

**Belvidere Cluster Wide  
Science Curriculum  
3rd grade  
Updated September, 2018**

**All Belvidere Cluster curriculum and instruction areas are aligned to the New Jersey Student Learning Standards (NJSLs) in accordance with the NJ Department of Education's curriculum implementation requirements.**

**Interdisciplinary Connections**

English Language Arts  
Mathematics  
Social Studies  
Technology  
Visual and Performing Arts

Technology Standards and Integration  
iPads/Chromebooks  
TCI Science  
iXL  
Scholastic Online  
Interactive SmartBoard activities

NJSLA Technology

8.1.2.A.2

Create a document using a word processing application.

8.1.2.A.4

Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).

8.1.P.B.1

Create a story about a picture taken by the student on a digital camera or mobile device.

8.1.P.C.1

Collaborate with peers by participating in interactive digital games or activities.

8.1.2.E.1

Use digital tools and online resources to explore a problem or issue.

**CAREER EDUCATION  
(NJDOE CTE Clusters)**

Education & Training  
Finance  
Information Technology  
Science, Technology, Engineering & Mathematics (STEM)

**21st Century Skills/ Themes**

Global Awareness  
Financial, Economic, Business and Entrepreneurial Literacy  
Civic Literacy  
Health Literacy  
Environmental Literacy  
Creativity and Innovation  
Critical Thinking

Problem Solving  
Communication  
Collaboration  
Information Literacy  
Media Literacy  
ICT (Information, Communication and Technology) Literacy

CRP1. Act as a responsible and contributing citizen and employee.  
CRP2. Apply appropriate academic and technical skills.  
CRP3. Attend to personal health and financial well-being.  
CRP4. Communicate clearly and effectively and with reason.  
CRP5. Consider the environmental, social and economic impacts of decisions.  
CRP6. Demonstrate creativity and innovation.  
CRP7. Employ valid and reliable research strategies.  
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  
CRP9. Model integrity, ethical leadership and effective management.  
CRP10. Plan education and career paths aligned to personal goals.  
CRP11. Use technology to enhance productivity.

### **Integrated Accommodations and Modifications**

#### **Special Education**

Printed copy of board work/notes provided  
Additional time for skill mastery  
Assistive technology  
Behavior management plan  
Center-Based Instruction  
Check work frequently for understanding  
Computer or electronic device utilization  
Extended time on tests/ quizzes  
Have student repeat directions to check for understanding  
Highlighted text visual presentation  
Modified assignment format  
Modified test content  
Modified test format  
Modified test length  
Multiple test sessions  
Multi-sensory presentation  
Preferential seating  
Preview of content, concepts, and vocabulary  
Reduced/shortened written assignments  
Secure attention before giving instruction/directions  
Shortened assignments  
Student working with an assigned partner  
Teacher initiated weekly assignment sheet  
Use open book, study guides, test prototypes  
Cubing activities  
Exploration by interest  
Flexible grouping  
Goal setting with students  
Jigsaw  
Mini workshops to re-teach or extend skills Open-ended activities  
Think-Pair-Share  
Varied supplemental materials

### **ELL**

Allowing students to correct errors (looking for understanding)  
Teaching key aspects of a topic Eliminate nonessential information Using videos, illustrations, pictures, and drawings to explain or clarify  
allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning  
Allowing students to correct errors (looking for understanding)  
Allowing the use of note cards or open-book during testing  
Decreasing the amount of work presented or required  
Having peers take notes or providing a copy of the teacher's notes  
Modifying tests to reflect selected objectives  
Providing study guides  
Reducing the number of answer choices on a multiple choice test  
Tutoring by peers  
Explain/clarify key vocabulary terms

### **At Risk**

Allowing students to correct errors (looking for understanding)  
Teaching key aspects of a topic Eliminate nonessential information allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning  
Allowing students to select from given choices .  
Allowing the use of note cards or open-book during testing  
Collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test  
decreasing the amount of work presented or required .  
Having peers take notes or providing a copy of the teacher's notes  
Marking students' correct and acceptable work, not the mistakes  
Modifying tests to reflect selected objectives  
Providing study guides  
Reducing the number of answer choices on a multiple choice test  
Tutoring by peers  
Using authentic assessments with real-life problem-solving  
Using true/false, matching, or fill in the blank tests in lieu of essay tests  
using videos, illustrations, pictures, and drawings to explain or clarify  
Flexible grouping  
Goal setting with students  
Jigsaw  
Mini workshops to re-teach or extend skills Open-ended activities  
Think-Pair-Share  
Varied supplemental materials

### **Gifted and Talented**

Alternative formative and summative assessments  
Choice boards  
Games and tournaments  
Group investigations  
Independent research and projects Interest groups for real world application  
Learning contracts  
Leveled rubrics

Multiple intelligence options  
Personal agendas  
Project-based learning  
Problem-based learning  
Stations/centers  
Think-Tac-Toes  
Tiered activities/assignments  
Tiered products

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#### **504**

Printed copy of board work/notes provided  
Additional time for skill mastery  
Assistive technology  
Behavior management plan  
Center-Based Instruction  
Check work frequently for understanding  
Computer or electronic device utilization  
Extended time on tests/ quizzes  
Have student repeat directions to check for understanding  
Highlighted text visual presentation  
Modified assignment format  
Modified test content  
Modified test format  
Modified test length  
Multiple test sessions  
Multi-sensory presentation  
Preferential seating  
Preview of content, concepts, and vocabulary  
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Secure attention before giving instruction/directions  
Shortened assignments  
Student working with an assigned partner  
Teacher initiated weekly assignment sheet  
Use open book, study guides, test prototype  
Exploration by interest  
Flexible grouping  
Goal setting with students  
Mini workshops to re-teach or extend skills  
Open-ended activities  
Think-Pair-Share  
Varied supplemental materials

# Grade 3, Science, Unit 1, Weather and Climate

Content Area: **Science**  
Course(s): **Science**  
Time Period: **September**  
Length: **4 weeks**  
Status: **Published**

## Next Generation Science Standards

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SCI.3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
SCI.3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.
SCI.3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
SCI.3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

## Student Learning Objectives

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Students will be able to:

- Develop a model using an analogy, to describe how weather and climate are related.
- Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- Obtain and combine information to describe climates in different regions of the world.
- Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
- Plan and conduct investigations collaboratively to produce evidence to answer a question.
- Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships.
- 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.
- Obtain and combine information from books and other reliable media to explain phenomena.
- Describe how 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.
- Understand climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- Understand a variety of natural hazards result from natural processes.
- Understand humans cannot eliminate natural hazards but can take steps to reduce their impacts.

## Enduring Understanding

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Students will organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merit of a design solution that reduces the impacts of such hazards.

## Essential Questions

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Can we predict the kind of weather that we will see in the spring, summer, autumn, or winter?

How can climates in different regions of the world be described?

How can we protect people from natural hazards such as flooding, fast wind, or lightening?

## Assessment

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### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize"

quadrant, the teacher might say, "List the key concepts just presented."

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

**Reader's Theater:**

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphic organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

## **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

## **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

### **Alternative:**

Self Selected Science Projects  
Extension Projects  
Concept Map

Students who understand the concepts can:

- Identify and test cause-and-effect relationships to explain change.
- 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.
- Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Examples of design solutions to weather related hazards could include: - Barriers to prevent flooding - Wind-resistant roofs - Lightning rods

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and include several criteria for success and constraints on materials, time, or cost.
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

### **Instructional Activities**

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Students will use tools, and resources (both print and digital) to collect weather data. They can use a variety of tools (e.g., thermometers, anemometers, rain gauges) to collect firsthand data and multiple resources (e.g., Weather Bug, NOAA) to gather weather data that has been collected over longer periods of time. Multiple units of measurement (e.g., m, cm, °C, km/hr) should be used when recording weather conditions such as temperature, types and amounts of precipitation, and wind direction and speed. To organize the data they collect, students create graphical displays (bar graphs and pictographs) and tables. Once a sufficient amount of data is collected, students need opportunities to analyze data, looking for patterns of change that can be used to make predictions about typical weather conditions for a particular region and time of year. As they collect and analyze data over time, students learn that certain types of weather tend to occur in a given area and that combinations of weather conditions lead to certain types of weather (e.g., it is always cloudy when it rains or snows, but not all types of clouds bring precipitation).

Students can use trade books and media resources to research types of severe weather hazards and their effects on communities and find examples of how communities solve problems caused by severe weather. As a class, students determine the types of severe weather that are common to the local area and discuss the effects on the community. (Define the problem.) In pairs or small groups, students can research ways that the community reduces the effects of severe weather. (Determine ways in which the problem is solved.) Given criteria, groups can determine how well each solution reduces the effects of severe weather. Groups can also prepare a presentation that:

- Describes the solution that the group thinks is best for reducing the effects of a given type of weather hazard,
- Lists evidence to support their thinking, and
- Lists at least one possible constraint, such as materials, time, or cost.

Make the temperature on a thermometer rise and

fall. <http://www.uen.org/Lessonplan/preview.cgi?LPid=9840>

Students create a wind vane and an anemometer and then use their instruments to observe and record weather data <http://www.uen.org/Lessonplan/preview.cgi?LPid=9844>

[Investigation 5: Severe Weather](http://www.uen.org/Lessonplan/preview.cgi?LPid=10090) (Grades 3-5) <http://www.uen.org/Lessonplan/preview.cgi?LPid=10090>

Students explore web sites to learn about severe weather. While this lesson plan is written for Utah, it can be easily adapted to any state

[Investigation 6: Collecting Weather Data](http://www.uen.org/Lessonplan/preview.cgi?LPid=10092) (Grades 3-

5) <http://www.uen.org/Lessonplan/preview.cgi?LPid=10092>

In this investigation, students collect weather data for two weeks. They will start seeing patterns and be able to make predictions.

[Investigation 7: Interpreting Weather Data](http://www.uen.org/Lessonplan/preview.cgi?LPid=10120) (Grades 3-

5) <http://www.uen.org/Lessonplan/preview.cgi?LPid=10120>

Students graph, compare, and interpret the weather data from [Investigation 6](#).

Students will construct a structure out of drinking straws to see if it can withstand an earthquake. <http://stem-works.com/subjects/8-earthquakes/activities/575>

[Make a Cloud!](http://stem-works.com/subjects/5-extreme-weather/activities/571) <http://stem-works.com/subjects/5-extreme-weather/activities/571>In this experiment, with the help of an adult, students will learn all about clouds. They will create their own, and learn how and why clouds form.

[Make a Barometer](http://stem-works.com/subjects/9-tornados-thunderstorms/activities/553) <http://stem-works.com/subjects/9-tornados-thunderstorms/activities/553>

Children will learn about atmospheric pressures by creating their own barometer. They will be able to observe how different pressures affect their creations.

[3D Flood Simulation](http://stem-works.com/subjects/7-tsunamis-floods/activities/132):<http://stem-works.com/subjects/7-tsunamis-floods/activities/132>

Watch this simulation of a flood to see a behind-the-scenes look at how a flood is initiated from rainfall!

[Make a Thunderstorm](http://stem-works.com/subjects/9-tornados-thunderstorms/activities/246) <http://stem-works.com/subjects/9-tornados-thunderstorms/activities/246>

Children will learn how cold and warm air creates a thunderstorm. All they need is a plastic container, food coloring and ice cubes! The experiment will represent what happens in a real thunderstorm.

## **Interdisciplinary Connections**

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### English Language Arts/Literacy

As students engage in the science described in this unit of study, they use books and other reliable media resources to collect weather and climate information for a given region. They compare information found in two different texts and use information to answer questions about weather and climate. To integrate writing, students can take brief notes as they conduct research and sort evidence into provided categories. Opinion pieces and short research projects should be included to build knowledge about weather and climate.

### Mathematic

Like literacy, mathematics is integrated in a variety of ways. Students use appropriate tools and units of measure when collecting and recording weather and climate data. They model with mathematics when organizing data into scaled bar graphs, pictographs, and tables. Throughout the unit, students reason abstractly and quantitatively as they analyze and compare weather data. They will use that information to answer questions and solve multistep problems.

Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2),(3-ESS3-1) MP.2

Model with mathematics. (3-ESS2-1),(3-ESS2-2), (3-ESS3-1)

MP.4 Use appropriate tools strategically. (3-ESS2-1)

MP.5 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).

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 (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)

3.MD.A.2

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 bar graphs. (3-ESS2-1) 3.MD.B.3

## **Texts and Resources**

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<http://www.state.nj.us/education/modelcurriculum/sci/3u1.pdf>

Scholastic Weather <http://teacher.scholastic.com/activities/wwatch/>

Weather Science content for Kids and Teens: The National Weather Service has several education resources available at this website.

NOAA Education Resources: The National Oceanic and Atmospheric Administration (NOAA) provides education resources at this website.

<http://www.lewis.kyschools.us/guides/docs/Elementary/3rd%20Grade/3rd%20grade%20Science/3rd%20grade%20Weather%20unit%20NGSS.pdf> Third grade unit on weather and climate.

The teacher's guide: lessons on weather. <http://www.theteachersguide.com/Weather.html>

<https://www.teachervision.com/weather/teacher-resources/6675.html> Weather resources for teachers: lesson plans, digital book links, minilessons, printables.

Books:

Weather (National Geographic Readers Series) by Kristin Baird Rattini

What Will the Weather Be? by Linda DeWitt

Magic School Bus Presents Wild Weather by Sean Callery

All About the Weather by Bruce LaFontaine

Why Does It Thunder and Lightening by Darice Bailer

The Best Book of Weather by Simon Adams

Down Comes the Rain by Franklyn Brantley

Flash, Crash, Rumble and Roll by Franklyn Brantley

Hurricane by David Wiesner

Hurricanes by Seymour Simon

List of books: <http://www.startwithabook.org/booklists/weather-report>

## **Grade 3, Science, Unit 2, Force and Motion**

Content Area: **Science**

Course(s): **Science**

Time Period: **October**  
Length: **6 weeks**  
Status: **Published**

## Next Generation Science Standards

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SCI.3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
SCI.3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

## Student Learning Objectives

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Students will be able to:

Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Demonstrate an understanding of the terms force, gravity, friction, and speed

Experiment with the effects of mass and friction on speed and motion

Understand that friction and other forces have an effect on speed and motion

## Enduring Understanding

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Students will be able to determine the effects of balanced and unbalanced forces on the motion of an object.

## Essential Questions

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How do scientists play soccer?

Can we use patterns that we observed to predict the future?

## Assessment

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### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

### Reader's Theater:

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

### **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

### **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

### **Alternative:**

Self Selected Science Projects  
Group Collaboration Projects  
Extension Projects  
Concept Map

Students who understand the concepts are able to:

- Identify cause-and-effect relationships.
- Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence.
- Use fair tests in which variables are controlled and the number of trials considered.
- Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Examples could include: - An unbalanced force on one side of a ball can make it start moving. - Balanced forces pushing on a box from both sides

- Make predictions using patterns of change.
- Make observations and/or measurements to produce data to serve as the basis of evidence for an explanation of a phenomenon.
- Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. Examples of motion with a predictable pattern could include: - A child swinging in a swing. - A ball rolling back and forth in a bowl. - Two children on a seesaw.

## **Instructional Activities**

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**Puffing Forces:** Students will predict and observe what happens when a force is applied to an object and compare the relative effects of a force of the same strength on objects of different weights by using a straw to gently puff air at a ping pong ball then a golf ball and measuring the distance the travels with a ruler. Students will repeat this procedure using a harder puff.

This lesson was adapted from the Utah Education Network

<http://www.uen.org/Lessonplan/preview?LPid=14858>

**Robo Arm:** This fun activity is one of five in a series of space based engineering challenges developed by NASA and Design Squad where students are engaged in implementing the Engineering Design process to build a robotic arm that can lift a cup off a table using cardboard strips, brass fasteners, paper clips, straw, string, tape and a cup. The activity includes an instructor's guide, questioning techniques, discussion questions, extension activity, a rubric, and 3 short video clips that enhance purpose of the activity and its relevance to NASA.

**Marshmallow Shooter:** Students will assemble a marshmallow shooter out of a plastic cup, balloon and heavy tape. All information located on Pinterest.

**Shoe Box Catapult:** Students will assemble a catapult using a shoe box, duct tape, plastic spoon, a rubber band. Students will use a variety of objects having different weights (cotton ball, counter marble, and other small classroom objects) to launch. For safety, students may launch objects outside.

**Investigating Motion:** What causes objects to move? Students will be given a set of everyday objects and asked to make predictions on how far each object will move when they blow on it. They will then measure the distances the objects moved and record their data and observations in their science journals. The observations and/or measurements of the object's motion will then be applied to provide evidence of a pattern that can be used to predict future motion. <http://ngss.nsta.org/Resource.aspx?ResourceID=354>

This article describes a series of easy to implement activities that develop the student's ability to explain what force is, how forces can change the motion of an object, and identify forces acting on

object at rest. It will also enable students to describe what friction is using everyday examples. Although these activities were conducted with a class of fourth grade students, they easily adapted for implementation with third graders. <http://ngss.nsta.org/Resource.aspx?ResourceID=447>

Mystery Forces is a non-fiction selection from Amplify Learning's Seeds of Science, Roots of Reading. The story presents a series of mysterious events, and asks students to be a "force detective" to determine which force (electrostatic, gravity or magnetic) caused the event. Students are engaged in the scientific practice of constructing an explanation based on evidence as they solve each mystery. <http://ngss.nsta.org/Resource.aspx?ResourceID=470>

Force and Motion Study Jams <http://studyjams.scholastic.com/studyjams/jams/science/forces-and-motion/force-and-motion.htm>

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## Interdisciplinary Connections

### English Language Arts

- In order to integrate the NJSL for ELA into this unit, students need opportunities to read content-specific texts to deepen their understanding of force and motion. As they read, teachers should pose questions such as, "What interactions can you identify between the objects in the text?" and "What patterns of motion are described in the text?" Students should be encouraged to answer questions and cite evidence from the text to support their thinking.
- To further support the integration of the ELA standards, students can also conduct short research projects about simple force-and-motion systems and the interactions that occur among forces and objects within the systems. For example, students could be asked to conduct a short study by bouncing a ball 10 times and identifying the patterns they observe. Next students could predict, based on the patterns they saw, what would happen if they bounced the ball 10 more times. Students then could draw a model of the force and motion system, identifying the structures and forces that interact within the system. This would also give students the opportunity to develop note-taking skills and use multiple sources to collect information about force and motion.

### Mathematics

- In order to integrate the Common Core State Standards for Mathematics, students can use measurement tools in a variety of ways to conduct investigations. Students could find the mass of an object in order to understand that the heavier something is, the greater the force needed to cause a change in its motion. Students could use rulers or tape measures to measure the distance an object moves. Student can then record and analyze their data to determine patterns of change and explain cause-and-effect relationships, while reasoning abstractly and quantitatively.

### Technology

Students will create a google slides or powerpoint presentation to demonstrate their understanding of simple machines and force and motion.

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## Texts and Resources

You Tube:

Force and Motion - Bill Nye <https://www.youtube.com/watch?v=8iKhLGK7HGk>

Gravity, Force and Motion <https://www.youtube.com/watch?v=LEs9J2IQIZY>

Force and Motion <https://www.youtube.com/watch?v=xCeaFWIFnk0>

Books:

Forces (Science All Around Me). Karen Bryant-Mole.

Forces and Motion. Lisa Trumbauer.

Forces and Motion: My World of Science. Angela Royston

I Fall Down. Vicki Cobb

The Magic School Bus Plays Ball: A Book about Forces. Joanna Cole

Teaching Science Through Trade Books By Christine Anne Royce, Emily Morgan, Karen Ansberry

Roller Coaster by Maria Frazee

Roller Coaster! Motion and Acceleration

## **Grade 3, Science, Unit 3, Electrical and Magnetic Forces**

Content Area: **Science**  
Course(s): **Science**  
Time Period: **December**  
Length: **4 weeks**  
Status: **Published**

### **Next Generation Science Standards**

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SCI.3-PS2-4  
SCI.3-PS2-3

Define a simple design problem that can be solved by applying scientific ideas about magnets.  
Ask questions to determine cause and effect relationships of electric or magnetic interactions between two

SCI.3-5-ETS1-1

objects not in contact with each other.

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

## Student Learning Objectives

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Students will be able to:

Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

Define a simple design problem that can be solved by applying scientific ideas about magnets.

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) •

Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

## Enduring Understanding

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Students will determine the effects of balanced and unbalanced forces on the motion of an object and the cause-and-effect relationships of electrical or magnetic interactions to define a simple design problem that can be solved with magnets.

## Essential Questions

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What are the relationships between electrical and magnetic forces?

How can we use our understandings about magnets be used to solve problems?

## Assessment

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### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

**Reader's Theater:**

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

### **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

### **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

### **Alternative:**

Self Selected Science Projects  
Extension Projects  
Concept Map

Assessment Questions/Concepts:

Identify and test cause-and-effect relationships in order to explain change.

- Ask questions that can be investigated based on patterns such as cause-and effect relationships.
- Ask questions to determine cause-and-effect relationships in electric or magnetic interactions between two objects not in contact with each other. (Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.)
- Magnetic forces could include: - The force between two permanent magnets; - The force between an electromagnet and steel paperclips; - The force exerted by one magnet versus the force exerted by two magnets.

- Cause-and-effect relationships could include: - How the distance between objects affects the strength of the force - How the orientation of magnets affects the direction of the magnetic force.
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Define a simple design problem that can be solved by applying scientific ideas about magnets (e.g., constructing a latch to keep a door shut or creating a device to keep two moving objects from touching each other).
- Define a simple design problem that can be solved through the development of an object, tool, process, or system, and include several criteria for success and constraints on material, time, or cost.
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

## **Instructional Activities**

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- As a class, create a list of the properties of magnets.
- Brainstorm a list of everyday objects that use magnets, and discuss the function of the magnet(s) in each object. For example, electric can openers have a strong magnet that attaches a can to the device as it cuts through (opens) the top of the can.
- In small groups or pairs, students discuss possible everyday problems that might be solved using magnets. For example, they could construct a latch to keep a door shut.
- As a class, determine possible criteria that might be used to determine how successful the devices might be, and discuss possible constraints (on materials, time, or cost) that might affect each group's design solution.
- Small groups or pairs should have the opportunity to create a presentation (poster, PowerPoint, drawings, or actual physical model, if time permits) to share both the design problem and solution with the class.

[Investigating the Magnetic Force Field: Calculating the Magnetic Pull of a Magnet by Varying Distances](http://ngss.nsta.org/Resource.aspx?ResourceID=28) <http://ngss.nsta.org/Resource.aspx?ResourceID=28>

Students will investigate the magnetic pull of a bar magnet at varying distances with the use of paper clips. Students will hypothesize, conduct the experiment, collect the data, and draw conclusions. As a class, students will then compare each team's data and their interpretation of the results.

Static Cling: <http://ngss.nsta.org/Resource.aspx?ResourceID=82> In this lesson, students will engage in two hands-on investigations to observe the phenomena that occurs when an electrically charged comb interacts cereal and styrofoam pellets. Through these observations, students will begin to establish the cause and effect relationships between two objects not in contact with one another.

## **Interdisciplinary Connections**

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### English Language Arts

Students should be given opportunities to conduct short research projects that build knowledge about electric and magnetic forces. They should be given multiple opportunities to recall and gather information from their investigations as well as from print and digital sources. Students should use that information to answer questions, describe cause-and-effect relationships, make comparisons, and explain interactions between objects when electrical or magnetic forces are involved. Teachers should provide a variety of texts for students to explore in order to develop students' note-taking skills. As students take notes, they should use graphic organizers, such as Venn diagrams and T-charts, to sort supporting evidence into provided categories. For example, as students read a variety of texts about forces, they can take notes and then sort the evidence they collect into categories, such as electrical and magnetic forces.

### Mathematics

Students should use measurement tools in a variety of ways as they conduct investigations. They could find the mass of an object in order to understand that the more mass an object has, the greater the force needed to attract, repel, or move it. Students then reason mathematically as they analyze their data to determine patterns of change that can be used to support explanations of cause-and-effect relationships. Students might also use algebraic reasoning during investigations. For example, when measuring magnetic strength by increasing the number of magnets, students can use multiplication to make predictions about possible outcomes. So, if a paper clip moves toward a single magnet when it is 2 centimeters away, then students might predict that the paper clip will move toward a double magnet when it is 4 centimeters away. Or, if the paper clip moved towards a set of four magnets at a distance of 8 centimeters, then students might predict that the paper clip will move toward a single magnet when it is 2 centimeters away.

## **Texts and Resources**

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<http://www.state.nj.us/education/modelcurriculum/sci/3u3.pdf>

NGSS Hub: Forces and Interactions <http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=11>

Magnetic and Nonmagnetic. Angela Royston. Heinemann (2003). This Heinemann First Library series introduces magnetism by way of everyday situations and objects. It contains colorful photos, as well as activities and questions to encourage further exploration.

Magnets. Karen Bryant-Mole. Heinemann (1998). This non-fiction chapter book explains the basic principles of magnetism

What Makes a Magnet? (Let's-Read-And-Find-Out Science series, Stage 2). Franklyn M. Branley. HarperCollins (1996). Branley explains how magnets work and includes instructions for making a magnet using a magnet and a compass.

Electricity and Magnetism Fundamentals

Author: Robert W. Wood - Illustrated by: Bill Wright

Level: 4-6 - Publisher: McGraw-Hill - Year: 1997 - ISBN: 0-07-071805-9

Description: Provides instructions for a variety of experiments to demonstrate the nature of electricity and magnetism and the relationship between them.

Experiments With Magnets: A New True Book

Author: Helen J. Challand - Illustrated by: ---

Level: 3-6 - Publisher: --- - Year: 1986 - ISBN: 0-516--41279-5

Description: Contains a variety of experiments investigating magnetism with descriptive photographs.

Electricity and Magnetism

Author: Peter Adamczyk, Paul-Francis Law - Illustrated by: ---

Level: 4-6 - Publisher: Usborne Publishing Ltd. - Year: 1993 - ISBN: 0-7460-0994-1

Description: Explains the properties of magnets and examines what electricity really is. Discusses historical breakthroughs as well as developments that will affect our lives in the 21st century

Amazing Magnets

Author: David Adler - Illustrated by: Dan Lawler

Level: 3-6 - Publisher: Troll Associates - Year: 1983 - ISBN: 0-89375-895-9

Description: Includes information and several experiments about magnets and magnetism. Uses a question and answer format.

Electricity

Author: John Clemence, Janet Clemence - Illustrated by: ---

Level: 3-6 - Publisher: Garrett Educational Corporation - Year: 1991 - ISBN: 1-56074-008-6

Description: Gives information on what electricity is and the ways we use it. It also contains a technology project to try

which focuses on making electricity safe.

### Playing With Magnets

Author: Gary Gibson - Illustrated by: Tony Kenyon

Level: 3-6 - Publisher: Copper Beech Books - Year: 1995 - ISBN: 1-5629-4633-1

Description: Contains a selection of exciting hands-on projects to help explain some of the fascinating properties of magnets.

<https://sites.google.com/a/cusdk8.org/kathyyoung/resources/science/physical/book-list> (great list of books recommended by foss)

## Grade 3, Science, Unit 4, Traits

Content Area: **Science**

Course(s): **Science**

Time Period: **Generic Time Periods**

Length: **4 weeks**

Status: **Published**

### Next Generation Science Standards

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SCI.3-LS3-1

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

SCI.3-LS3-2

Use evidence to support the explanation that traits can be influenced by the environment.

### Student Learning Objectives

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Analyze and interpret data to make sense of phenomena using logical reasoning.

Analyze and interpret data to provide evidence that plants and animals have traits inherited

from parents and that variation of these traits exists in a group of similar organisms. Describe how different organisms vary in how they look and function because they have different inherited information.

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

Use evidence (e.g., observations, patterns) to support an explanation.

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

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## Enduring Understanding

Plant and animal traits contribute to their well-being.

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## Essential Questions

*What kinds of traits are passed on from parent to offspring?*

*What environmental factors might influence the traits of a specific organism?*

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## Assessment

### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

**Reader's Theater:**

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

## **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

## **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

## **Alternative:**

Self Selected Science Projects  
Group Collaboration Projects  
Extension Projects  
Concept Map

Students will be able to:

- Identify cause-and-effect relationships in order to explain change.
- Use evidence (e.g., observations, patterns) to support an explanation.
- Use evidence to support the explanation that traits can be influenced by the environment. Examples of the environment's effect on traits could include:

Normally tall plants that grow with insufficient water are stunted.

A pet dog that is given too much food and little exercise may become overweight.

## **Instructional Activities**

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Sort and classify organisms based on similarities and differences in characteristics or traits.

Students can easily observe external traits of animals such as body coverings; type, shape, and number of external features; and type, shape, and color of eyes. Similarly, they can observe external traits of plants such as the type of root system or the shape, color, and average size of leaves. The characteristics that organisms inherit influence how they look and how they function within their environment. As students observe parents and their offspring, they will notice that parents and offspring share many traits. As they observe a larger number of organisms from the same group, they will notice similarities and differences in the traits of individuals within a group. Students can observe similarities and differences in the traits of organisms and use these observations as evidence to support the idea that offspring inherit traits from parents, but these traits do vary within a group of similar organisms.

To investigate how the environment influences traits, students can plant the same type of seedling in different locations, which will provide variations of light, water, or soil. Data can be collected about rates of growth, height, and heartiness of the plant. The information gathered can be analyzed to provide evidence as to how the environment influenced the traits of the plant. As students read about, observe, and discuss these ideas, they learn that even though every organism inherits particular traits from its parents, the environment can have a marked effect on those traits and the development of others.

Use newsela.com article to adjust lexile level. Front load content vocabulary, engage students in independent read, then socratic discussion.

Guppies Galore: Groups of students set up a small freshwater aquarium (made from gallon jars) that feature a male guppy, a female guppy, and a green plant. After the female guppy goes through her pregnancy and gives birth, the students will then observe, over time, the development of the fry into male and female guppies with characteristics similar to the parents. Students measure and plot graphs with collected data. Journal daily changes with description and labeled diagram.

Build Your Own Wild Self - use interactive website to create human self with animal parts. Give justification for use of parts. Compare and Contrast self to one choice animal.

Seed Dispersal <http://www.mbgnet.net/bioplants/seed.html> Explore various seeds and what they stick to, how far they can be carried.

Stomata in a Leaf - use a microscope to observe, clear nail polish over one leaf, preview instructional video: [Finding Stomata](#)

Keeping Seeds Safe: <https://newsela.com/articles/seed-vault/id/12177/>

Monster Genetics: <https://www.teacherspayteachers.com/Product/Monster-Genetics-Traits-and-Heridity-for-Upper-Elementary-1474425>

Teaching Heredity in Elementary School: <https://www.bloglovin.com/blogs/minds-in-bloom-3751870/teaching-heredity-in-elementary-school-3514314609>

Book List:

What Do You Do With a Tail Like This? by Stever Jenkins

The Kids' Family Tree Book by Caroline Leavitt

What Did I Look Like When I was a Baby? Jeanne Willis

## **Interdisciplinary Connections**

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### *English Language Arts*

In order to integrate the NJSLS for English language arts, students will need opportunities to read about inherited traits of animals and plants in a variety of texts and resources. During discussions, teachers might pose questions such as “What kinds of traits are passed on from parent to offspring?” or “What environmental factors might influence the traits of a specific organism?” Students should be able to refer specifically to the text when answering questions, articulate the main idea, and describe the key ideas using supporting details in their explanations. Additionally, they should describe the relationship between scientific ideas or concepts, using language that pertains to time, sequence, and cause and effect.

During this unit, students also need opportunities to write informative/explanatory texts to convey ideas and information gathered through investigations and from other resources. For example, after reading texts about a given organism, students should be expected to use key details and appropriate facts about that organism to compose an informative piece of writing. This piece should list some of the organism’s traits that were passed on from its parents, describe how those traits enable the organism to interact in its environment to meet its needs, and describe any influence the environment has on the organism’s traits. Students should also have the opportunity to report orally on a given topic related to traits and the way they are influenced by the environment. They should share relevant facts, details, and information while speaking clearly and at an understandable pace.

### *Mathematics*

This unit also has connections to the NJSLS for mathematics. Students can use rulers to measure the growth of organisms, then generate and plot the data they collected on line plots, making sure the horizontal scale is marked off in appropriate units (whole numbers, halves, or quarters). For example, students might chart out data in line plots to document the growth (over time) of each of a number of plants grown from a single parent. As students analyze their data, they will observe that the offspring are not the same exact height as each other or as the parent, but that the height of all plants is very similar when the plants are grown under the same conditions. Students might also make similar line plots to compare the same type of plants grown with varying amounts of water or sunlight, then compare these data to the growth data of the parent plant. Analyzing this data will help students understand that environmental factors influence/affect the traits of organisms. As students collect, organize, and analyze their data, they have opportunities to reason abstractly and model with mathematics.

### *Social Studies*

Connect to repercussions of loss of plants in our environment. Research biographies of plant activists over the years, discuss their impact on environment.

## Texts and Resources

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Newela.com

<https://newsela.com/articles/animals-fearvanishing/id/15253/> Lexile 530, 690, 950, 1120

readworks.org

<http://www.buildyourwildself.com/>

<http://www.mbgnet.net/bioplants/adapt.html>

[http://www.calacademy.org:8080/sites/default/files/assets/docs/pdf/361\\_stomataprintingmicroscopeinvestigation.pdf](http://www.calacademy.org:8080/sites/default/files/assets/docs/pdf/361_stomataprintingmicroscopeinvestigation.pdf)

## Grade 3, Science, Unit 5, Continuing the Cycle

Content Area: **Science**

Course(s): **Science**

Time Period: **Generic Time Periods**

Length: **4 weeks**

Status: **Published**

### Student Learning Objectives

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Students will:

Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Develop models to describe phenomena. (3-LS1- 1)

Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Develop understanding that reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3- LS1-1) LS4.B

Develop understanding sometimes the differences in characteristics between individuals of the same species provide advantages in surviving.

SCI.3-LS4-2

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

## Enduring Understanding

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Understanding of the similarities and differences in organisms' life cycles and how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

## Essential Questions

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Do all living things have the same life cycle?  
Are there advantages to being different?

## Assessment

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### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

**Reader's Theater:**

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand

\_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

### **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

### **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

### **Alternative:**

Self Selected Science Projects  
Extension Projects  
Concept Map

*Students who understand the concepts are able to:*

- Identify cause-and-effect relationships in order to explain change.
- Use evidence (e.g., observations, patterns) to construct an explanation.
- Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Examples of cause-and-effect relationships could include:

Plants that have larger thorns than other plants may be less likely to be eaten by predators.

Animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.

## **Instructional Activities**

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The Mystery of Migration ~ Going Home

Book: Going Home: The Mystery of Migration Dawn Publications

Article: When Plants Die Out, People Pay The Price Newsela.com <https://newsela.com/articles/plants-extinct/id/17593/> Frontload content vocabulary, students independently read article (Lexile: 590, 830, 1080, 1210)

Lead Socratic discussion surrounding article.

Plant Adaptations, Smart Plants <http://www.mbgnet.net/bioplants/adapt.html>

[https://www.youtube.com/watch?v=Mbj\\_WQ76F1Q](https://www.youtube.com/watch?v=Mbj_WQ76F1Q)

In third grade, students learn that the changes an organism goes through during its life form an observable pattern.

Although different types of organisms have unique and diverse life cycles, they follow a pattern of birth, growth, reproduction, and death. While observing and studying life cycles, students should look closely for patterns of change and use these observed patterns to make predictions. They should also sort and classify a variety of organisms using

the similarities and differences they observe. For example, flowering plants begin as seeds. With the right conditions, the seeds germinate and grow, from small seedlings to adult plants. Adult plants then produce flowers that, once pollinated, will produce seeds from which the next generation will grow.

Animals, likewise, go through observable patterns of change, which allow students to sort and classify them based on the stages of their life cycles. Some animals, for example, undergo complete metamorphosis; others go through incomplete metamorphosis; while others do not undergo metamorphosis at all. Some animals begin their life cycles with a live birth, while others hatch from eggs. Students should develop models to describe the unique and diverse life cycles of organisms. They can draw diagrams, build physical models, or create presentations to show the patterns of change that make up the life cycles of given organisms. As students become familiar with the stages in the life cycles of different types of plant and animals, they will come to understand that reproduction is essential to the continued existence of every kind of organism.

In **Unit 4: Traits**, students learned that organisms have traits that are inherited from their parents. This process occurs during reproduction. While observing and identifying traits of a specific species or type of organism, students also learned that there are differences in characteristics within the same species. In this unit, students learn that these differences in characteristics among individuals of the same species sometimes provide advantages in survival, finding mates, and reproducing. For example, when comparing plants from the same species, those with larger or more abundant thorns may be less likely to be eaten by a predator. Likewise, animals with better camouflage coloration may be more likely to survive and therefore more likely to leave offspring. As students read about, observe, and discuss variations in organisms' characteristics, they should identify cause-and-effect relationships that help explain why any variation might give an advantage in surviving or reproducing to some members of a species over others.

Guppies Galore: <http://ngss.nsta.org/Resource.aspx?ResourceID=321> Groups of students set up a small freshwater aquarium (made from gallon jars) that feature a male guppy, a female guppy, and a green plant. After the female guppy goes through her pregnancy and gives birth, the students will then observe, over time, the development of the fry into male and female guppies with characteristics similar to the parents.

## **Interdisciplinary Connections**

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### [Let's Hear It For Ladybugs!](#)

This article describes a ladybug life cycle unit that incorporates language arts and science concepts. Students build on their prior knowledge of butterflies as they explore the metamorphosis of ladybugs. To create their final project, clay life cycle models, students synthesize what they learned from live observation and nonfiction texts.

### [Simply Butterflies!](#)

This article gives suggestions for building a simple walk-in classroom butterfly observatory and using the observatory to hatch out Painted Lady butterflies as part of a four-week unit on life cycle stages.

#### *English Language Arts*

Students need opportunities to read about the life cycles and inherited traits of organisms in a variety of texts and resources. During discussions, teachers might pose questions such as

What are the stages of an organism's life cycle?

How do the life cycles of organisms compare?

What makes an organism's life cycle unique?

How do organisms use their characteristics to survive, find mates, and reproduce?

Students need access to a variety of books, pictures, and maps. They should be able to refer to these resources specifically when answering questions, articulating the main idea, and describing the key ideas using supporting details in their explanations. Additionally, they should describe the relationship between scientific ideas or concepts and using language that pertains to time, sequence, and cause and effect.

Students also need opportunities to write informative/explanatory texts to convey ideas and information gathered through investigations and from other resources. For example, after reading texts about a given organism, students should be expected to use key details and appropriate facts about that organism to compose an informative piece of writing that lists some of the organism's traits that might give it an advantage in survival, growth, or reproduction over others of its kind. Students can also use Venn diagrams or T-charts to compare traits among individuals from a common species. These data can be used to explain how variations in characteristics can give an advantage to one or another individual in reproduction, growth, or survival. Students should also have the opportunity to report on how one or more traits of an organism give it an advantage in survival, growth, and/or reproduction in its environment. As students speak, they should share relevant facts, details, and information while speaking clearly and at an understandable pace.

### *Mathematics*

Students can draw scaled picture graphs or bar graphs to represent a data set with several categories, such as the average length of the lifespan of a variety of organisms, which could range from days to hundreds of years, or the varying reproductive capacity of organisms, which could range from a single offspring to thousands. As students analyze their data, they may observe similarities within a category of organisms (e.g., mammals, reptiles, or insects) or marked differences across these same categories. Analyzing data will help students understand that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death. As students collect, organize, and analyze their data, they have opportunities to reason abstractly and model with mathematics.

This article gives suggestions for building a simple walk-in classroom butterfly observatory and using the observatory to hatch out Painted Lady butterflies as part of a four-week unit on life cycle stages.

## **Texts and Resources**

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Teaching Science Through the Trade Books, Royce, Morgan, Ansberry

<https://dawnpub.com/activity-old/home/> Going Home book

<http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=13> (NGSS Hub)

Book: Going Home: The Mystery of Migration Dawn Publications

# **Grade 3, Science, Unit 6, Organisms and the Environment**

Content Area: **Science**

Course(s): **Science**

Time Period: **March**

Length: **6 weeks**

Status: **Published**

## **Next Generation Science Standards**

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SCI.3-LS4-3

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

SCI.3-LS1-1

Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

## **Student Learning Objectives**

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Construct an argument that some animals form groups that help members survive.

Research and describe how a locally indigenous animal lives in groups, how the group is structured, and how it is essential for their survival.

Research and describe how an animal living in a different habitat lives in groups, how the group is structured, and why it is essential for their survival.

Create a presentation utilizing previous research on an animal group.

Construct an argument with evidence that in a particular habitat some organisms can survive well, some

survive less well, and some cannot survive at all.

## Enduring Understanding

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Students will develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

## Essential Questions

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In a particular habitat, why do some organisms survive well, some survive less well, and some not survive at all?

## Assessment

### Formative Assessments:

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled “Predict, Explain, Summarize, Evaluate.” After new material is presented, the teacher spins the spinner and if the spinner lands in the “Summarize” quadrant, the teacher might say, “List the key concepts just presented.”

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

### Reader's Theater:

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

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**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

## **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

## **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

## **Alternative:**

Self Selected Science Projects  
Extension Projects  
Concept Map

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Assessment Questions/concepts:

- Identify cause-and-effect relationships in order to explain change.
- Construct an argument with evidence.
- Construct an argument with evidence (e.g., needs and characteristics of the organisms and habitats involved) that in a particular habitat, some organisms can survive well, some can survive less well, and some cannot survive at all.

Exit Tickets, teacher observation and student self reflection of collaborative work/discussion, teacher created assessments

## **Instructional Activities**

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### [Muskox Maneuvers](#)

In this activity, students create a physical model showing how muskoxen work together as a group to protect their young from predators (wolves).

### [Musk Ox Save Calf from Wolves Video](#)

In this short video, Arctic wolves attack a musk ox calf on Canada's Ellesmere Island, but the herd rushes to its defense by forming a defensive circle around the calves.

### [Insects That Work Together](#)

This nonfiction book summarizes how some insects work together to increase their chances of survival. Details are provided on four types of insects: honeybees, hive wasps (hornets, yellow jackets, and paper wasps), termites, and ants. A short section on insect migration and building a hive model are also included.

### [Battle at Kruger: Water Buffalo Save Calf from Lions Video](#)

This short video captures student imagination and elicits ideas about how groups of organisms work together for survival. The video contains real footage of a pack of lions attack on a water buffalo calf. The footage filmed by amateur tourists features a surprising plot twist (featuring a crocodile), and exciting finale with the water buffalo herd rescues the calf and chases off the lions.

[A Walk in the Desert \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American deserts. It provides detailed information on how plants and animals adapt and survive there.

[A Walk in the Deciduous Forest \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American deciduous forests. It provides detailed information on how plants and animals adapt and survive there.

[A Walk in the Rain Forest \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American rain forests. It provides detailed information on how plants and animals adapt and survive there.

[A Walk in the Prairie \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American prairies. It provides detailed information on how plants and animals adapt and survive there.

[A Walk in the Tundra \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American tundra. It provides detailed information on how plants and animals adapt and survive there.

[A Walk in the Boreal Forest \(Biomes of North America\)](#)

This nonfiction text describes the climate, soil, plants and animals of the North American boreal forests. It provides detailed information on how plants and animals adapt and survive there.

[A Journey into the Ocean \(Biomes of North America\)](#)

This nonfiction text describes the organisms and features of the ocean environment. It provides detailed information on how plants and animals adapt and survive there.

[Journey Into an Estuary \(Biomes of North America\)](#)

This nonfiction text describes the features and plants and animals of North American estuaries. It provides detailed information on how plants and animals adapt and survive there.

-Create KWL chart for an animal locally indigenous. Research group structure, how the group functions, and why working as a group is necessary.

-Students choose additional animal. Research and create presentation detailing group structure and functions.

Social Structures of Animal Groups: Students first learn that all organisms have a variety of behaviors and traits that enable them to survive. One of these behaviors includes forming groups. Groups serve different functions and can vary dramatically in size. Animals may form groups to obtain food, to defend themselves, and/or to cope with changes in their environment. Students should have opportunities to conduct research on animals that form groups in order to understand how being part of a group is beneficial to survival and reproduction. Students begin with studying animals that are indigenous to the local environment (e.g., squirrels, coyotes, deer, birds, or fish), and then investigate other animals of interest, such as (but not limited to) lions, sea turtles, or penguins. For each animal that is studied, students should identify the social structure of the group and how this structure supports individuals in their need to obtain food, defend themselves, and reproduce.

Focus on the roles of males and females within a group as well as the interactions between parents and offspring. Within some groups of animals, the offspring leave the nest or pack early while others remain for longer periods of time. Those that stay within the group for longer periods of time may do so because of the benefits provided by the group structure. Compare group structures of different animals and the functions that define each, they should also think about how the size of the group and the roles of individuals within the group affect the animals' overall ability to obtain food, defend themselves, and reproduce. Students will construct arguments with evidence, using cause-and-effect relationships to show why some animals form groups and how this is advantageous to survival and reproduction.

Understand that for any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. Explore the components of a given environment, learn that each environment has a particular climate as well as finite sources of water and space. Each environment will support organisms (both plants and animals) with structures and behaviors that are best suited to the climate and resources available. Investigate the organisms (plants and animals) that live in certain environments and determine what traits and behaviors allow these organisms to survive and reproduce in that environment. Identify some examples of organisms that would survive less well, or not at all, in that environment, and give evidence to support their thinking. Construct arguments with evidence, using cause-and-effect relationships, to show how the needs and characteristics of the organisms are not well suited for the given

environment.

### **Interdisciplinary Connections**

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English Language Arts Students need opportunities use informational text and other resources to gather information about organisms and the environments in which they live. Students should be able to ask and answer questions to demonstrate understanding of content-specific text and be able to cite evidence from the text to support their thinking. For example, after reading an article about wolves, students ask and answer questions such as: How does being a member of a pack help wolves survive? What characteristics do wolves have that enable them to survive in their environment? What characteristics and resources does the environment have that allow wolves to survive and reproduce in that environment? Students should be able to refer specifically to the text when answering questions, articulating the main idea and describing key details in their explanations. Students also need opportunities to write informative/explanatory texts and opinion pieces with supporting evidence to convey their ideas and understanding of cause-and-effect relationships between the environment and an organism's ability to survive and reproduce. For example, after reading text about a given animal, students should be expected to use key details and appropriate facts about that animal to compose an informative piece of writing that describes the animal's characteristics and behaviors that aid in its survival. Students should also have the opportunity to orally report on a given topic, sharing relevant facts and details while speaking clearly and at a reasonable pace.

Mathematics Students can model with mathematics by graphing the average number of organisms that make up a group among a variety of species. For example, some species live in small groups of six to eight members, while others live in groups that include thousands of organisms. Students will also reason abstractly and quantitatively as they describe and compare these groups and their ability to survive and reproduce in a given environment.

Social Studies connection global mapping of environments.

### **Texts and Resources**

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NJ Model Curriculum <http://www.state.nj.us/education/modelcurriculum/sci/3u6.pdf>

Animal Habitat video - teachertube <http://www.teachertube.com/video/animal-habitats-81306>

Articles:

Biography - <https://www.readworks.org/passages/famous-scientists-robert-hooke>

Plants and Animals Wild Things <https://www.readworks.org/passages/wild-things>

Book List:

[I See a Kookaburra](#) by Steve Jenkins and Robin Page

[DK Eyewitness Ecology](#) by Brian Lane

[I Took a Walk](#) by Henry Cole

[On the Way to the Beach](#) by Henry Cole

# Grade 3, Science, Unit 7, Using Evidence to Understand Change in Environments

Content Area: **Science**  
Course(s): **Science**  
Time Period: **April**  
Length: **6 weeks**  
Status: **Published**

## **Next Generation Science Standards**

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SCI.3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
SCI.3-LS4-1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
SCI.3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

## **Student Learning Objectives**

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Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Create a timeline illustrating the changes in knowledge of dinosaurs and fossils over time.

Describe the changes that take place in the process of a bone becoming a fossil.

Analyze maps and analyze data collected on types of fossils collected from different parts of the world.

Predict and observe changes that take place for plants and animals when the environment changes.

Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

## Enduring Understanding

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Students develop an understanding of the types of organisms that lived long ago and also about the nature of their environments. Students develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

**Environmental changes can cause dramatic effects on organisms.**

## Essential Questions

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What do fossils tell us about the organisms and the environments in which they lived?

What happens to the plants and animals when the environment changes?

## Assessment

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### **Formative Assessments:**

**A-B-C Summaries:** Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

**Debriefing:** A form of reflection immediately following an activity.

**Idea Spinner:** The teacher creates a spinner marked into 4 quadrants and labeled “Predict, Explain, Summarize, Evaluate.” After new material is presented, the teacher spins the spinner and if the spinner lands in the “Summarize” quadrant, the teacher might say, “List the key concepts just presented.”

**Inside-Outside Circle:** Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

**Reader’s Theater:**

**Exit Card:** Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

**Portfolio Check:** Check the progress of a student’s portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student’s achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

**Quiz:** Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

**Journal Entry:** Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

**Choral Response:** In response to a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

**Misconception Check:** Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

**Student Conference:** One on one conversation with students to check their level of understanding.

**3-Minute Pause:** The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

**Observation:** Walk around the classroom and observe students as they work to check for learning.

**Self-Assessment:** A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

**Index Card/Summaries/Questions:** Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

**Hand Signals:** Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand \_\_\_\_\_ and can explain it (e.g., thumbs up). - I do not yet understand \_\_\_\_\_ (e.g., thumbs down). - I'm not completely sure about \_\_\_\_\_ (e.g., wave hand).

**One Minute Essay:** A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

**Analogy Prompt:** Present students with an analogy prompt: (A designated concept, principle, or process) is like \_\_\_\_\_ because \_\_\_\_\_.

**Web or Concept Map:** Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.

<http://www.graphic.org/concept.html>

## **Benchmark:**

ELA Research Based Benchmark  
Interim Assessments

## **Summative:**

End-of- Unit Assessment/ Performance Task  
Culminating Learning Project  
End-of-year Assessment

## **Alternative:**

Self Selected Science Projects  
Extension Projects  
Concept Map

Assessment Questions/concepts:

- Observe that phenomena exist from very short to very long periods of time.
- Analyze and interpret data to make sense of phenomena using logical reasoning.
- Analyze and interpret data from fossils (e.g., type, size, distributions of fossil organisms) to provide evidence of the organisms and the environments in which they lived long ago.
- Describe a system in terms of its components and interactions.
- Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- Examine how fossils are formed
- Understand how fossils provide evidence of plants and animals that lived long ago as well as the environmental conditions at that time
- [Quizlet.com/subject/fossils/](http://quizlet.com/subject/fossils/)

## **Instructional Activities**

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1. Fun with

Fossils Activities [http://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp\\_funfossils/fun-with-fossils/](http://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_funfossils/fun-with-fossils/)

Fossils provide a valuable record of the plant and animal life and environmental conditions from millions, even billions of years ago. In this lesson, students create their own fossils, and then use multimedia

resources to learn how real fossils form and what scientists can learn from them.

2. Paleontologist's Path [https://www.nps.gov/flfo/learn/education/paleontologists\\_path\\_1\\_3.htm](https://www.nps.gov/flfo/learn/education/paleontologists_path_1_3.htm)

3. Students use BrainPOP Jr. resources to explore how a bone becomes a fossil. Students play a sequencing game recounting the steps of fossilization, and then create their own sequencing game.

<https://educators.brainpop.com/lesson-plan/fossilization-sequencing-games-how-bones-become-fossils/>  
<https://jr.brainpop.com/science/land/fossils>

## **Interdisciplinary Connections**

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### ***English Language Arts***

Students use content-specific print and digital sources such as books, articles, and other reliable media to observe and analyze fossils, and they use their observations to describe the types of organisms that lived in the past and characteristics of the environments in which they lived. When using these types of resources, students should determine the main idea and key details and use this information as evidence to support their thinking. They should take notes as they read and observe and use their notes as they write opinion and/or informational/explanatory pieces that convey information and ideas about organisms, both past and present, and their environments. As students discuss and write about the effects of a changing environment on organisms, they should ask and answer questions to demonstrate understanding and should cite evidence from their observations or from texts to support their thinking. Third graders should also have the opportunity to use their work to report on their findings about the effects of a changing environment on organisms living today, as well as those that lived in the past. Students should use appropriate facts and relevant descriptive details as they report out, speaking clearly at an understandable pace.

The Abertaosaurus Mystery Philip Currie's Hunt in the Badlands by T.V. Padma

Resources : <https://sites.google.com/site/namthirdgrade/reading--language-arts/the-albertosaurus-mystery>

### ***Mathematics***

In order to connect the NJSL for mathematics, students generate measurement data using appropriate tools, such as rulers marked with halves and fourths of an inch, and show the data by making a line plot where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. For example, students could make a line plot to show the length of a variety of fossils, then use that data, as well as other observational data, to make comparisons to modern-day organisms and to support their thinking. Questions such as the ones below might be used to guide students' analysis of data.

## **Texts and Resources**

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Model Curriculum <http://www.state.nj.us/education/modelcurriculum/sci/3u7.pdf>

Explorations through Time <http://www.ucmp.berkeley.edu/education/explotime.html>

Fun with Fossils [http://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp\\_funfossils/fun-with-fossils/](http://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_funfossils/fun-with-fossils/)

Picture Books:

Rare Treasure: Mary Anning and Her Remarkable Discoveries by Dan Brown

Big Old Bones by Carol and Donald Carrick

Boy, Were We Wrong About Dinosaurs By Kathleen V. Kudlinski

Bill Nye the Science Guy's Great Big Dinosaur Dig by [Bill Nye](#)

Barnum's Bones: How Barnum Brown Discovered the Most Famous Dinosaur in the World By [Tracey Fern](#)

[Curious About Fossils \(Smithsonian\)](#) by Kate Waters

Monster Bones: The Story of a Dinosaur Fossil (Science Works) by [Jacqui Bailey](#)

When Fish Got Feet, Sharks Got Teeth, and Bugs Began to Swarm: A Cartoon Prehistory of Life Long Before Dinosaurs by [Hannah Bonner](#)

Billions of Years, Amazing Changes: The Story of Evolution by [Laurence Pringle](#)