



Weather

PROJECT PLANNING GUIDE

OBJECTIVES OF THE 4-H WEATHER PROJECT

1. Develop youth through their interest in science, specifically the science of weather--meteorology.
2. Increase knowledge of meteorology.
3. Increase awareness of our atmosphere and the physical principles which explain the "why" of many atmospheric phenomena.
4. Develop understanding of science and how questions are answered through experimentation. Improve reasoning and problem solving abilities.

EXTENSION RESOURCE MATERIALS

1. The Weathermakers
2. Observation and Measurement of Weather
3. Severe Weather

NOTE: This planning guide is based on information and activities described in the three project manuals which are available from county Extension agents. After each suggested "Thing to Do," the corresponding project manual reference is given in parentheses.

To achieve the most meaningful and satisfying learning experiences in meteorology, 4-H'ers should complete Levels 1, 2, 3 in sequence and accomplish all or most of the "Things to Do" in each level.

LEVEL 1
(9- to 11-year-olds)

Things to Learn	Things to Do
1. Definitions of weather and climate.	1. Write your definition of "weather" and "climate," then look in a dictionary or text book to see how good your definitions are. If necessary, rewrite your definitions and learn them.
2. Basic elements of weather.	2. List the four basic elements of weather.
3. Air is matter. a. Air takes up space. b. Air has weight. c. Air exerts pressure.	3. Demonstrate that air takes up space. Demonstrate that air has weight. Demonstrate that air exerts pressure. (Unit I, pg. 3-4)
4. How air circulates.	4. Demonstrate that warm air rises and expands and how it circulates. (Unit I, pg. 4-5)
5. What the atmosphere is and what it does for us.	5. Describe the atmosphere. (Unit I, pg. 6)
6. Physical relationship between sun and earth.	6. Demonstrate the different effects of direct and indirect rays of the sun. (Unit I, pg. 7-9)
7. How colors affect temperature.	7. Show how dark and light colors differ in temperature. (Unit I, pg. 9-10)
8. How bodies of water affect weather and climate.	8. Show how soil and water differ in heating capacity. (Unit I, pg. 10-11)
9. How altitude affects weather and climate.	9. Explain why the mountains of North Carolina are generally cooler than the piedmont or coastal plain.
10. Effects of water in our atmosphere on weather.	10. a. Prove there is water in air. b. Find the dew point. c. Make fog. d. Make rain. (Unit I, pg. 12-15)

LEVEL 2
(12- to 14-year-olds)

Things to Learn	Things to Do
1. Four basic weather parameters.	1. List the four basic weather parameters (Unit II, pg. 2-3)
2. What is temperature?	2. Compare readings of two differently exposed thermometers. (Unit II, pg. 3-5)
3. Who is Galileo?	3. Read about Galileo's discovery related to meteorology. (Unit II, pg. 5-6)
4. How to measure air pressure.	4. Show how a Torricelli barometer works. (Unit II, pg. 6-7)
5. Why air pressure changes.	5. Show how an aneroid barometer works. (Unit II, pg. 7-8)
6. Units of air pressure measurements.	6. Construct a barometer. (Unit II, pg. 8-9)
7. Significance of wind direction.	7. Make a weathervane. (Unit II, pg. 10-11)
8. What makes the wind blow? What are the "doldrums, horse latitudes, Polar Easterlies, Trade Winds?"	8. Read about wind and be able to define the following terms: doldrums, horse latitudes, Polar Easterlies, Trade Winds. (Unit II, pg. 11-12)
9. What is the coriolis force?	9. Define coriolis force. (Unit II, pg. 12)
10. How local winds are set up.	10. Explain land, sea, and mountain breezes. (Unit II, pg. 13)
11. What an anemometer measures.	11. Construct an anemometer. (Unit II, pg. 13-14)
12. What is humidity? a. relative b. absolute	12. Demonstrate how relative humidity affects how comfortable we are. (Unit I, pg. 17-18)
13. What a psychrometer measures.	13. Construct and use a psychrometer. (Unit II, pg. 19-21)
14. How a cloud is formed, and what is adiabatic cooling.	14. Read about the way a cloud is formed. (Unit II, pg. 20)
15. Different types of clouds.	15. a. Categorize the three main cloud types. b. Determine how high the base of cumulus cloud is. (Unit II, pg. 22-23)

Things to Learn	Things to Do
16. How to observe and be aware of the changing weather.	16. Use the instruments you've constructed to take twice daily observations of temperature, wind speed and direction, humidity and precipitation, and clouds.

LEVEL 3
(15- to 19-year-olds)

1. What is a weather front?	1. Simulate a cold front, warm front, and occluded front. (Unit II, pg. 3-6)
2. What is stable and unstable atmosphere?	2. Demonstrate stability and instability in the atmosphere. (Unit III, pg. 7-8)
3. How stability affects weather.	3. Demonstrate overturning in the atmosphere (Unit III, pg. 8-9)
4. What causes the thunder and lightning associated with thunderstorm?	4. Read about thunderstorms in a text or other source of information. (Unit III, pg. 10-12)
5. Characteristics of tornadoes.	5. a. Simulate a tornado vortex. (Unit III, pg. 10-12) b. Create a funnel cloud. (Unit III, pg. 12-15)
6. How to protect yourself and others in a tornado. a. What tornado watch means. b. What tornado warning means.	6. Practice tornado drills in your home. (Unit III, pg. 12)
7. What constitutes a weather observation station?	7. Build a weather station. (Unit III, pg. 16-18)
8. How to record observations. a. Weather symbols.	8. Make a Weather Log and take twice daily weather observations. (Unit III, pg. 21)

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