`

CURRICULUM GUIDE FOR

Weather

(Based on STC Weather Kit)

Additional resources can be found on Wallingford's W drive under Elementary Science

Wallingford Public Schools
First Grade
Science

Based on the Scope and Sequence approved by Wallingford Board of Education on February 5th, 2008
Approved by Science Management Team on November 6, 2008

Table of Contents

UNIT SUMMARY

The Weather unit is designed to have students explore weather concepts with hands-on investigations. Using a variety of tools, students observe, discuss, measure, and record data on cloud cover, precipitation, wind, and temperature. They learn how to read a thermometer and construct a rain gauge to measure precipitation. They also study cloud formations and use a wind scale to estimate the speed of wind. To apply their new skills and knowledge, students compare their own weather predictions with an actual weather forecast and use the weather data they have collected to form generalizations about the weather in their own locale. Students will begin to use an inquiry based approach as a way to solve problems and make informed decisions.

STAGE 1- STANDARDS/GOALS

What should students understand, know, and be able to do? Stage one identifies the desired results of the unit including the related state science content standards and expected performances, enduring understandings, essential questions, knowledge and skills.

Enduring Understandings *Insights earned from exploring generalizations via the essential questions (Students will understand THAT…) K-12 enduring understandings are those understandings that should be developed over time, they are not expected to be mastered over one unit or one year.*	**Essential Questions** *Inquiry used to explore generalizations*
Overarching Enduring Understandings: EU1 Science is the method of observation and investigation used to understand our world. (K-12) EU2 Inquiry is the integration of process skills, the application of scientific content, and critical thinking to solve problems. (K-12) *Unit Specific Enduring Understandings:* EU3 Weather is characterized by features such as temperature, wind speed, direction and precipitation. EU4 Weather may be quantified using tools such as thermometers, rain gauges and wind speed/direction indicators. EU5 Understanding the elements of weather help us plan our daily lives. EU6 Humans can use their observations and records to understand and forecast the weather. Scientists who do this are called meteorologists.	EQ1 How is inquiry used to investigate the answers to questions we pose? EQ2 Why does the weather change? EQ3 What is a season? EQ4 How does the weather change in each season? EQ5 How does the weather affect what we wear? EQ6 How does the weather affect how we feel? EQ7 How does the weather affect what we do? EQ8 How do you measure the weather?

Knowledge and Skills

What students are expected to know and be able to do.

The knowledge and skills in this section have been extracted from Wallingford's K-5 Science Scope and Sequence.

Knowledge

K1. Explain how the weather changes daily and seasonally.
K2. Observe and collect weather data daily, weekly and monthly.
K3. Analyze weather data for trends and patterns.
K4. Measure weather using a thermometer, weather vane, anemometer and a rain gauge.
K5. Describe how weather affects clothing, shelter and transportation.

Skills

S1. Generate appropriate questions such as "why did…?" I wonder…?
S2. Observe and describe commonalities and differences among objects.
S3. Sort and classify objects based on two observable properties.
S4. Predict what might happen.
S5. Design an investigation to help answer a testable question.
S6. Conduct simple investigations.
S7. Employ simple equipment and measuring tools, such as:
- Equal arm balance
- Thermometer
- Scales
- Electric hot plate
- Rulers/number lines/yard sticks
- Non-standard measuring devices

S8. Demonstrate safe use of materials.
S9. Organize appropriate and accurate measurements and observations using:
- Graphic organizers
- Picture and bar graphs
- Illustrations and diagrams
- Journaling

S10. Draw conclusions based on data, observations and findings.
S11. Communicate results or information in an appropriate manner using:
- Pictures
- Oral reports
- Journals

Content Standard(s) *Generalizations about what students should know and be able to do.*	
CSDE Content Standards (CSDE Science Framework 2004)	**CSDE Primary Expected Performances** (CSDE Science Framework 2004**)**
Energy in the Earth's Systems – How do external and internal sources of energy affect the Earth's systems? **K.3 - Weather conditions vary daily and seasonally.** Daily and seasonal weather conditions affect what we do, what we wear and how we feel.	A7. Describe and record daily weather conditions. A8. Relate seasonal weather patterns to appropriate choices of clothing and activities.
Scientific Inquiry	A INQ 1 Make observations and ask questions about objects, organisms and the environment. A INQ 2 Use senses and simple measuring tools to collect data. A INQ 3 Make predictions based on observed patterns.
Scientific Literacy	A INQ 4 Read, write, listen and speak about observations of the natural world. A INQ 5 Seek information in books, magazines and pictures. A INQ 6 Present information in words and drawings.
Scientific Numeracy	A INQ 7 Use standard tools to measure and describe physical properties such as weight, length and temperature. A INQ 8 Use nonstandard measures to estimate and compare the sizes of objects. A INQ 9 Count, order and sort objects by their properties. A INQ 10 Represent information in bar graphs.

STAGE 2 – DETERMINE ACCEPTABLE EVIDENCE

How will we know if students have achieved the desired results and met the content standards? How will we know that students really understand? Stage two identifies the acceptable evidence that students have acquired the understandings, knowledge, and skills identified in stage one.

Performance Task(s) *Authentic application in new context to evaluate student achievement of desired results designed according to GRASPS. (Goal, Role, Audience, Setting Performance, Standards)*	**Other Evidence** *Other methods to evaluate student achievement of desired results.*
Your favorite meteorologist is going on vacation and they need you to fill in for a little while. You will be responsible for recording data on the weather features for your given day and then giving a weather report. Make your weather presentation creative. You may use maps, pictures or graphs. As part of your presentation, you will need to suggest appropriate clothing and outdoor activities. **K3, K5, S10, S11, EU1, EU4, EU6, EQ5, EQ6, EQ7, EQ8**	• Journal Entries **S11, K2 & K5** • Graphs **S9, K2 & K4** • Drawings **S9, S11, K2 & K5** • Written assessment (see teacher's guide for assessments two, three and four) **S11, K1, K3 & K5** • Teacher observations **K1 & K4** ***Additional assessment ideas can be found on Wallingford's W drive***

Sample Assessment 1

Modified from KITES 2002 http://www.ebecri.org/custom/weather.html

Teacher Note: Graph the weather for several weeks. At the end of each week, discuss the pattern of weather for that week so that the children can get used to the concept of weather patterns.

Create a Graph C which shows a definite pattern of changing conditions.

a. Look at the two weekly weather graphs and explain what you notice about the weather for each week.
b. Compare the two weather charts and explain the similarities and differences.
   Sample prompts may include:
   - Was it rainy all week, or sunny, or a little bit of both? When did it change?
   - Did it get warmer or colder during the week, or did it stay the same?
   - Was it mostly sunny or cloudy and when did it change?
   - Was it windy or calm?
   - What season do you think it might be?
   - What day of the week would be best for outdoor activities? What kinds of activities would be the best on that day?
   - Which day of the week would be best for kit flying? Why do you think so?

4	• The student can explain orally or in writing the pattern of weather for the week in terms of clouds, wind speed, temperature and precipitation (where appropriate).
3	• The student can describe orally or in writing the pattern of weather for the week, but has a few minor errors or omissions in describing the pattern of changing conditions.
2	• The student can describe orally or in writing some of the pattern of weather for the week, but has major errors or omissions in describing the pattern of changing conditions.
1	• The student attempted orally or in writing to describe some of the features of the weather for the week with little or no success.

Sample Assessment 2

Modified from KITES 2002 http://www.ebecri.org/custom/weather.html

Teacher Note: *Two pieces of evidence in Weather Graph D (see next page) suggest that the correct season is winter – the two days of snow fall.*

Directions: Look at the graph of weather and answer the following questions:

1. What season do you think it is? Explain why you think so.
2. Draw yourself dressed for this season.
3. Tell me why you made this decision.
4. On which days, if any, would you want to be outside playing for a long time? Why?

4	• Names the correct season and describes in writing or orally how the data supports the conclusion. • Makes appropriate decisions about how to dress and when to engage in outdoor activities.
3	• Names the correct season and describes in writing or orally how the data supports the conclusion with few errors. • Makes appropriate decisions about how to dress and when to engage in outdoor activities.
2	• Names the correct season, but the explanation has gaps in understanding. • Makes appropriate decisions about how to dress with few errors or omissions.
1	• Attempts to name the season and explain the reasoning with little or no success.

Weather Graph D

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 	2 	3 	4 	5 	6 	7 
8 	9 	10 	11 	12 	13 	14 
15 	16 	17 	18 	19 	20 	21 
22 	23 	24 	25 	26 	27 	28 
29 	30					

Sample Assessment 3

Month – July
Season – Summer
Temperature – 80

Questions:

- What clothes would you wear? Why?
- What activities could you do today? Why?

Sample Assessment 4

Month – November
Season – Fall
Temperature – 50

Questions:

- What clothes would you wear? Why?
- What activities could you do today? Why?

Sample Assessment 5

Month – April
Season – Spring
Temperature – 62

Questions:

- What clothes would you wear? Why?
- What activities could you do today? Why?

Sample Assessment 6

Month – January
Season – Winter
Temperature – 31

Questions:

- What clothes would you wear? Why?
- What activities could you do today? Why?

STAGE 3 – LESSON ACTIVITIES

What will need to be taught and coached, and how should it best be taught, in light of the performance goals in stage one? How will we make learning both engaging and effective, given the goals (stage 1) and needed evidence (stage 2)? Stage 3 helps teachers plan learning experiences that align with stage one and enables students to be successful in stage two. Lesson activities are suggested, however, teachers are encouraged to customize these activities, maintaining alignment with stages one and two.

The suggested lesson activities are not sequenced in any particular order. Teachers may select which lesson activities will best meet the needs of their students and the unit objectives. Each lesson activity is coded with the corresponding knowledge (K) and/or skill (S) objectives that are found in stage one.

Many of the concepts in this kit are related and can be linked to concepts in the Solids, Liquids and Gases Units, particularly those concepts about air (gas).

ENDURING UNDERSTANDING: Weather is characterized by features such as temperature, wind speed, direction and precipitation.

STC Lesson 1: SHARING WHAT WE KNOW ABOUT WEATHER

STC *Weather* pages 3-8

Students discuss what they know and would like to know about the weather.

- *What is the weather like today?*
- *How does the weather affect what we wear?*
- *How do you decide what to wear to school each day?*

Time: 30-40 minutes

Knowledge and Skills: K5, S1, S4, S10 & S11

STC Lesson 2: OBSERVING THE WEATHER

STC *Weather* pages 11-20

Students use their senses to observe the weather.

- *How do we use our senses to investigate our world?*
- *What are some observable weather features?*

Time: 40-45 minutes

Knowledge and Skills: K2, S2, S9, S10, S11

STC Lesson 3: RECORDING THE WEATHER

STC *Weather* pages 25-30

Students collect data on cloud cover, precipitation and temperature.

(See page 137 in STC manual for an extension project that incorporates recording weather observations. This can be done over the course of the unit.)

- *How can we keep a record of daily weather conditions?*
- *How do we measure the weather?*

Time: 45 minutes (daily recording of 5 minutes during morning meeting)

Knowledge and Skills: EU5, K2, K4, S6, S7 & S9

ENDURING UNDERSTANDING: Weather may be quantified using tools such as thermometers, rain gauges and wind speed/direction indicators.

STC Lesson 4: ESTIMATING WIND SPEED

STC *Weather* pages 33-40

Students observe, describe and record wind speed.

- *What is the wind?*
- *Was the wind blowing today?*
- *How can we tell how fast the wind is blowing today?*
- *If we take the anemometer outside, what will happen if there is a gentle breeze?*
- *If we take the anemometer outside, what will happen if there is a strong breeze?*

Time: 45 minutes

Knowledge and Skills: K1, K2, K4, S2, S4, S6, S7, S10 & S11

FOSS Lesson on Wind Speed – Anemometer

Foss *Air and Weather* Investigation 3 Part 2: Wind Speed pages 12-16

Teacher will take students outside on a windy day for a wind observation walk. Students should notice the winds affect on the environment. Teacher will bring students back inside where they will discuss the fact that wind is air that moves. They will also discuss how wind cannot be seen but the affect of wind on objects can be seen. Teacher will then construct classroom anemometer. Teacher and students will then go back outside to try to get the anemometer to move (teacher may have to gently help the anemometer to get going). Teacher will ask students to describe what they observe happening to the anemometer. Teacher then asks students to observe something else that is moving due to the wind. Teacher and students will then come inside to talk about their observations. Students will then be instructed to draw something they saw moving due to the winds affect on the environment.

- *What is the wind?*
- *Was the wind blowing today?*
- *How can we tell how fast the wind is blowing today?*
- *If we take the anemometer outside, what will happen if there is a gentle breeze?*
- *If we take the anemometer outside, what will happen if there is a strong breeze?*

Time: 45 minutes

Knowledge and Skills: K1, K2, K4, S2, S4, S6, S7, S10 & S11

FOSS WIND SPEED PART TWO – Wind Vane

Foss *Air and Weather* Investigation 3 Part 4: Wind Vanes (weather vanes) pages 22-27

Teacher and students will revisit their discussion on the wind and its affects. Teacher asks students, how fast is the wind moving today and in what direction? Teacher explains that like the anemometer there are different ways to classify how fast the wind is moving. Teacher explains that the Beaufort Scale (Student Sheet No.17) was developed as an observation scale for measuring the winds at sea. It was later adapted for use on land. It is still used as a measurement tool by meteorologists today. Another tool used to measure wind direction is a wind/weather vane. Teacher will construct a classroom vane. Teacher and students will go outside and use the wind scale (Student Sheet N.17) to observe and classify the wind speed according to the Beaufort Scale. Students will then write and draw

observations in their science journal. These observations should take place several times over the remaining parts of the unit.

- *What is the wind?*
- *Was the wind blowing today?*
- *How can we tell how fast the wind is blowing today?*
- *If we take the anemometer outside, what will happen if there is a gentle breeze?*
- *If we take the anemometer outside, what will happen if there is a strong breeze?*
- *How strong does the wind have to be to make the anemometer move?*

Time: 40 minutes (multiple days)
Knowledge and Skills: K1, K2, K4, S2, S4, S6, S7, S10 & S11

STC Lesson 5: READING A THERMOMETER
STC *Weather* pages 43-53
Students observe and discuss thermometers as tools that measure temperature.

- *How do we measure the weather?*
- *How do thermometers work to tell us the temperature?*
- *What happens to the liquid in a thermometer when it is cold?*
- *What happens to the liquid in a thermometer when it is hot?*
- *Why is it important to know the temperature?*

Time: 35-45 minutes
Knowledge and Skills: K2, K4, S1, S4, S7, S8, S10 & S11

STC Lesson 6: MAKING A MODEL THERMOMETER
STC *Weather* pages 55-60
Students read and record temperature on a thermometer and relate temperatures to appropriate clothing and activities.

- *How do we measure the weather?*
- *How can we make a thermometer?*
- *What happens to the liquid in a thermometer when it is cold?*
- *What happens to the liquid in a thermometer when it is hot?*
- *Why is it important to know the temperature?*

Time: 35-45 minutes
Knowledge and Skills: K2, K4, S1, S4, S7, S8, S10 & S11

STC Lesson 7: COMPARING INSIDE AND OUTSIDE TEMPERATURES
STC *Weather* pages 63-69
Students record indoor and outdoor temperatures and compile a class graph.

- *How do we measure the weather?*
- *How do outside temperatures change over time?*
- *How do outside temperatures compare with inside temperatures?*
- *What happens to the liquid in a thermometer when it is cold?*
- *What happens to the liquid in a thermometer when it is hot?*
- *Why is it important to know the temperature?*

Time: 35-45 minutes
Knowledge and Skills: K2, K4, S1, S4, S7, S8, S10 & S11

Lesson 8: MEASURING WATER TEMPERATURE
STC *Weather* pages 71-80
Student's measure and record temperature of hot and cold water.

- *How do we measure the weather?*
- *What happens with hot and cold water are mixed?*
- *What happens to the liquid in a thermometer when it is cold?*
- *What happens to the liquid in a thermometer when it is hot?*
- *Why is it important to know the temperature?*

Time: 35-45 minutes
Knowledge and Skills: K2, K4, S1, S4, S7, S8, S10 & S11

STC Lesson 9: EXPERIMENTING WITH COLOR AND TEMPERATURE
STC *Weather* pages 83-89
Students investigate the relationship between color and the absorption of heat. ***This is a great activity that could easily be modified to an inquiry investigation***. Students could raise questions and design their own experiments to investigate questions such as, "Would I stay cooler in the hot summer in a white shirt or black shirt?" or "Would I be warmer in the fall in a dark color or a light color?"

- *How do we measure the weather?*
- *What effect does color of clothing have on temperature in the clothing?*
- *What happens to the liquid in a thermometer when it is cold?*
- *What happens to the liquid in a thermometer when it is hot?*
- *Why is it important to know the temperature?*

Time: 35-45 minutes
Knowledge and Skills: K2, K4, S1, S4, S7, S8, S10 & S11

ENDURING UNDERSTANDING: Understanding the elements of weather help us plan our daily lives.

Lesson 10: MAKING A RAIN GAUGE
STC *Weather* pages 91-99
Students measure the amount of rainfall using a simple rain gauge.

- *How do we measure the weather?*
- *What tools do we need to measure the weather?*
- *How can we measure how much rain falls?*
- *What kind of weather do clouds sometimes bring with them?*
- *What do the clouds look like that bring rain?*
- *How do you think a rain gauge works?*
- *Where do you think we should place the rain gauge? Why?*

Time: 60 minutes
Knowledge and Skills: K2, K3, K4, S1, S4, S5, S6, S7, S8, & S10

STC Lesson 11: EXPLORING PUDDLES
STC pages 101-111
Students learn about evaporation as they observe and record changes in pie tin puddle.

- *What is a puddle?*
- *What is evaporation?*
- *What happens to a puddle in sunny weather?*

Time: 30 minutes (may take several days to complete)
Knowledge and Skills: K1, K2, K4, S1, S2, S4, S6, S8, S9, S10, S11

STC Lesson 12: TESTING RAINY DAY FABRICS
STC pages 113-120
Students conduct experiments with fabrics to determine which materials are suitable for wearing in wet weather. ***This is a great activity that could easily be modified to an inquiry investigation***.
Students could raise questions and design their own experiments to test which materials make the best "rain coat."

- *How do different types of materials respond to water?*
- *Which fabric would keep you the driest on a rainy day?*
- *What clothes would you wear on a rainy day?*
- *Why do some clothes feel wet while others do not?*
- *What kinds of coats protect us from the weather?*
- *Many animals do not have feathers to protect them like birds do. What protects them from the weather?*

Time: 50 minutes
Knowledge and Skills: K4, K5, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11

STC Lesson 13: OBSERVING CLOUDS
STC *Weather* pages 123-126
Students observe, draw and discuss cloud formations.

- *How can we describe the size, shape or other characteristics of clouds?*
- *Why does the weather change?*
- *Do all clouds look the same?*
- *How are clouds alike?*
- *How are clouds different?*

Time: 45 minutes
Knowledge and Skills: K2, S2, S9 & S11

STC Lesson 14: CLASSIFYING CLOUDS
STC *Weather* pages 129-133
Students sort cloud pictures using their own system and according to three defined cloud types.

- *Do all clouds look the same?*
- *How are clouds alike?*
- *How are clouds different?*
- *How do clouds let us know that the weather will change?*

Time: 30 minutes
Knowledge and Skills: K1, K2, S2, S3, S10, S11

ENDURING UNDERSTANDING: Humans can use their observations and records to understand and forecast the weather. Scientists who do

this are called meteorologists.

STC Lesson 15: COMPARING FORECASTS TO TODAY'S WEATHER

STC *Weather* pages 135-138

Students make forecasts for the next day's weather and compare their predictions with what actually happens.

- *What is a prediction?*
- *How do predictions help us to make decisions?*
- *How does the forecast help us decide what clothes to wear?*
- *How can the weather forecast help us choose something fun to do outside with our family?*
- *How does the forecast from a daily newspaper compare with today's weather?*
- *How do meteorologists forecast the weather?*
- *How do forecasts help you make decisions about outdoor activities?*

Time: 20 minutes

Knowledge and Skills: K1, K2, K3, K4, K5, S2, S9, S10, S11

STC Lesson 16: SUMARIZING OUR WEATHER OBSERVATIONS

STC *Weather* pages 141-148

Students tally their weather data and summarize the weather characteristics over a long period of time.

- *How can you tell what the weather was like two weeks before?*
- *What kind of weather will we probably have next week?*
- *Why is it important to keep track of weather?*
- *How would you describe the weather we have had over the past few weeks?*

Time: 40 minutes

Knowledge and Skills: K3, S10, S11

LITERATURE RESOURCES

These literature resources have been purchased to supplement the kit and are housed in each elementary school library.

Guided Reading Sets (6 copies in each school)

Rain, Robert Kalan
What's the Weather Like Today?, Rozanne Williams
How's the Weather?, William Berger
Mouse Goes Out, Phyllis Root
Snow, Newbridge

Read Aloud (1 copy per school)

Clouds, Saunders-Smith
Snowy Flowy Blowy, Nancy Tafuri
Bear in Sunshine, Stella Blackstone
Here Comes Spring and Summer..., Mary Murphy
Sunshine and Storm, Elizabeth Jones

Recommended Websites:

1. The Franklin Institute - www.fi.edu/weather/todo
   Make your own Weather Station
2. Learn NC - www.learnnc.org/lessons/CarolMccrary5232002884
   Rainy Weather Lesson Plan
3. Weather Wiz Kids - http://www.weatherwizkids.com/
   Meet meteorologist Crystal Wicker in this interactive website that helps kids understand current in-the-news weather patterns. A must-see. A great website for parents!
4. Web Weather for Kids - http://eo.ucar.edu/webweather/index.html
   Teacher tips, activities, games and "weather ingredients" and stories. A great place to look for simple classroom experiments.
5. Dan's Wild Wild Weather Page - http://www.wildwildweather.com/
   Weather resources and more from WHNT Channel 19. This child and teacher-friendly site provides you with a vast amount of information about the many aspects of weather, includes games, sounds and quizzes.
6. Franklin's Forrest - http://sln.fi.edu/weather/index.html
   This site, created by the Franklin Institute, offers children the opportunity to investigate current weather conditions and become weather forecasters themselves!
7. Ice and Snow - http://www.units.muohio.edu/dragonfly/snow/
   This site offers children and teachers the opportunity to explore snow and ice, and even travel to Antarctica and learn how to make an igloo!
8. Weather Channel - http://www.weather.com/
   World weather information

Materials List
Weather (STC) Grade 1

Revised September 2008

25 sheets	Black paper
25 sheets	White paper
25 sheets	Blue paper
25	10oz plastic cups
25	16oz plastic cups
2	White plastic pail
2	3X3 Post-it notes
1	3X5 Post-it notes
1	2" clear packing tape
10	4oz plastic cups
8	6X6 nylon fabric
8	6X6 cotton fabric
8	6X6 wool fabric
8	6 X6 cotton/poly fabric
31	4X6 white fabric
31	Pieces of stiff tag board (2x7")
300	Cotton balls
25	8" model Fahrenheit thermometer backings and 25 white shoelaces
2	Anemometer systems (2 bases, 16-5oz cups, 4 cardboard squares, 2 jumbo straws, 2 super jumbo straws)

15	Rubber band #14
1	Roll transparent tape
1	Stamp pad with bottle of ink
11	Weather stamps in Ziploc bag
25	8" Fahrenheit thermometers
1	Rain gauge
1	Poster -Weather calendar
1	Hole punch
20	8" Aluminum pie tins
1	Curriculum guide, Weather
1	STC Weather teachers guide
1	Large outside thermometer
1	Demo thermometer (large)
1	Poster-A Guide to the Sky (FOSS)
	Poster-Wind Scale (FOSS)
1	Foss Teacher Guide: Air and Weather - Supplemental Lessons (Investigation 3 & 4 masters)
1	Weather cloud photographs Pack, 10 sets of 9 cards
1	**Wind vane** built in a bag(directions from DSM Weather Watching) (wind vane card, 1 piece of lightweight cardboard, 1 wooden dowel, 1 jumbo straw, 1 T-pin, 1 red bead, 1 wooden base)

Shaded items are from FOSS: Air and Weather kit. Non-shaded items are from STC: Weather kit.

Please remember to check your library for the non-fiction books for this unit.