computer models and the weather forecasts?”

(Answer: The more complex the math, the more detailed the forecasts will be.)

11. **FAST FORWARD** the videotape through the classroom demonstration segment (15 seconds). **STOP** when the narrator says, “and the real-world phenomena they simulate.”

12. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment and see which forecast information helps firefighters combat fires.”

**RESUME** the video. **PLAY** for 1 minute and 5 seconds. **STOP** when the narrator says, “... the more severe fire conditions we’re gonna have.”

**ASK**, “What forecast information helps dictate fire behavior?”

(Answer: Temperature, relative humidity, and wind direction help dictate fire behavior.)

13. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment to see how firefighters make use of these forecasts.”

**RESUME** the video. **PLAY** for 2 minutes and 43 seconds. **STOP** when the narrator says, “... Here we are actually a humanitarian science and that’s my job.”

**ASK**, “How do firefighters mainly make use of these forecasts?”

(Answer: Knowing the forecast for temperature, humidity, and wind direction helps firefighters decide where to most safely place their emergency services personnel and how to most effectively fight the fire.)

14. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for the new weather technology applications being researched by NASA.”

**RESUME** the video. **PLAY** for 1 minute and 9 seconds. **STOP** when the narrator says, “... as land and oceans bloom and fade each year.”

**ASK**, “What are some of the new weather technology applications being researched by NASA?”

(Answer: Tracking pollution patterns around the world; monitoring wild land fires, biomass burning, deforestation, disappearance of lakes, harmful land use practices, changes in the ozone layer, and conditions resulting in disease epidemics.)

15. Provide students with a **FOCUS FOR MEDIA INTERACTION**. **SAY**, “Watch the following video segment for the most essential tool for interpretation of meteorological data.”

**RESUME** the video. **PLAY** for 25 seconds. **STOP** when the narrator says, “... bright young people with new ideas.”

**ASK**, “What is the most essential tool for interpretation of meteorological data?”

(Answer: Intelligent people to give meaning and relevance to the data.)

**Culminating Activity:**

Step 1: **SAY**, “As we have seen, meteorologists use a variety of information to make their short and long-term predictions. Now we are going to try to make short-term (24 hour) predictions using the clouds.

Step 2: Go to the cloud chart web site (<http://web2.airmail.net/danb1/clouds.htm>). View the different types of clouds and the weather they foretell. If weather permits, go outdoors and look at the clouds; if not, have students look out the classroom windows. Have students make their predictions in writing, noting the type of clouds they see and what kind of weather they precede. Take up predictions, being sure to make your own notes of the cloud types.

Step 3: **DURING THE NEXT CLASS**, hand out students’ predictions. **ACCESS** the weather web site for that day; **COMPARE** students’ forecasts with the actual weather conditions. **DISCUSS WITH THE CLASS** reasons why students’ predictions are or are not correct.

Step 4: Provide students with current local information on temperature, relative humidity, barometric readings, and wind speed and direction. Do not let students see any forecasts; only give them access to current data. **ASK** students to predict the weather for their hometown for tomorrow. Predictions must be made and justified by the student based solely on the current weather information provided on the web site. Then turn to the forecast for tomorrow and see if the students’ predictions concur with those of the weather service.

### **Cross-Curricular Extensions**

#### LANGUAGE ARTS

1. Students will keep a daily weather diary for a week. Students should note the effects changes in temperature, precipitation, and sunshine/cloud cover have on their wardrobe choices, their recreational activities, and their ability to perform various tasks, from getting to school to doing chores at home and/or work. Most notably, they should elaborate on how the weather affects their emotions.
2. Students should write the copy for a weather broadcast, reporting weather conditions observed during class time and including a forecast for the next day.

#### MATHEMATICS

1. Have the class maintain a record of high and low temperatures in your locality for a week. Students will then graph both the high and low temperatures to see if any significant changes occurred; they may then also calculate the average daily high and low temperature for the week.

#### SOCIAL STUDIES

1. Students will research major U.S. weather-related events of the past 100 years, including notable hurricanes, snowstorms, tornados, droughts, floods, etc. (The teacher may want to make a list and allow students to sign up for the event of their choice to avoid duplication of information.) The report (which could be

presented on PowerPoint or in standard written format) should include both short- and long-term effects of the event on the locality involved.

#### VISUAL ARTS

1. Students will do artistic renditions of landscapes affected by wind, rain, snow, or partly cloudy skies.
2. Students will complete presentations on PowerPoint involving well-known paintings depicting some form of precipitation. The presentation should include the name of the artist, the title of the artwork, the age of the painting, where the work is currently on display, and any background information on how the work was developed. (For example, the artist was stranded in the tropics during the monsoon season, or, like Monet, s/he painted the same subjects repeatedly, varied only by light conditions often determined by the weather and the time of day.)

#### COMMUNITY CONNECTIONS:

1. Visit a local television station and see how and where weather broadcasts are actually made. Students should also be able to see how satellite information is fed into the computer models used by local meteorologists to make forecasts.
2. Ask a local meteorologist to visit the class and discuss weather forecasting.