

# Weather Instruments

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### COPYMASTERS

<b>Student Activity Sheets</b>	
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<b>School-Home Connection</b>	
<b>Unit Test</b>	



# About **Weather Instruments**

**DeltaScienceModules**, THIRD EDITION

**S**tudents explore *Weather Instruments* with twelve hands-on activities and the Delta Science Reader. They measure weather conditions using kit tools and devices of their own making. Observations begin with temperature. Students compare Fahrenheit and Celsius scales and take thermometer readings twice a day. They investigate air pressure and barometers, and construct wind vanes and record wind direction and wind strength. Experiments with evaporation and condensation lead to humidity tests, cloud classifications, and indoor precipitation. From their own data, students draw conclusions about connections among the weather factors. They learn how and why today's factors reliably predict tomorrow's weather.

In the Delta Science Reader *Weather Instruments*, students read about what weather is and what factors cause changes in the weather. Various weather tools, such as the thermometer, barometer, wind vane, anemometer, hygrometer, and rain gauge, are described. The book presents biographical sketches of key scientists in this field—Gabriel Fahrenheit, Anders Celsius, and Sir Francis Beaufort—and describes the work of airport meteorologists. Students also read about wind chill and how a thermometer works.

# Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
<b>1 Air Temperature</b> <i>page 13</i>	<ul style="list-style-type: none"> <li>• discuss the Celsius and Fahrenheit scales</li> <li>• use thermometers to measure air temperature in Celsius and in Fahrenheit</li> <li>• begin a class Weather Data chart</li> </ul>
<b>2 Air Pressure</b> <i>page 23</i>	<ul style="list-style-type: none"> <li>• observe the rise and fall of measured barometric pressure</li> <li>• practice reading a barometer</li> <li>• learn that the barometer needle moves in response to changes in air pressure</li> </ul>
<b>3 Barometric Changes</b> <i>page 31</i>	<ul style="list-style-type: none"> <li>• measure and record barometric pressure twice each day</li> <li>• observe and record weather conditions twice each day</li> <li>• infer relationships between weather changes and barometric pressure</li> </ul>
<b>4 Wind Direction</b> <i>page 37</i>	<ul style="list-style-type: none"> <li>• discuss how to determine where the wind is blowing from</li> <li>• construct their own wind vanes</li> <li>• discuss how wind direction can help predict the weather</li> </ul>
<b>5 Wind Strength</b> <i>page 43</i>	<ul style="list-style-type: none"> <li>• make an instrument to measure wind strength</li> <li>• measure and record the strength of the wind</li> <li>• observe the effects of the wind on objects in their surroundings</li> <li>• add wind strength data to the class Weather Data chart</li> </ul>
<b>6 Temperature Changes</b> <i>page 51</i>	<ul style="list-style-type: none"> <li>• graph temperature data from the class chart</li> <li>• use the graphed data to visualize general trends in temperatures</li> <li>• discuss possible reasons for differences between morning and afternoon temperatures</li> </ul>
<b>7 Changes in Water</b> <i>page 59</i>	<ul style="list-style-type: none"> <li>• set up experiments in which water evaporates and condenses</li> <li>• infer that evaporation and condensation involve a change in the form of water</li> <li>• learn that evaporation and condensation are inverse processes</li> </ul>
<b>8 Humidity</b> <i>page 67</i>	<ul style="list-style-type: none"> <li>• observe the effect of moisture on cobalt paper</li> <li>• use cobalt paper to measure air humidity</li> <li>• add humidity data to the class Weather Data chart</li> </ul>
<b>9 Making a Cloud</b> <i>page 75</i>	<ul style="list-style-type: none"> <li>• observe a cloud form in a jar of hot water</li> <li>• describe the formation of a cloud</li> <li>• infer how clouds form in nature</li> </ul>
<b>10 Classifying Clouds</b> <i>page 81</i>	<ul style="list-style-type: none"> <li>• determine the amount of cloud cover</li> <li>• classify amount of cloud cover</li> <li>• classify clouds by shape</li> <li>• use weather symbols to describe current weather conditions</li> <li>• add cloud data to the class Weather Data chart</li> </ul>
<b>11 Precipitation</b> <i>page 89</i>	<ul style="list-style-type: none"> <li>• observe and define precipitation</li> <li>• discuss the water cycle</li> <li>• use a rain gauge to measure rainfall</li> <li>• record precipitation data on the class Weather Data chart</li> </ul>
<b>12 What's Your Weather Like?</b> <i>page 97</i>	<ul style="list-style-type: none"> <li>• examine the class Weather Data chart</li> <li>• discover relationships among weather factors</li> <li>• look for short-term and long-term weather changes</li> </ul>
<b>Assessment</b> <i>page 103</i>	<ul style="list-style-type: none"> <li>• See page 103.</li> </ul>

## Weather Instruments

Process Skills	Vocabulary	Delta Science Reader
measure, make and use models	<b>atmosphere, degrees Celsius, degrees Fahrenheit, dual-scale thermometer, temperature, thermometer, weather</b>	pages 3, 10, 14, 15
observe, interpret data	<b>air pressure, barometer, millibar</b>	page 4
measure, observe, infer		page 4
communicate, make and use models	<b>wind vane</b>	page 5
make and use models, measure, observe	<b>anemometer</b>	pages 5, 11
collect, record, display or interpret data; infer; communicate		pages 2, 3
make and use models, infer	<b>condensation, evaporation, water vapor</b>	page 6
observe, make and use models	<b>humidity</b>	page 7
observe, describe, infer	<b>cloud</b>	page 6
infer, classify, make and use models	<b>cirrus cloud, cloud cover, cumulus cloud, stratus cloud</b>	page 13
observe, communicate; make and use models; collect, record, display or interpret data	<b>millimeter, precipitation, rain gauge, water cycle</b>	pages 6, 8
collect, record, display or interpret data; predict		pages 9, 12, 13

See the following page for the Delta Science Reader Overview Chart.

# Overview Chart for Delta Science Reader

## Weather Instruments

Selections	Vocabulary	Related Activity
<b>Think About...</b>		
<b>What Causes Earth's Weather?</b> <i>page 2</i>	air mass, atmosphere, cloud, troposphere, water vapor, weather	5, 12
<b>How Do We Measure Air Temperature?</b> <i>page 3</i>	Celsius, Fahrenheit, temperature, thermometer	1, 6
<b>How Do We Measure Air Pressure?</b> <i>page 4</i>	air pressure, barometer	2, 3
<b>How Do We Measure Wind?</b> <i>page 5</i>	anemometer, wind, wind vane	4, 5
<b>What Causes Clouds and Precipitation?</b> <i>page 6</i>	condensation, evaporation, precipitation, water cycle	7, 9, 10, 11
<b>How Do We Measure Humidity?</b> <i>page 7</i>	humidity, hygrometer	8
<b>How Do We Measure Precipitation?</b> <i>page 8</i>	rain gauge	11
<b>Other Weather Tools</b> <i>page 9</i>		12
<b>People in Science</b>		
<ul style="list-style-type: none"> <li>• <b>Gabriel Fahrenheit</b> <b>Anders Celsius</b> <i>page 10</i></li> <li>• <b>Sir Francis Beaufort</b> <i>page 11</i></li> <li>• <b>Airport Meteorologists</b> <i>page 12</i></li> </ul>	<p>Beaufort scale</p> <p>cirrus cloud, cold front, cumulus cloud, front, meteorologist, stationary front, stratus cloud, warm front, weather map</p>	1, 5
<b>Did You Know?</b>		
<ul style="list-style-type: none"> <li>• <b>How Thermometers Work</b> <i>page 13</i></li> <li>• <b>About Wind Chill</b> <i>page 14</i></li> </ul>	<p>wind chill</p>	<p>1, 6</p> <p>4, 5</p>

See pages 111–118 for teaching suggestions for the Delta Science Reader.

# MATERIALS LIST

## Weather Instruments

Quantity	Description	Quantity	Description
		<b>TEACHER-PROVIDED ITEMS</b>	
1 . . . . .	adhesive dots, blue, p/200*	1 . . . . .	container, large
1 . . . . .	adhesive dots, red, p/200*	1 . . . . .	fan, electric
16 . . . . .	balls, table tennis	1 . . . . .	flashlight (optional)
1 . . . . .	barometer	- . . . . .	ice cubes*
1 . . . . .	barometer dial chart	- . . . . .	magazines
16 . . . . .	beads	32 . . . . .	markers or crayons, blue
16 . . . . .	cardboard, corrugated, 10 cm × 30 cm*	32 . . . . .	markers or crayons, red
16 . . . . .	cardboard, corrugated, 15 cm × 15 cm*	16 . . . . .	markers, felt-tip
16 . . . . .	cards, Wind Vane*	1 . . . . .	paper, black (optional)
1 . . . . .	chart, Air Temperature*	- . . . . .	paper, chart*
1 . . . . .	chart, Cloud	1 . . . . .	paper towels, roll
1 . . . . .	chart, The Water Cycle	32 . . . . .	pencils
1 . . . . .	chart, Weather Data*	1 . . . . .	pitcher
2 . . . . .	clay, modeling, 0.25 lb*	1 . . . . .	plastic wrap
6 . . . . .	cobalt paper, p/3*	1 . . . . .	ruler, dual-scale
1 . . . . .	compass	17 . . . . .	scissors
32 . . . . .	containers, plastic, fluted, 1-pt	1 . . . . .	screwdriver, flathead, small
16 . . . . .	containers, plastic, round	- . . . . .	water, tap*
16 . . . . .	dowels, wooden, 35-cm		
16 . . . . .	droppers		
32 . . . . .	envelopes*		
32 . . . . .	fasteners, brass*		
1 . . . . .	fasteners, hook-and-loop, p/4*		
1 . . . . .	food coloring, blue, 1 oz*		
1 . . . . .	glue, 4 oz*		
1 . . . . .	jar, plastic		
16 . . . . .	lids, for tumblers		
1 . . . . .	paper clips, p/100		
1 . . . . .	paper scales sheet		
8 . . . . .	petri dishes		
1 . . . . .	rain gauge		
1 . . . . .	rubber band		
1 . . . . .	rubber sheet		
1 . . . . .	straws, drinking, p/50*		
16 . . . . .	T-pins*		
2 . . . . .	tape, masking*		
2 . . . . .	tape, transparent*		
16 . . . . .	thermometers		
1 . . . . .	thread*		
16 . . . . .	trays, plastic		
16 . . . . .	tumblers, plastic		
1 . . . . .	Teacher's Guide		
8 . . . . .	Delta Science Readers		
		* = consumable item	† = in separate box

# ACTIVITY SUMMARY

**In this Delta Science Module, students are introduced to the various factors that together make up weather conditions and to the variety of instruments used to measure those factors.**

**ACTIVITY 1** Students begin taking outdoor weather measurements twice a day. After an introduction to the Celsius and Fahrenheit scales, they measure and record outdoor air temperature. In addition to recording air temperatures individually, students also begin a class Weather Data chart.

**ACTIVITY 2** Students are introduced to the concept of air pressure. Students observe the rise and fall of a barometer needle and learn about the barometer's function. They practice reading air pressure on a model barometer and on the classroom barometer.

**ACTIVITY 3** Students continue to investigate air pressure. They use the barometer to measure the air pressure twice a day and record their readings. In addition, they observe, record, and discuss the weather conditions that accompany various barometric readings and learn the importance of air pressure for predicting weather changes. They also add information on weather conditions and air pressure to the class Weather Data chart.

**ACTIVITY 4** Students build a wind vane from cardboard, a straw, and a dowel. They use their wind vanes to determine wind direction and add the data to the class Weather Data chart. They learn the importance of wind direction for predicting the weather.

**ACTIVITY 5** Students construct devices to measure wind strength. They use the devices in their daily observation sessions and they record the information on the class Weather Data chart.

**ACTIVITY 6** Students review the air temperature data from the class Weather Data chart. They graph and analyze the data, observing short- and long-term temperature changes, and they discuss possible reasons for these changes.

**ACTIVITY 7** Students experiment with the processes of evaporation and condensation. They observe the processes and infer the changes of state that water undergoes during these processes.

**ACTIVITY 8** After determining the effect of moisture on cobalt paper, students use cobalt paper to measure the humidity. They begin to record humidity in their daily observation sessions.

**ACTIVITY 9** Students learn the conditions necessary for cloud formation. They observe as a cloud is created in the classroom and discuss the formation of clouds in nature.

**ACTIVITY 10** Students go outside to observe, describe, and classify clouds. They determine cloud cover and record the types of clouds in the sky. They use weather symbols to record other current weather conditions and begin recording cloud data.

**ACTIVITY 11** Students observe the formation of precipitation from an indoor cloud and learn how precipitation occurs. They discuss the water cycle in nature and relate it to what they have learned about evaporation and condensation. They begin to use a rain gauge to measure rainfall during their daily weather observations.

**ACTIVITY 12** Students bring together all they have learned in the module. They observe short- and long-term changes on the class Weather Data chart and infer interactions among the various weather factors.