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

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

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

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

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

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 weatherrelated 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

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 (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 (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 (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/571In 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

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

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

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

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

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

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

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

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

Essential Questions

How do scientists play soccer?

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

Assessment

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

Puffing Forces: Students will predict and observe what happens when a force is applied to an obje and compare the relative effects of a force of the same strength on objects of different weights b 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 develop 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, balloo 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 ou

Investigating Motion: What causes objects to move? Students will be given a set of everyday obje and asked to make predictions on how far each object will move when they blow on it. They will t 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 o 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 adapt 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 Readi 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 engage 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-mot tm

Interdisciplinary Connections

English Language Arts

• In order to integrate the CCSS 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.

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=xCeaFWlFnk0

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

SCI.3-PS2-4	**Define a simple design problem that can be solved by applying scientific ideas about magnets.**
SCI.3-PS2-3	**Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.**
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

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

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

What are the relationships between electrical and magnetic forces?

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

Assessment

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

• Ask questions that can be investigated based on patterns such as cause-andeffect 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

- 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

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

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

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

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

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.

Enduring Understanding

Plant and animal traits contribute to thier well-being.

Essential Questions

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

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

Assessment

spot quick checks: * Think Pair Share * Quick Writes * Quick Draws * Chalkboard Splash * Ranking * * Thumb Up/Down

end of unit teacher created assessments, exit tickets, teacher observation, journaling

- 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 affect 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

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 voaculary, 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 inteactive 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-Heredity-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

English Language Arts

In order to integrate the CCSS 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 CCSS 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 reprocussions of loss of plants in our environment. Reasearch biographies of plant activists over the years, discuss their impact on environment.

Texts and Resources

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

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

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.**
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.**

Enduring Understanding

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

Do all living things have the same life cycle?

Are there advantages to being different?

Assessment

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

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

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

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 life span 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

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

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

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

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

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

Assessment

• 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

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

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

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

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

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

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

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

• 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/

Instructional Activities

1. Fun with
Fossils Activities 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. Palentologist's Path 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

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 CCSS 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

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/

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