Weather Forecasting

TABLE OF CONTENTS

About **Weather Forecasting**

DeltaScienceModules, THIRD EDITION

Students explore *Weather Forecasting* with twelve hands-on activities and the Delta Science Reader. They discover the importance of accurate weather forecasting and record keeping, and how to do both. Student partners build weather stations that are the headquarters of their unit work. They fill the station with temperature, rainfall, and wind data. Then they add barometric pressure and relate it to weather conditions. Students plot fronts and other large-scale factors on weather maps, differentiate cloud formations, and research weather folklore. With the help of a video, they delve into severe weather—hurricanes and tornadoes—for which forecasting is especially valuable.

In the Delta Science Reader *Weather Forecasting,* students are introduced to the world of weather forecasting and the data, instruments, and science that make forecasting accurate. Students read about the six weather factors— temperature, air pressure, wind, humidity, precipitation, and cloudiness—as well as the difference between weather and climate. The reader contains a biographical sketch of tornado expert Tetsuya Theodore Fujita. Students also find out about two other kinds of weather scientists: climatologists and hurricane hunters. Students learn about different types of winds and how a weather satellite works.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 **Building Weather Stations** *page 13*	• discover the role of weather stations • construct weather stations • create sections for recording data on local and national weather
2 **Why Forecast the Weather?** *page 19*	• discuss the usefulness of forecasting the weather • discuss what weather forecasters look at to predict the weather • discover the importance of accurate record keeping in formulating an accurate forecast • add sections of data to the weather stations
3 **Collecting Weather Data** *page 25*	• collect temperature, rainfall, and wind data • discover how data collection aids in forecasting • add daily weather data to the weather stations
4 **High and Low Pressure** *page 33*	• explore the concept of air pressure • observe that air pressure is exerted in all directions • relate air pressure to wind and weather forecasting
5 **Forecasting with a Barometer** *page 41*	• examine a barometer and understand how to read one • investigate barometric pressure readings as a means of forecasting the weather • add barometric pressure readings to their weather data collection
6 **Decoding Weather Data** *page 49*	• interpret weather map symbols • construct station models using student-collected data • make and update sections on the weather stations
7 **Weather Fronts** *page 55*	• investigate the different types of weather fronts • learn to interpret fronts and predict the weather they bring • plot weather fronts on a map • update data on sections of their weather stations
8 **Isobars and Isotherms** *page 63*	• examine national weather data collected from the newspapers • draw isobars and isotherms on their weather maps • deduce what happens when air masses of different pressure meet
9 **Creating a Cloud** *page 69*	• discuss how clouds form • discuss a cloud's contribution to weather • construct cloud chambers and create clouds in them
10 **Classifying Clouds** *page 75*	• identify some basic types of clouds • discuss the layered arrangement of clouds • associate specific types of clouds with specific types of weather conditions
11 **Folklore and Forecasting** *page 81*	• discuss possible scientific explanations for weather-related, folkloric sayings • examine the accuracy of almanac weather forecasts • compare and contrast their weather data with almanac forecasts
12 **Severe Storms** *page 87*	• discover what weather conditions result in natural disasters • practice forecasting deteriorating weather conditions • relate how forecasting has improved to the point of being able to save lives and property
Assessment *page 95*	• See page 95.

Process Skills	Vocabulary	Delta Science Reader
make and use models	**atmosphere, climate, meteorologist, meteorology, weather, weather forecasting, weather station**	pages 2, 3–5
communicate; observe; collect, record, display, or interpret data	**forecast**	pages 2, 3–5, 9
measure; observe; collect, record, display, or interpret data; infer	**Beaufort scale, precipitation, rain gauge**	pages 3–5, 7, 11, 14
communicate, make and use models, observe, infer	**air pressure, vacuum**	page 3
make and use models; measure; observe; collect, record, display, or interpret data	**aneroid barometer, barometer, millibars**	page 3
collect, record, display, or interpret data; infer; communicate	**coding, station model**	page 6
compare; infer; collect, record, display, or interpret data	**air mass, cold front, front, occluded front, stationary front, warm front, weather front**	page 6
collect, record, display, or interpret data; infer; compare	**isobars, isotherms**	page 6
make and use models, observe, infer	**condense, convection, nuclei**	pages 3, 7
infer, compare, classify	**cirrus, cloud layer, cumulonimbus, cumulus, fog, nimbostratus, nimbus, stratus**	page 7
communicate; collect, record, display, or interpret data; compare; infer	**almanac, folklore**	pages 7, 15
collect, record, display or interpret data; infer; communicate; compare	**hurricane, tornado**	pages 8, 10, 12–13

Weather Forecasting

3

Overview Chart for Delta Science Reader
Weather Forecasting

Selections	Vocabulary	Related Activity
Think About...		
Why Do We Predict the Weather? *page 2*	air mass, atmosphere, forecast, meteorologist, troposphere, weather	2
How Is Weather Data Gathered? *page 3*	air pressure, anemometer, barometer, convection, evaporate, humidity, hygrometer, precipitation, rain gauge, relative humidity, water cycle, water vapor, weather balloon, weather station, wind vane	1, 3, 4, 9
What Do Weather Maps Show? *page 6*	cold front, front, isobar, occluded front, station model, stationary front, surface map, warm front, weather map	6, 7, 8
How Are Weather Forecasts Made? *page 7*	cirrus cloud, cumulus cloud, nimbus cloud, prevailing winds, stratus cloud	5, 10
How Is Severe Weather Predicted? *page 8*	tornado	12
How Do Weather and Climate Differ? *page 9*	climate, global warming, greenhouse effect	
People in Science		
• **Tetsuya Theodore Fujita** *page 10*		12
• **Climatologists** *page 11*		
• **Hurricane Hunters** *page 12*	hurricane	
Did You Know?		
• **How Weather Satellites Work** *page 14*		
• **Winds Have Names** *page 15*	local winds	11

See pages 103–115 for teaching suggestions for the Delta Science Reader.

MATERIALS LIST

Quantity	Description
1	barometer
16	boxes, flat*†
1	chart, Clouds
16	compasses
32	cups, paper*
1	fasteners, hook-and-loop, p/4*
2	index cards, 15 cm × 20 cm, p/100*
16	lids, for tumbler
3	maps, U.S. outline, p/32*
1	matches, wooden*
2	paper, construction, 23 cm × 30 cm, p/50*
2	paper, construction, black, 45 cm × 60 cm
3	paper fasteners, p/100
1	rain gauge
16	thermometers, Celsius
16	tumblers, plastic
1	video, *Hurricanes & Tornadoes*
1	**Teacher's Guide**
8	**Delta Science Readers**

Quantity	Description
TEACHER-PROVIDED ITEMS	
1	bucket or bowl
1	flashlight (optional)
–	handouts, storms
–	ice, crushed*
16	markers
1	*The Old Farmer's Almanac*
–	paper towels*
32	pencils, colored
16	rulers, metric
16	scissors
1	stapler
–	string
1	VCR and monitor
–	water, tap*
–	weather reports, local and national

* = consumable item   † = in separate box

ACTIVITY SUMMARY

What causes certain weather conditions? If we knew, might we be able to predict what weather conditions are coming our way? In this Delta Science Module, students explore weather forecasting.

ACTIVITY 1 Students construct a weather station on which they will later record and display weather observations and data. The different types of weather-related information that they will collect are discussed.

ACTIVITY 2 Students relate the usefulness of accurate weather forecasts to their everyday lives. Discussions focus on what conditions must be examined when forecasting the weather, as well as the importance of accurate record keeping.

ACTIVITY 3 Students begin collecting weather data and displaying it on their weather stations. They are introduced to the thermometer, rain gauge, and compass, and learn how to use them. Students explore how collecting temperature, rainfall, and wind data helps them forecast the weather.

ACTIVITY 4 Students are introduced to the concept of air pressure. They perform an experiment showing that air pressure is exerted in all directions on all things exposed to the air. They relate air pressure to wind and to certain weather conditions which can be forecast.

ACTIVITY 5 Students continue learning about air pressure by investigating the barometer and relating barometric pressure readings to weather conditions. They take their own barometric pressure readings and add these to their weather stations.

ACTIVITY 6 Students discover how to code weather information, just as meteorologists do.

ACTIVITY 7 Students examine weather fronts: what they are, where they move, and what kind of weather they are likely to bring. They plot fronts on a national weather map and transfer the data to their weather stations.

ACTIVITY 8 Students learn the usefulness of plotting areas of similar air pressure and temperature on weather maps. Students designate these areas on national weather maps using the same system that meteorologists use, and then transfer the data to maps on their weather stations.

ACTIVITY 9 Different types of clouds are associated with different weather conditions. Students conduct an investigation of clouds. They learn the conditions necessary for clouds to form and then perform a classroom experiment where they create their own clouds.

ACTIVITY 10 Students discuss the physical characteristics of several types of clouds and the weather conditions that they bring.

ACTIVITY 11 Weather-related folklore is examined next. Students discuss several sayings that originated long ago and were based on observations of specific weather conditions. Students recall what they have learned about weather and weather forecasting as they examine the science relating to the folklore.

ACTIVITY 12 Students examine two types of severe storms—hurricanes and tornadoes. They explore the structure of each kind of storm, and learn how important it is to disseminate forecasts to people who may be in the path of such a storm. Students are given hypothetical weather data and apply what they know about hurricanes and tornadoes to identify the type of storm represented by each set of data.