CEREAL CITY SCIENCE™
by BCAMSC

Teacher Guide and Student Journal
Sample Activity and Planning Pages

Weather, Climate, & Natural Hazards 3ENG

SECOND EDITION

A third grade unit supporting Next Generation Science Standards
and Michigan Science Standards

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A third-grade unit supporting **Next Generation Science Standards** and the **Michigan Science Standards** developed and written by the Battle Creek Area Mathematics and Science Center for

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Weather, Climate, and Natural Hazards

Pre-activity Informational Pages

Activities

Appendix

NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas	Activities
ESS2.D: Weather and Climate • Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. • Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.	1,2,3,4,5,6,7
3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	1,2,3,4,5,6,7
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.	1,2,3,4,5,6,7
ESS3.B: Natural Hazards • A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.	6,7
3-ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.**	7

NEXT GENERATION SCIENCE STANDARDS

Science and Engineering Practices	Activities
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in tables and various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.	1,2,3,4,5,6,7
3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	1,2,3,4,5,6
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.	6,7
3-ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.**	7
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and other reliable media to explain phenomena.	1,2,5,6,7
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.	1,2,3,4,5,6,7

NEXT GENERATION SCIENCE STANDARDS

Crosscutting Concepts	Activities
Cause and Effect • Cause-and-effect relationships are routinely identified, tested, and used to explain change.	1,2,3,4,5,6
3-ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.**	6,7
Patterns • Patterns of change can be used to make predictions.	1,2,3
3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	2,3,4,5,6
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.	2,3,4,5,6,7

COMMON CORE STATE STANDARDS - READING

Reading Standards for Informational Text—Grade 3	Activity
Key Ideas and Details	
RI.3.1: Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.	2,5,6,7
RI.3.2: Determine the main idea of a text; recount the key details and explain how they support the main idea.	2,5,6,7
RI.3.3: Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.	2,5,6,7
Craft and Structure	
RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade-3 topic or subject area.	2,5,6,7
RI.3.5: Use text features and search tools (e.g., keywords, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.	5,6,7
RI.3.6: Distinguish their own point of view from that of the author of the text.	
Integration of Knowledge and Ideas	
RI.3.7: Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).	2,5,6,7
RI.3.8: Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).	5,6,7
RI.3.9: Compare and contrast the most important points and key details presented in two texts on the same topic.	6,7
Range of Reading and Level of Text Complexity	
RI.3.10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 2–3 text complexity band independently and proficiently.	6,7

COMMON CORE STATE STANDARDS - WRITING

Writing Standards–Grade 3	Activity
Text Types and Purposes	
W.3.1: Write opinion pieces on topics or texts, supporting a point of view with reasons. a. Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons. b. Provide reasons that support the opinion. c. Use linking words and phrases (e.g., because, therefore, since, for example) to connect opinion and reasons. d. Provide a concluding statement or section.	3,7
W.3.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic and group related information together; include illustrations when useful to aid comprehension. b. Develop the topic with facts, definitions, and details. c. Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information. d. Provide a concluding statement or section.	2,4,7
W.3.3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences. a. Establish a situation and introduce a narrator and/or characters; organize an event sequence that unfolds naturally. b. Use dialogue and descriptions of actions, thoughts, and feelings to develop experiences and events or show the response of characters to situations. c. Use temporal words and phrases to signal event order. d. Provide a sense of closure.	4
Production and Distribution of Writing	
W.3.4: With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose. (Grade-specific expectations for writing types are defined in standards 1–3 above.)	2,3,7

COMMON CORE STATE STANDARDS - WRITING

Writing Standards–Grade 3	Activity
W.3.5: With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing. (Editing for conventions should demonstrate command of language standards 1–3, up to and including grade 3.)	2,3,4,7
W.3.6: With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.	7
Research to Build and Present Knowledge	
W.3.7: Conduct short research projects that build knowledge about a topic.	5,7
W.3.8: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence to provide categories.	5,7
W.3.9: (Begins in grade 4)	
Range of Writing	
W.3.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	1,2,3,4,5,6,7

COMMON CORE STATE STANDARDS - LANGUAGE

Language Standards—Grade 3	Activity
Conventions of Standard English	
L.3.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. a. Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences. b. Form and use regular and irregular plural nouns. c. Use abstract nouns (e.g., childhood). d. Form and use regular and irregular verbs. e. Form and use the simple (e.g., I walked; I walk; I will walk) verb tenses. f. Ensure subject–verb and pronoun–antecedent agreement. g. Form and use comparative and superlative adjectives and adverbs, and choose between them depending on what is modified. h. Use coordinating and subordinating conjunctions. i. Produce simple, compound, and complex sentences.	1,2,3,4,5,6,7
L.3.2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling in writing. a. Capitalize appropriate words in titles. b. Use commas in addresses. c. Use commas and quotation marks in dialogue. d. Form and use possessives. e. Use conventional spelling for high-frequency and other studied words and for adding suffixes to base words (e.g., sitting, smiled, cries, happiness). f. Use spelling patterns and generalizations (e.g., word families, position-based spellings, syllable patterns, ending rules, meaningful word parts) in writing words. g. Consult reference materials, including beginning dictionaries, as needed to check and correct spelling.	1,2,3,4,5,6,7
Knowledge of Language	
L.3.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening. a. Choose words and phrases for effect. b. Recognize and observe differences between the conventions of spoken and written standard English.	1,2,3,4,5,6,7

COMMON CORE STATE STANDARDS - LANGUAGE

Language Standards—Grade 3	Activity
Vocabulary Acquisition Use	
L.3.4: Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade-3 reading and content, choosing flexibly from a range of strategies. a. Use sentence-level context as a clue to the meaning of a word or phrase. b. Determine the meaning of the new word formed when a known affix is added to a known word. c. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., company, companion). d. Use glossaries or beginning dictionaries, both print and digital, to determine or clarify the precise meaning of key words and phrases.	2,5,6,7
L.3.5: Demonstrate understanding of word relationships and nuances in word meanings. a. Distinguish the literal and nonliteral meanings of words and phrases in context (e.g., take steps). b. Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful). c. Distinguish shades of meaning among related words that describe states of mind or degrees of certainty (e.g., knew, believed, suspected, heard, wondered).	1,2,3,4,5,6,7
L.3.6: Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships (e.g., After dinner that night we went looking for them).	1,2,3,4,5,6,7

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 3	Activities
Mathematical Practices	
1. Make sense of problems and persevere in solving them.	1–7
2. Reason abstractly and quantitatively.	1–7
3. Construct viable arguments and critique the reasoning of others.	1–7
4. Model with mathematics	
5. Use appropriate tools strategically.	
6. Attend to precision.	1–7
7. Look for and make use of structure.	1–7
8. Look for and express regularity in repeated reasoning.	1–7
3.OA Operations and Algebraic Thinking	
Represent and solve problems involving multiplication and division. 1. Interpret products of whole numbers (e.g., interpret 5x7 as the total number of objects in 5 groups of 7 objects each). 2. Interpret whole-number quotients of whole numbers (e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each). 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). 4. Determine the unknown whole number in multiplication or division equations relating three whole numbers.	
Understand and apply properties of operations and the relationship between multiplication and division. 5. Apply properties of operations as strategies to multiply and divide. 6. Understand division as an unknown-factor problem.	

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 3	Activities
Multiply and divide within 100. 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division, or properties of operations. By the end of grade 3, know from memory all products of two one-digit numbers.	
Solve problems involving the four operations, and identify and explain patterns in arithmetic. 8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. 9. Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.	
3.NBT Number and Operations in Base Ten	
Use place value understanding and properties of operations to perform multi-digit arithmetic.	
1. Use place value understanding to round whole numbers to the nearest 10 or 100.	
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	2
3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operations.	
3.NF Number and Operations—Fractions	
Develop understanding of fractions as numbers.	
1. Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioning into b equal parts; understand a fraction a/b as the quantity formed by parts of size 1/b.	

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 3	Activities
2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.	
3. Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.	
3.MD Measurement and Data	
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	
1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes (e.g., by representing the problem on a number line diagram).	2
2. Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units (e.g., by using drawings to represent the problem).	
Represent and Interpret Data	
3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.	2
4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units: whole numbers, halves, or quarters.	
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.	
5. Recognize area as an attribute of plane figures and understand concepts of area measurement.	

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 3	Activities
6. Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).	
7. Relate area to the operations of multiplication and division.	
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	
8. Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	
3.G Geometry	
Reason with shapes and their attributes.	
1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., four sides) and the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of the subcategories.	
2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	

UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goal	Phenomenon/ Engineering Challenge	Summary: Students will...
1 Weather Trackers	Preparation: 15 minutes Activity 1: Lesson 1A: 55–60 min. Lesson 1B: 75–80 min. Lesson 1C: 55–60 min. 2 classes	Analyze and interpret weather data across different areas on the same day at the same time. Determine how to set up a weather station to collect and record weather data for your region over time.	Weather conditions vary in different regions. Weather observations: weather changes throughout the day and from day to day.	• analyze weather data from a different region and compare data with own region. • raise questions about weather and how it varies. • make weather observations. • begin long-term weather data collection.
2 Air is All Around	Preparation: 15 minutes Activity 2: Lesson 2A: 45–50 min., 2 classes Lesson 2B: 55 min., 2 classes Lesson 2C: 50–55 min., 2 classes Lesson 2D: 50–55 min., 2 classes	Use a thermometer to investigate the changes in temperature throughout the day and over several weeks. Determine what is being measured when measuring temperature in a weather report. Use a model to explain the sun's uneven heating of Earth.	Weather conditions vary in different regions. Weather observations: weather changes throughout the day and from day to day. The temperature at the beach or shore is cooler than the temperature inland.	• use thermometers to investigate changes in temperature throughout the day and in different locations. • investigate how air is all around. • use models to explain the sun's uneven heating of Earth.
3 Air Has Pressure, Too!	Preparation: 20 minutes Activity 3: Lesson 3A: 50 min., 2 classes Lesson 3B: 50 min., 2 classes	Use a model to construct an explanation of air pressure. Determine how to use data from daily observations of barometric pressure to forecast changes in weather.	Weather conditions vary in different regions. Weather observations: weather changes throughout the day and from day to day.	• use a model to determine that air pressure is greater at lower altitudes. • use a barometer to collect air pressure data over a period of time. • build a model of an aneroid barometer.

UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
• interpret weather data. • determine what different weather instruments measure. • organize data on a chart and log.	Obtaining, Evaluating, and Communicating Information Analyzing and Interpreting Data Planning and Carrying Out Investigations Patterns	**Formative Assessment** Science Talk Journal Entries Activity Pages
• obtain and evaluate information about air. • investigate how the temperature differs from place to place (shade vs. sun) and at different times of the day (morning, afternoon, evening). • investigate how different materials (land and water) absorb heat at different rates. • make sense of data from investigations.	Planning and Carrying Out Investigations Asking Questions and Defining Problems Developing and Using Models Obtaining, Evaluating, and Communicating Information Patterns Cause and Effect	**Formative Assessment** Activity Pages **Summative Assessment** Science Talk Journal Entries
• use a model of water under pressure to relate to air pressure. • use patterns in data to forecast changes in weather. • use step-by-step directions to build a prototype.	Constructing Explanations and Designing Solutions Developing and Using Models Patterns Cause and Effect	**Formative Assessment** Activity Page Journal Entry (3A) **Summative Assessment** Science Talk Journal Entries

UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goals	Phenomenon/ Engineering Challenge	Summary: Students will...
4 When the Air Moves	Preparation: 15 minutes Activity 4: Lesson 4A: 45–50 min., 2 classes Lesson 4B: 45–50 min., 3 classes	Analyze and interpret patterns in data to determine if the direction and speed of the wind can be used to predict future weather conditions.	Weather conditions vary in different regions. Weather observations: weather changes throughout the day and from day to day. The speed and direction of the wind varies from place to place and throughout the day.	• make observations of the speed and direction of the wind at various locations on the schoolyard. • be introduced to a design challenge to find the best wind speed and direction for launching a kite.
5 Clouds	Preparation: 20 min. Activity 5: Lesson 5A: 55–60 min., 2 classes Lesson 5B: 50–55 min., 2 classes Lesson 5C: 50 min., 2 classes 3–4 days of observations	Carry out an investigation to determine where the water in a puddle goes after it rains. Develop a model to demonstrate how clouds form and how it rains.	Water in a puddle disappears. Clouds moving across the sky, changing shape, shrinking and growing.	• investigate what happens to the water in a puddle. • make cloud observations. • analyze data to determine that water in a puddle evaporates. • obtain information about clouds using text.
6 It's Raining! It's Pouring!	Preparation: 10 min. Activity 6: Lesson 6A: 50–60 min., 2 classes Lesson 6B: 50–60 min., 2 classes Lesson 6C: 50–60 min., 2 classes	Obtain information using text and models about different forms of precipitation.	Rain and snow fall from the clouds in the sky.	• make and record observations of precipitation. • collect data on precipitation amounts. • observe a model of how freezing rain occurs. • obtain information to determine how rain, snow, sleet, and freezing rain occur. • obtain information from text to describe how there are different climates on Earth.

UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
• design and build a anemometer. • use patterns in wind direction to forecast future weather conditions.	Analyzing and Interpreting Data Asking Questions and Defining Problems Developing and Using Models Patterns Cause and Effect	**Formative Assessment** Activity Pages Science Talk (4A) **Summative Assessment** Anemometer model Science Talk Journal Entries
• use cloud types to forecast changes in weather. • develop a model to show where water goes when it evaporates and how clouds form.	Constructing Explanations and Designing Solutions Developing and Using Models Obtaining, Evaluating, and Communicating Information Planning and Carrying Out Investigations Cause and Effect	**Formative Assessment** Activity Page Science Talk *Rain Maker Observation Log* Class Discussion **Summative Assessment** Journal Entry Video Narration/Science Talk
• use a radar weather map to determine where it is raining and where it might rain next. • develop a model to explain how rain, snow, sleet, and freezing rain occur. • determine the climate of a certain location.	Obtaining, Evaluating, and Communicating Information Developing and Using Models Engaging in Argument from Evidence Cause and Effect	**Formative Assessment** Rain gauge models Science Talk Activity Page **Summative Assessment** Journal Entries Science Talk

UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goals	Phenomenon/ Engineering Challenge	Summary: Students will...
7 Wild Weather	Preparation: 15 min. Activity 7: Lesson 7A: 65–75 min. Lesson 7B: 50 min., 2 classes Lesson 7C: 50 min., 2 classes Added building and presenting time	Obtain information using video, text, and models to determine the impact of severe weather events. Use information to develop a model to reduce the impact of severe weather events.	Destruction from Hurricane Katrina. Children's accounts of destruction of Hurricane Katrina	• obtain information from video and text about the destruction from Hurricane Katrina. • brainstorm ideas of how to prepare for severe weather. • develop and test a model of a house to withstand the wind and water destruction of a severe storm.

UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
• develop and test a model of a house to withstand the wind and water destruction of a severe storm. • obtain information about different severe weather events. • develop a public service announcement to convince people to take precautions to reduce the impact of severe weather events.	Obtaining, Evaluating, and Communicating Information Developing and Using Models Engaging in Argument from Evidence Constructing Explanations and Designing Solutions Cause and Effect	**Summative Assessment** Respond to text Student models Activity page Student presentations Public service announcements Science talk

Dear Parent,

Your student is beginning a unit called *Weather, Climate, and Natural Hazards*, created at the Battle Creek Area Mathematics and Science Center. This unit was designed to promote inquiry-focused science that provokes questions, ideas, and reasoning to inform and solve problems. During the next twelve weeks, your child will be actively engaged with the unit. *Weather, Climate and Natural Hazards* is geared for third-grade students and focuses on the following learning expectations:

- Analyze weather data over time to create a graphical display to reveal patterns and relationships.
- Devise an argument using data from scientific explanations about the world to create a solution to a weather-related problem.
- Obtain information from books and reliable media to explain how cause-and-effect relationships are used to describe weather-related phenomena.
- Use climatic features to describe the weather conditions typical for an area.
- Investigate how human activities can reduce the effects of natural hazards.

During this unit of study, your child will collect and analyze weather data related to different regions and climates. The class will use this new information to create graphical displays to describe weather conditions for specific areas. They will collect data on temperature, wind speed, wind direction, and precipitation. Students will recognize patterns in the data to make predictions and determine climates.

The unit of study includes hazardous weather conditions that occur in different climates. Students describe the various hazards due to weather and create a design solution that reduces the impact of weather-related hazards. They will develop and critique design solutions created by their peers to reduce the impact of severe storms.

Suggestions for activities to do at home are included in this letter. These activities will reinforce the concepts taught during this unit of instruction.

We hope you enjoy discussing the concepts involved in *Weather, Climate and Natural Hazards* with your child. Let us know if we may be of assistance.

The Outreach Staff
Battle Creek Area Mathematics and Science Center
(269) 213-3907 or (269) 213-3908

ACTIVITIES TO DO AT HOME

Weather Observations and Reports:

1. Work with your student to develop an at-home weather station. Have your student record temperature, wind direction, wind speed, and barometric pressure in the morning and afternoon. Compare your at-home weather data with the local weather station.
2. Discuss precautions and steps your family can take to decrease the impact of severe weather (lightning, flood, strong winds, tornadoes, freezing rain, blizzards).
3. If your family has a relative or friend in a city far away, have your child communicate with them and compare weather data between the two locations. Discuss why there is a difference in weather patterns and if the distant location experiences a different climate.
4. Watch the morning and/or evening weather forecasts together. Make a list and discuss the different terms the meteorologist uses in the forecast. Then have your student research the meaning of the terms.
5. Share memories of severe storms from your childhood or those of a grandparent. Discuss how warning systems, forecasts, and safety precautions have changed.

Take your child to the library or bookstore to find magazines and books about weather and climate.

Example books:

On the Same Day in March: A Tour of the World's Weather by Marilyn Singer

Why Does It Rain? by Judith Jango-Cohen

Oh Say Can You Say What's the Weather Today? by Tish Rabe

Weather by Seymour Simon

Weather Forecasting by Gail Gibbons

What is Climate? by Bobbie Kalman

Weather Clues in the Sky: Clouds by Belinda Jensen

ACTIVITY 1

WEATHER TRACKERS

Teacher Background Information
In the following activities, your students will engage in collecting weather data and keeping track of weather observations over a period of time. Students are introduced to weather data in different regions for comparison with their own region. Throughout the following lessons they will be asked to use information to figure out why the weather differs from region to region and why we have different climates on Earth.

Engage the Learner
This lesson introduces and activates prior knowledge regarding weather across time and different regions. Students make connections between what they have observed and historical and current weather data.

Considerations for Students With Special Needs, Diverse Backgrounds, and Emerging Bilingual Learners
Students are asked to draw and write in their Student Journals. Students may benefit by working with a partner in the longer writing pieces. Students with an IEP should be allowed to dictate their ideas and answers.

Students are asked to plan an investigation and write their plan in the Student Journal. Encourage students who struggle to write to demonstrate and explain their ideas for an investigation. Ask another student to listen and work together to write the plan for their investigation.

LESSON 1A: WEATHER OBSERVATIONS

Advance Preparation
Duplicate copies of the *Parent Letter* and *Activities to Do at Home* to be sent home.

Display the world map in the classroom. Check to see if your school has a globe that can be used for the duration of the unit.

Make a What We Think chart to keep throughout the unit as a reference for current student thinking and conceptual shifts as the unit progresses.

What We Think	Questions We Have	What We Did	What We Figured Out	How Does that Help Us to Figure Out the Phenomenon?

ESTIMATED TIME
Lesson 1A: 55–60 minutes
2 classes
Lesson 1B: 55–60 minutes
2 classes
Lesson 1C: 55–60 minutes
2 classes

LESSON LEVEL LEARNING GOALS
Analyze and interpret weather data across different areas on the same day at the same time.

Determine how to set up a weather station to collect and record weather data for your region over time.

MATERIALS NEEDED
For each student:
student pages
For each group of 4:
On the Same Day Card Set
For the class:
world map
8 push pins
Teacher provides:
chart paper or white board
markers
globe
clipboard
Post-It Notes

TEACHING TIP
Throughout the activities in the Teacher Guide, you will notice that specific student instructions from the Student Journal pages are given first and italicized. Additional information for the teacher follows the italicized instructions in plain print.

ESS2.D: WEATHER AND CLIMATE
- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

DEVELOPING AND USING MODELS

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

Identify limitations of models.
- Develop and/or use models to describe and/or predict phenomena.
- **Use a model to test cause-and-effect relationships or interactions concerning the functioning of a natural or designed system.**

CAUSE AND EFFECT

Cause-and-effect relationships are routinely identified, tested, and used to explain change.

Choose a weather forecast Internet site to use for data collection for your region and for a different region within the United States. Examples:

weather.com

weather.noaa.gov

weather.org

Procedure

Engage the learner.

Divide the class into groups of four students. Distribute one *On the Same Day Card Set* to each group. Ask the students to discuss the information on each card and why they think the weather is different in the different regions.

Facilitate the group activity and brainstorming by circulating among the students and listening to their ideas. Use a clipboard, paper, and pencil to record ideas that can be used in the whole-group discussion. To check for student understanding and preconceptions, ask:

- Can someone explain what you have discussed so far?
- Where in the world is _____?
- Are the weather conditions similar to what we might experience at that time of year?
- Why do you think it is similar? Different?
- What do you think causes that to happen?
- What do you mean when you say…?
- Tell me more about….
- How might we find out?

Allow sufficient time for groups to brainstorm their ideas about the differences in the weather conditions in the different regions around the world. Ask the students to develop an initial model of what they think causes the weather to be different throughout the world. Ask the students to use the Student Journal for their initial models and then collaborate to develop a group model on chart paper or white boards.

Use the space below to draw a model of your initial ideas of what causes the weather to be different on the same day throughout the world.

Facilitate the group model development by circulating among the students and listening to their exchange of ideas and observing their drawings on the model. To help groups think, collectively ask:

- Has everyone had a chance to share their ideas?
- What common ideas were shared?
- Do you think that is a good place to start with your model?
- What do you know about the weather that might help you?
- Would it be helpful to make a list of the different components (elements or things) you think are important in a model that explains the cause of the different weather conditions throughout the world?
- Who has another component to add?
- Do you all agree? Why or why not?

Assure the groups that this is their initial model and all ideas are welcome at this time. Let them know that they will have multiple opportunities to revise their models as the lessons progress.

Science Talk

Conduct a whole-class sharing of ideas from their discussions and their initial models. Invite the groups to bring their models and gather in a circle to share and compare. Ask one group to begin the discussion by explaining their model. Ask:

- Who would like to start the conversation and share their model?
- I see that you included _____ on your model? Can you explain why the group thought that was important?
- Did anyone else have the same component in their model?
- Can you explain what your group has developed?
- Tell us more about...
- Who can add to _____'s idea?
- Do the rest of you agree? Why or why not?
- Continue the sharing and discussion until all groups have had the opportunity to share.

Listen for ideas that relate to the position of each location on Earth. Ideas may suggest distance to the equator, amount of rainfall, mountainous terrain, or distance to the ocean. Display the What We Think chart and ask students to share their initial ideas to write in the What We Think column. Take this opportunity to add questions that came up during the Science Talk. Explain that the class will save the chart to use as a reference for new thinking and ideas, questions, and what they figured out as the lessons progress. Place tally marks or check marks when multiple students have the same or similar ideas.

TEACHING TIP

Science Talk is a conversation among students that allows them to have the opportunity to orally express their ideas and listen to the ideas of others. Allow sufficient time for each student to express ideas and opinions. Encourage "student-led" conversation in the classroom. Encourage students to listen to the ideas of others, express their ideas in their own words, and build off the ideas of others.

CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems

- **Construct an explanation of observed relationships.**
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
- Identify the evidence that supports particular points in an explanation.
- ~~Apply scientific ideas to solve design problems.~~

ASKING QUESTIONS AND DEFINING PROBLEMS

Asking questions and defining problems in grades 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.

- **Use prior knowledge to describe problems that can be solved.**
- Identify scientific (testable) and non-scientific (non-testable) questions.
- **Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause-and-effect relationships.**

Display the world map. Assist the groups in locating the city on their *On the Same Day Card* on the map. Place a push pin on the location of each city. Discuss students' initial ideas about how the location of the area may have an effect on the weather conditions.

If you have a globe, take time to locate each city from the card set on the globe. The globe will give students a better model of the distance apart, hemispheres, and where the cities are on different sides of Earth. Check for early ideas about the cause-and-effect relationship between location on Earth and weather. Entertain all early ideas at this time.

Take time to develop and record questions about the phenomenon and record them on the What We Think chart. Ask the class:

- What do we already know about the cause of weather conditions and what causes them to change?
- What questions should we ask to find out more?
- Would it be useful if we had a deeper understanding of what is being measured in each of the weather conditions in the weather reports?
  - What is temperature?
  - How does it differ or change? What makes it change?
  - What is pressure?
  - How does it differ or change? What makes it change?
  - What makes the wind?
  - Why does the wind vary in strength?
- What might we learn if we researched the different areas on the globe?
- Would it be useful to learn how weather patterns occur?
- What do we need to know to be able to figure out all the different weather conditions?

Divide the class into their groups and distribute Post-It notes to each group. Ask the students to develop at least three questions they have about the weather, what causes different weather events, what causes different weather to occur around the world, and what causes the weather to change from day to day and throughout the day. Encourage students to think of any weather and/or climate related questions. Ask them to write one question on each Post-It Note.

When each group has at least three questions ask someone to volunteer to share one of the questions the group thinks is important. Post their question on the Questions We Have column. Ask if any other group had the same or a similar question and post it next to the first question. Continue the sharing of questions until all groups have shared at least three. Honor all questions from the students.

After the questions are posted and clustered by similarities, ask students to assist in labeling the clusters into categories. Categories may include:

- Location
- Equator
- Temperature
- Precipitation
- Altitude/Mountains
- Rainfall
- Ocean
- Wind

Inform the class that in the following lessons they will engage in activities to help them answer their questions.

Read the Journal Entry as a class.

Pre-Writing Strategy: Science Talk
Divide the class into the original groups. Give the groups sufficient time to discuss their ideas for a response to the Student Journal prompts. Inform the students that their responses are a record of what they currently think and they will have the opportunity to revisit their thinking and responses as the unit progresses and they have new knowledge to apply to the questions.

Journal Entry
Your class is exploring how different locations around the world could be experiencing different weather conditions on the same day at the same time. Write what you think causes the different weather conditions to occur. (Hint: Use your group initial model to help you write your answer.)

Make a list of questions you could investigate to find out why the different weather conditions occur.

Assessment: Formative
Use the Science Talk and Journal Entry to assess the students' initial ideas about weather in different areas and their ability to ask questions to investigate the reason for phenomena.

WRITING
Text Types and Purposes
W.3.1: Write opinion pieces on topics or texts, supporting a point of view with reasons.
a. Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.
b. Provide reasons that support the opinion.
c. Use linking words and phrases (e.g., because, therefore, since, for example) to connect opinion and reasons.
d. Provide a concluding statement or section.

Research to Build and Present Knowledge
W.3.7: Conduct short research projects that build knowledge about a topic.
W.3.8: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence to provide categories.

LESSON 1B: MAKING WEATHER OBSERVATIONS

Advance Preparation

Conduct a survey of your schoolyard for the weather observations. Look for areas with sun and shade, and open spaces for cloud observations.

Select an Internet weather site for your area that gives current weather conditions and an hourly forecast. The site should also allow students to check the current weather conditions in the cities on the *On the Same Day Card Set* (www.weather.com).

Procedure

Explore the concept.

Review the What We Think chart from the previous lesson. Ask students to review what they are trying to find out and add any new questions they have about the phenomenon of the different weather conditions around the world. Review the questions from the previous lesson.

Inform the class that they are going to dig deeper into weather conditions and how they are measured, and conduct long-term observations of weather to help them determine why the weather conditions differ on the same day in different regions and identify patterns in data to predict future weather events.

Divide the class into groups of three to four students and distribute the Student Journals to each student. Review how they use their senses to make observations and the importance of recording their observations. Inform the class that they will make a second weather observation in the following lesson.

Have the students take a pencil and their Student Journals and go outside and observe the weather.

1. *Draw and label a picture of your observations of weather on two days.*
2. *Make a list of the weather conditions you observed.*
3. *Write how the weather has changed. Write why you think it changed.*

Facilitate the weather observations by circulating among the teams, observing their observation entries and listening to their exchange of ideas. To help students make sense of observations and elaborate on their explanations, ask:

- What have you observed so far?
- How is your observation related to weather?
- What do you mean when you say…?
- Tell me more about what you have drawn or written.

MATERIALS NEEDED

For each student:
student pages

For each group of 4:
On the Same Day Card Set (one card per group)

For the class:
world map

Teacher provides:
chart paper/marker
clipboard
paper
pencil

ESS2.D: WEATHER AND CLIMATE

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

PATTERNS

Patterns of change can be used to make predictions.

TEACHING TIP

To help students recognize changes in weather from day to day or week to week, plan on additional whole-class outings. If possible, choose a day with blustery winds, fog, or light rain so students can engage their senses in weather observations. Plan for outings and weather observations at different times of the day.

ASKING QUESTIONS AND DEFINING PROBLEMS

Asking questions and defining problems in grades 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.

- Use prior knowledge to describe problems that can be solved.
- Identify scientific (testable) and non-scientific (non-testable) questions.
- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause-and-effect relationships.

- How might you learn more about…?
- What are some other possibilities?
- What do you already know about _____ that makes you think that?
- Do you think that if you moved to a different area of the schoolyard you would make the same observation? What makes you think that? How can you find out?
- What information about the weather can you learn if you observe a tree? What makes you think that?
- What information about the weather can you learn if you observe the ground, grass, sky, or sidewalk?
- What questions do you have about your weather observations?

Record any questions the students might generate from their observations and save for Science Talk. Encourage all teams to make observations in different areas of the schoolyard and to observe in an open area and an area under trees or beside the school building.

After students have had sufficient time to make observations, return to the classroom for discussion and raising questions that can be investigated.

Allow sufficient time for each team of students to discuss their observations and finish writing and drawing their initial weather observations on the schoolyard.

When teams have completed their entries, encourage them to collaborate with other teams and discuss and compare their findings. Invite groups to share their discoveries of similarities and differences among observations. Have the students complete the Activity Page in the Student Journal as a collaborative effort.

Science Talk

Conduct a whole-class sharing of their weather observations. Listen for observations that include temperature, cloud cover, precipitation, wind speed, wind direction, and humidity. Record their observations on the board and make tally marks when observations are repeated. Make additions and adjustments to the What We Think chart as the student ideas begin to develop and change.

Write the term *weather* on the board or chart paper. As a class, discuss the meaning of the term and determine a class definition to use throughout the unit. After the class is satisfied with their definition, have them add it to the Key Terms in the Student

Journal. Inform the class that they will revisit their definition as the unit progresses and make adjustments as they gain information.

Display the Internet weather site for your area. Have the students compare their weather observations to the data on the weather site. Discuss the similarities and differences and their ideas of the meaning of the data on the weather report that they were not able to observe. Accept all ideas at this time.

Distribute one card from the *On the Same Day Card Set* to each group of four students. Have the students look at the weather data on the card and compare it with their own data. Demonstrate how to access the weather data from each of the locations on the *On the Same Day Card Set*. Allow time for discussion of the similarities and differences in the weather conditions from area to area. Encourage groups to discuss their early ideas of why the weather differs from one region to another on Earth.

Ask students to share any weather-related questions that may have come up during their discussions and observations. Refer to observations and questions you recorded during your facilitation to help students get started in raising questions.

Example questions:

- What do all the data on the cards, student observations, and Internet site measure?
- What are we measuring when we measure temperature?
- What is the barometric pressure?
- What are clouds and why are they different?
- How do clouds form?
- What are the different forms of precipitation?
- How does water (rain) fall from the sky?
- What is humidity?
- What makes the wind?
- What makes the wind blow at different speeds?
- Why does the wind come from different directions?

Record student-generated questions to use as a reference throughout the unit. Inform the class that they will be comparing the weather data over several weeks from their school data collection and weather data from the locations on their cards. Ask students what they think they can learn through long-term weather data collection.

CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems

- **Construct an explanation of observed relationships.**
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
- Identify the evidence that supports particular points in an explanation.
- ~~Apply scientific ideas to solve design problems.~~

Assessment: Formative

Use the Science Talk and Activity Page to assess the students' initial ideas about how weather conditions vary in different locations and the different climate zones on Earth.

Use the Science Talk and Activity Page to assess the students' ability to raise questions based on observations.

LESSON 1C: COLLECTING AND RECORDING DATA

Advance Preparation

Make copies of the *Weather Observation Log* for each team of students. Each team will have a *Weather Observation Log* to record data for where they live and their location on the *On the Same Day Card Set*. Determine how many days a week the students will look up and record their data in the logs. Daily data entry will require a considerable amount of paper. You may choose to have students record data from both locations two to three days a week.

Prepare six weather stations and label each station with the corresponding *Weather Stations Card Set* card.

Temperature Station: outdoor thermometer, four handheld thermometers

Wind Station: windsock, direction signs, compass

Pressure Station: analog barometer

Cloud Cover Station: *Cloud Cover Card Set*

Weather Recording Station: *Weather Observation Log*

Precipitation Station: rain gauge, metric ruler

Display the *Weather Trackers Observation* chart for use throughout the unit. Have students record the daily weather data using a dry erase marker.

Procedure

Explain the concept and define the terms.
Provide sufficient time for students to review their weather observations from the previous lesson. Make a list of the different weather conditions that the students observed. Check for observations of the air temperature, wind speed and direction, cloud cover, precipitation (if any), or humidity. Ask students what instruments they used to make their weather observations. Review the different senses that helped students complete their observations.

Take this opportunity to discuss what would happen if they went outdoors today and repeated the weather observations. Listen for ideas that some conditions change from day to day and within a day.

Go outside and repeat the weather observations. Enter the second day's observations in the Student Journal (1B) and compare the observations from the previous outing.

MATERIALS NEEDED

For each student:
- student pages
- *Weather Observation Log*

For the class:
- outdoor thermometer
- 4 handheld thermometers
- windsock
- barometer
- signs: North, South, East, West
- compass
- rain gauge
- metric ruler
- *Cloud Cover Card Set*
- *Weather Stations Card Set*
- *On the Same Day Card Set*
- *Weather Trackers Observation Chart*

Teacher provides:
- chart paper
- markers
- dry erase marker for chart

TEACHING TIP

Questioning techniques and a method of record keeping during teacher facilitation of group discussions is key in helping students to develop the ability to reason and justify their ideas with evidence. During facilitation of the instrument stations, carry a clipboard with paper to record key student responses and ideas for elaboration during the whole-group discussion.

SCIENCE TALK

Science Talk is a critical component of science lessons. Science Talk provides an avenue for the exploration of ideas and exchange of points of view, and is intellectually and academically challenging. Science Talk is not an add-on to the lesson and provides academically productive talk that is critical for learning in science. (See Science Talk in the Appendix.)

PLANNING AND CARRYING OUT INVESTIGATIONS

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design.

- **Evaluate appropriate methods and/or tools for collecting data.**
- **Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.**

After the class has shared their observations, ask students for their ideas of how they could use weather observations to help predict weather or create a weather forecast to inform the public about current and future weather conditions. Record their ideas on the What We Think chart.

Divide the class into six groups and have students retrieve their Student Journals. Show the class the weather instrument stations. Explain that within their groups they are to look at each instrument at each station and note in their Student Journals what the instrument measures and how it might be helpful when making weather observations. Allow four to five minutes for each weather instrument station.

Temperature Station: *What weather condition(s) does the thermometer measure?*

How is knowing data collected from the thermometer useful?

Wind Station: *What weather condition(s) does the windsock measure?*

How is knowing data collected from the windsock useful?

What weather condition(s) do the compass and direction signs measure?

How is knowing data collected from the compass and direction signs useful?

Cloud Cover Station: *What weather conditions can be predicted with cloud observations?*

How is knowing the cloud cover useful?

Pressure Station: *What weather condition(s) does the barometer measure?*

How is knowing data collected from the barometer useful?

Precipitation Station: *What weather condition(s) does the rain gauge measure?*

How is knowing data collected from the rain gauge useful?

Weather Recording Station: *How is recording day-to-day weather data useful?*

Facilitate the students' discussions by circulating among the stations, observing their interactions with the instruments and listening to their conversations. To help students make connections among ideas about the weather and the instruments, ask:

- How does that instrument relate to weather observations? What might it tell you? What makes you think that?

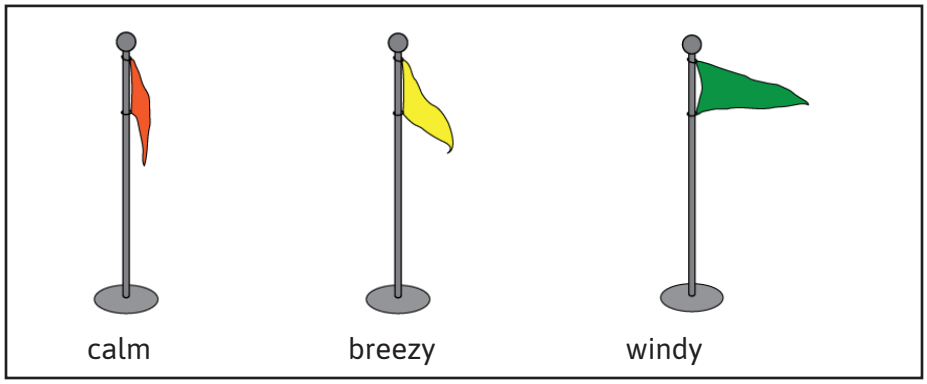
- Can you give me an example of how you might use that instrument? How might it be useful in making weather observations?
- Why do you think that?
- When have you seen a similar instrument?
- How might we find out how that instrument works?

Science Talk
Take this opportunity to allow students to share their initial thinking about the weather instruments and data collection tools from their discussions at the weather stations.

Hold up the thermometer and ask student volunteers to share their entries in the Student Journal about what the thermometer measures when making weather observations. Encourage other students to share their ideas and add to the conversation.

Demonstrate how to read the thermometer and discuss the Fahrenheit and Celsius scales. Inform the class that in the following lessons they will go into greater detail on what each instrument measures and how the different weather conditions develop.

Hold up the windsock. Ask students to share their ideas of the information they can gain from displaying a windsock in the schoolyard. Listen for ideas that relate to wind speed and/or direction. Discuss the use of the direction signs with the windsock. Explain that meteorologists describe wind direction as the direction the wind is coming from. If the windsock is flapping in the wind and pointing toward the north, the wind is coming from the south. Discuss ideas of how the windsock can tell us the speed of the wind. Draw the following diagrams on the board or chart paper.



Calm: the flag is limp and not moving or barely moving.
Breezy: the flag is partway out and moving.
Windy: the flag is straight out and flapping in the wind.

ESS2.D: WEATHER AND CLIMATE
- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

TEACHING TIP
Throughout the unit, find opportunities to take students outdoors and experience weather as well as collect data from instruments. Students may begin to recognize patterns in how the sky appears and air feels to predict future weather events. Patterns may begin to emerge between cloud cover and temperature or wind direction and temperature.

Plan for additional outings to occur at different times of the day.

ANALYZING AND INTERPRETING DATA

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- **Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.**
- **Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.**
- Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.

Continue the sharing of ideas with the remaining weather tools observed in the instrument stations. Ask students for their ideas of why they think it is important to include the observation logs and chart as weather tools.

As a class, discuss the placement of the different instruments for measuring daily weather conditions. Discuss where on the schoolyard each instrument should be placed to get the most accurate measurements: for example, indoors or outdoors, in sunlight or shade, near the building or in the open yard, near grass or pavement. Come to a consensus on the location of the instruments.

Example instrument placement:

Thermometer—sunny location, low enough for students to be able to make an accurate reading.

Windsock—open location, away from buildings, trees, and bushes that may interfere with the speed and direction of the wind.

Rain gauge—open location, away from trees and roof runoff.

Direction signs—near windsock.

Observation logs and chart—in the classroom.

Barometer—in the classroom or a protected area outdoors.

Go outside and place the instruments in the appropriate locations. Conduct a weather data collection practice with the class. Tell students that you would like them to practice reading and recording the measurements of each of the weather instruments on the class *Weather Trackers Observation* chart.

Ask students why it is important to record the time of day on the *Weather Observation Log*. Listen for ideas of changes in temperature, cloud cover, and precipitation throughout the day. After weather data has been collected, ask students to observe once again with their senses and make connections among their observations and the data from the instruments.

Elaborate on the concept.
For the following weeks, assign Weather Tracker teams of students to check one of the weather instruments each day until all teams have taken measurements and recorded the data with each instrument. Explain that each day, the Weather Tracker team will be responsible for entering the data on the *Weather Trackers Observation* chart and for presenting a daily report of their findings.

Allow time for each group to routinely select a person to check the weather for the city from the *On the Same Day Card Set card* and make entries in the *Weather Observation Log*.

Evaluate students' understanding of the concept.
Distribute the *Weather Observation Logs* to each student. Have them make their first entries in the log and record today's weather data. As a class, compare their entries with the weather in their city from the *On the Same Day Card Set*.

Assessment: Formative
Use the Science Talk, Activity Pages, and entries on the *Weather Trackers Observation* chart to assess the students' ability to record weather data and their initial understanding of each weather condition.

OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

- ~~Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.~~
- ~~Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.~~
- ~~Combine information in written text with that contained in corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.~~
- ~~Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.~~
- Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts.

APPENDIX

ENGINEERING DESIGN PROCESS

The Engineering Design Process provides students with a series of steps to guide them as they solve problems and design and test products, models, and solutions. The process is cyclical, yet not necessarily in an order. Students are encouraged to evaluate as they progress through the process, revisit the mission often, and revise thinking and their plan multiple times as the process unfolds.

Engineers do not always follow the Engineering Design Process steps in order, one after another. It is very common to design something, test it, find a problem, and then go back to an earlier step to make a modification or change the design. Engineers must always keep in mind the mission or problem they are trying to solve and the limitations (cost, time, material, etc.) that are part of the solution to the problem. Two key elements in working as an engineer are teamwork and design-test-and-redesign.

Mission
- Defines the problem and what the engineers are trying to design or build.
- Describes the limitations within which the engineers must solve the problem.

Brainstorm Ideas
- Imagine, discuss, and sketch possible solutions.
- Conduct research into what has already been done.
- Discover what materials are available, time frame, and other limitations.

Plan and Design
- Draw and write a plan.
- Design your solution through drawing and manipulating materials.
- Develop a plan or steps and a schedule.

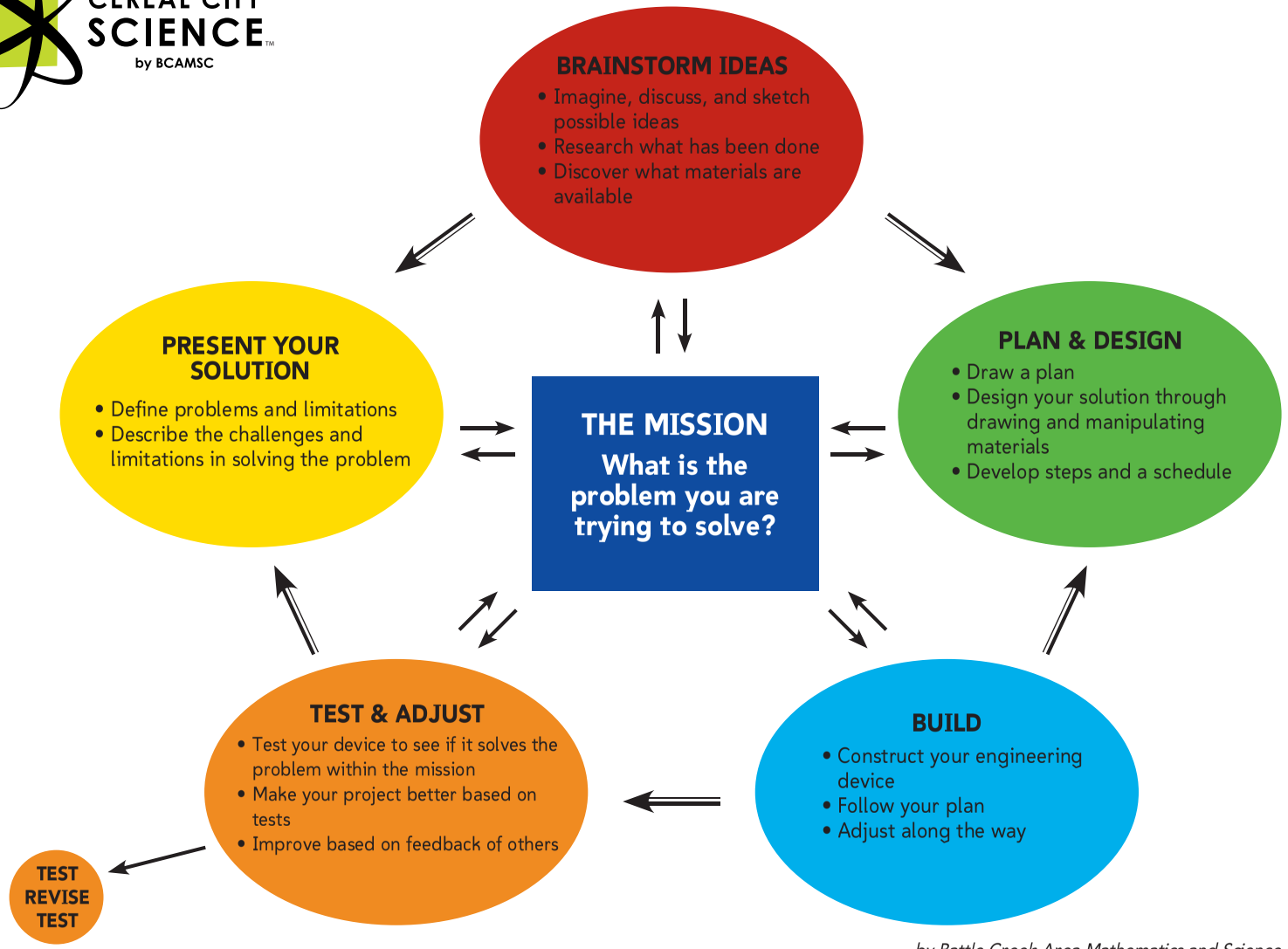
Build
- Construct your engineering device or project.
- Follow your plan.
- Adjust and test along the way.

Test and Adjust
- Test your device to see if it solves the problem within the mission and limitations.
- Make your project better based on tests: Test → Revise → Test.
- Improve based on feedback of others.

Present Your Solution
- Demonstrate how your solution solves the problem.
- Define problems and limitations.
- Describe the challenges and limitations in solving the problem.
- Describe additional revisions that could improve the device or project.

CEREAL CITY SCIENCE™ by BCAMSC

ENGINEERING DESIGN PROCESS



by Battle Creek Area Mathematics and Science Center
Cereal City Science
Adopted from the Carnegie Mellon Robotics Academy

APPENDIX

CEREAL CITY SCIENCE by BCAMSC

Student Journal
3.ES.NGSS

Weather, Climate, & Natural Hazards 3ENG

SECOND EDITION

A third grade unit supporting Next Generation Science Standards
and Michigan Science Standards

Name:_____

Name:_____

ACTIVITY **1A**

Weather Observations

Date:_____

Use the space below to draw a model of your initial ideas of what causes the weather to be different on the same day throughout the world.

Name: _____

Date: _____

1. Your class is exploring how different locations around the world could be experiencing different weather conditions on the same day at the same time. Write what you think causes the different weather conditions to occur. (Hint: Use your group initial model to help you write your answer.)

2. Make a list of questions you could investigate to find out why the different weather conditions occur.

Name:_____

Date:_____

ACTIVITY **1B**

Making Weather Observations

1. Draw and label a picture of your observations of weather on two days.

First Weather Observation
Second Weather Observation

Name: _____

Date: _____

2. Make a list of the weather conditions you observed.

First Weather Observation
Second Weather Observation

3. Write how the weather has changed. Write why you think it changed.

Name:_____

Date:_____

Temperature Station:

What weather condition(s) does the thermometer measure?

How is knowing data collected from the thermometer useful?

Wind Station:

What weather condition(s) does the windsock measure?

How is knowing data collected from the windsock useful?

What weather condition(s) do the compass and direction signs measure?

Name: _____

Date: _____

How is knowing data collected from the compass and direction signs useful?

Cloud Cover Station:
What weather conditions can be predicted with cloud observations?

How is knowing the cloud cover useful?

Pressure Station:
What weather condition(s) does the barometer measure?

How is knowing data collected from the barometer useful?

Name:_____

Date:_____

Precipitation Station:

What weather condition(s) does the rain gauge measure?

How is knowing data collected from the rain gauge useful?

Weather Observation Logs:

How is recording day-to-day weather data useful?

K E Y T E R M S **Name:**_____

Date:_____