

## Curriculum Map: Next Generation Science Grade 2020

Course: EARTH & SPACE SCIENCE Sub-topic: General

Grade(s): None specified

**Course Description:** The performance expectations in third grade help students formulate answers to questions such as: "What is typical weather in different parts of the world and during different times of the year? How can the impact of weather-related hazards be reduced? How do organisms vary in their traits? How are plants, animals, and environments of the past similar or different from current plants, animals, and environments? What happens to organisms when their environment changes? How do equal and unequal forces on an object affect the object? How can magnets be used?" Third grade performance expectations include PS2, LS1, LS2, LS3, LS4, ESS2, and ESS3 Disciplinary Core Ideas from the NRC Framework. Students are able to 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. Students are expected to develop an understanding of the similarities and differences of organisms' life cycles. An understanding that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops, is acquired by students at this level. In addition, students are able to construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Students are expected to develop an understanding of types of organisms that lived long ago and also about the nature of their environments. Third graders are expected to 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. Students are able to determine the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They are then able to apply their understanding of magnetic interactions to define a simple design problem that can be solved with magnets. The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

### Unit: Physical Science-Forces and Interactions

Timeline: August to October

**Month:** September-2nd Week of November (10 weeks)

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

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

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.

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.

**Essential Questions:** How can one explain the structure, properties, and interactions of matter?  
How can one explain and predict interactions between objects within systems?  
How is energy transferred and conserved?

How are waves used to transfer energy and information?

**Content:** Students use system and system models and stability and change to understanding ideas related to why some objects will keep moving and why objects fall to the ground. Students apply Newton's third law of motion to related forces to explain the motion of objects. Students also apply an engineering practice and concept to solve a problem caused when objects collide. The crosscutting concepts of system and system models and stability and change provide a framework for understanding the disciplinary core ideas. Students demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, engaging in argument from evidence, developing and using models, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas

-Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. {Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.} {3-PS2-1}

-The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. {Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.} {3-PS2-2}

**Lessons: Lesson 1- Forces in "Tug of War"**

Students will explore the impact of unbalanced and balanced forces through the game "Tug of War."

ENGAGE: Opening Activity- Access Prior

Learning I Stimulate Interest I Generate Questions

1. Lead students to an area where a large rope is laying in the middle. Arrange students in a fashion so all students are able to see the rope from the same angle.
2. Pose the questions: "Is the rope moving?" (No.) "How can we make the rope move?" {Have students brainstorm ideas of how to make the rope move. They should record their ideas in their science journal.}
3. Facilitate a discussion about the ways we can move the rope. (Based on prior knowledge, the students' answers should include pull the rope and possibly push the rope.) EXPLORE: Lesson Description- Materials Needed I Probing or Clarifying Questions You will begin this lesson by only using one piece of rope (normal "Tug of War" and will transition into "4 Way Tug of War.")
4. Explain that students will be exploring the concept of force using the game "Tug of War." In the game, there needs to be teams of people on each side of the rope.
5. Students will then generate three different possible teams to compete against another team be used in the game and record their ideas in their journal. Each team that they create will be used to answer a testable science question. For example, a student may want to see boys verses girls to test the question "Who is stronger, boys or girls?"
6. The teacher will randomly select students to test their questions. As the student shares the teams they have selected, focus on the question the students are trying to answer. Students may need some help wording their question into a scientific question.
7. The class will then compete in a game of tug of war to test the question. Students should record the results and possible explanation for the result in their science journal.
8. The teacher should select three different situations to have the students test out. EXPLAIN: Concepts Explained and Vocabulary Defined

9. After the students have tested their questions (scenarios) in "Tug of War," the teacher should facilitate discussion. The main focus of the discussion should be that the rope moved in the direction that had the largest force upon it.

10. The teacher should then explain that everything has force upon it. If an object isn't moving, there are balanced forces upon it. The teacher should explain that the rope laying still has equal forces upon it. It has gravity pushing it down to earth while the ground is pushing the rope up. The forces on both ends of the rope are the same since no one is pulling on it. 11. The teacher should then demonstrate that the rope will move when forces become unbalanced. The teacher should then pick up the rope in the middle. The teacher should explain the rope has moved (changed position) because the force of gravity is less than the force exerted by picking up the rope.

12. The teacher should explain that more than one force is always acting on an object. An object will move when there are unbalanced forces. ELABORATE: Applications and Extensions

13. To illustrate more than one force is acting on it, students will play a class game of "Four Way Tug of War." To create this game, the teacher will attach the additional rope by tying a knot in the middle of the rope. Through this activity, students could discover that the merging and combining of teams could help create unbalanced forces and allow the rope to move in the direction of the greater force. EVALUATE: Formative Monitoring (Questioning I Discussion): Students will be making predictions, observations, and asking questions in their student journals. The teacher will also be asking questions and facilitating discussion throughout the entire lesson.

### **Lesson F2- Falling Objects**

Children are introduced to the term, "gravity". By conducting an experiment with a ping pong ball and a golf ball, they explore what effect gravity has on weight.

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

Specific learning Outcomes: Students will understand that gravitational force acts continuously on an object as it falls .

Two objects dropped from the same height should hit the ground at the same time .

All things fall to the ground because of the pull of gravity .

### **Lesson F3- Flicking Force**

Students will predict and observe what happens when force is applied to an object, and compare the relative effects of a force of the same strength on objects of different weights by flicking the ping pong ball then the golf ball gently with a finger and measuring the distance the ball covered with a ruler. Students will repeat this procedure using a harder flick.

This lesson was adapted from the Utah Education Network  
[http://www.uen.org/Lessonj:1lanL\[1review?LPid=14858](http://www.uen.org/Lessonj:1lanL[1review?LPid=14858)

ENGAGE: Opening Activity- Access Prior Learning I Stimulate Interest I Generate Questions  
Access Prior Learning: Have students discuss different sports that are played with balls and a striking force and what they know about force and the motion and direction of the ball. e.g. baseball, badminton, tennis, ping pong, hockey

Generate Questions EXPLORE: Lesson Description- Materials Needed I Probing or Clarifying Questions  
Materials Needed for each pair of students: One ping pong ball, One golf ball, One ruler, Assortment of spherical objects of varying weights

Probing or Clarifying Questions: What effect does the force of the same strength have on objects of different weights?

Instructional Procedures:

1. Instruct students to predict what will happen when an equal force is applied to objects of different weight.
2. Instruct the students to flick the ping pong ball gently with one finger and measure the distance the ball covered.
3. Record the distance on the Force Chart. Repeat for 3 trials.

4. Instruct the students to flick the ping pong ball as hard as possible with one finger and measure the distance the ball covered.
5. Record the distance the ball covered on the Force Chart. Repeat for 3 trials.
6. Repeat steps 2 through 5 using the golf ball. EXPLAIN: Concepts Explained and Vocabulary Defined
7. Using the information recorded on their charts, have students compare data and draw conclusions about force applied to objects and it's outcome in distance and direction the object traveled.
8. Gather students together and discuss what they have discovered.

The following questions may be used to guide the discussion.

\*What did you discover about the ping pong ball as a force in motion?

What did you discover about the golf ball as a force in motion?

\*Which ball produced the greater direction/distance and why?

\*What can you conclude about amount of force and the weight of the object? Use your data to draw conclusions.

\*How would the speed of the object and distance change if the force had increased or decreased in strength? Use your data to draw conclusions.

\*What does weight have to do with force?

9. Allow students time to explore with force applied to objects by having available other spherical objects of varying weights.

10. Guide students in creating a working definition .

11. Introduce Newton's Second Law of Motion- more mass needs a greater force to accelerate. The greater the force applied to an object, the greater the change in speed or direction of the object.

Vocabulary: Inertia, balanced and unbalanced forces

#### **Lesson F4- Pendulum Swing**

Students will plan and conduct an investigation to explore the effects of force on an object in motion.

1. Then discuss/review lesson one concept/outcomes of Newton's First Law of Motion.
2. Watch videos on pendulums to stimulate interest and generate questions:

Foucault Pendulum at the Houston Museum of Natural Science

<http://www.youtube.com/watch?v=nB2SXL YwKkM> lesson was adapted from the Utah Education Network <http://www.uen.org/Lessonplan/preview?LPid=14858>

United Streaming: TEAMS: Force and Motion: Measuring Forces Segment 5 "How do Pendulums Work?" <http://app.discoveryeducation.com/search?Ntt=pendulum&N=18341&N=4294949582&N=4294939062>

EXPLORE: Lesson DescriptionMaterials Needed: For each group: •

Ruler, 2 pieces of masking tape, 2 feet of string, 2" ping pong ball , Lesson 4-Building a Pendulum Paper, Large straw Probing or Clarifying Questions

How does a force applied to an object effect the speed or direction of an object in motion?

Instructional Procedures Explain that students will be building a machine to make observations of an object's motion to provide evidence that a pattern can be used to predict future motion and further explore the effects of force on an object in motion.

Each group is responsible for building a machine and using it to experiment with applying

force to an object in motion.

1. Display the materials and have the students brainstorm ways they can build a pendulum using the materials provided. Guide the children to think about how they can create a pendulum that is attached to a permanent fixture. Explain that all materials must be used and students may NOT hold their pendulum.

2. Once their pendulum is constructed have students refer to Lesson 4 in their journal.

3. Groups predict what will happen when a force acts on the pendulum and write their predictions in their student journal for lesson 4.

4. Groups are to conduct the investigation making sure to document their observations on their worksheets.

Teacher: Asks for justifications (evidence) and clarification from students to provide evidence that a pattern can be used to predict future motion.

Formally provides definitions, explanations, and new labels

Vocabulary: Pendulum, fulcrum point, Inertia, balanced force and unbalanced force

Students: Uses their recorded observations in explanations. Listens critically to others' explanations.

### **Lesson FS Static Electricity**

Students will experiment with static electricity.

Prior Student Knowledge: Students have experienced getting shocks from people when walking across the carpet. Background Information: Rubbing the balloons against your hair and the woolen fabric creates static electricity. This involves negatively charged particles jumping to positively charged objects. When you rub the balloons against your hair or the fabric they become negatively charged, they have taken some of the electrons from the hair/fabric and left them positively charged.

Your positively charged hair is attracted to the negatively charged balloon and it will rise up to meet it. The aluminium can is drawn to the negatively charged balloon. The area near it becomes positively charged and opposites attract.

In the first experiment both the balloons were negatively charged after rubbing them against the woolen fabric. Because of this, they were not attracted to each other.

ENGAGE: Opening Activity- Access Prior Learning I Stimulate Interest I Generate Questions Ask the students, "Have you ever gotten a shock from another person? What caused the shock?" Tell them that they are experiencing static electricity when that happens. Ask children if they can think of any other ways to show the transfer of static electricity. Ask, "What do you think would happen if you rubbed two balloons on a piece of fabric and then put them close together? Would they be attracted to each other or repelled?"

EXPLORE: Lesson Description Instruct the students to follow the steps below:

1. Children write a prediction down in their science journal about what will happen when you place two static electrically charged balloons next to each other.

2. Rub the 2 balloons one by one against the woolen fabric, then try moving the balloons together. Do they want to attract or do they repel each other?

3. Children record a prediction about the effects of rubbing a balloon against their hair.

4. Rub 1 of the balloons back and forth on your hair then slowly pull it away. Have group members observe what happens.

5. Predict what will happen when you place a static electrically charged balloon next to an aluminum can.

6. Put the aluminum can on its side on a table. After rubbing the balloon on your hair again, hold the balloon close to the can and observe what happens. Does it roll towards it or away? Slowly move the balloon away from the can and see what happens.

Materials Needed: Two balloons per group One tin can per group One piece of woolen fabric

per group

Probing or Clarifying Questions: What causes static electricity? What evidence did you see that tells you static electricity is present?

EXPLAIN: Concepts Explained and Vocabulary Defined Rubbing the balloons against your hair and the woolen fabric creates static electricity. This involves negatively charged particles jumping to positively charged objects. When you rub the balloons against your hair or the fabric they become negatively charged, they have taken some of the electrons from the hair/fabric and left them positively charged. Your positively charged hair is attracted to the negatively charged balloon and it starts to rise up to meet it. The aluminum can is drawn to the negatively charged balloon. The area near it becomes positively charged and opposites attract. In the first experiment both the balloons were negatively charged after rubbing them against the woolen fabric. Because of this, they were not attracted to each other.

**Vocabulary:** Acceleration  
Design  
Direction  
Force  
Gravity  
Investigation  
Motion  
Net Force  
Net Zero  
Pattern  
Predict  
Prediction  
Speed  
Systems  
Unbalanced forces  
Velocity

**Topic: 3rd Grade – Topic Model – Bundle 1 Organism Traits**

Minutes for Topic: 45

**Topic:**

**Topic: Lesson 1**

**Core Lesson  
Essential  
Questions:**

How can one explain the structure, properties, and interactions of matter?

**Core Lesson Big  
Ideas:**

Matter can be understood in terms of the types of atoms present and the interactions both between and within atoms.

**Topic: Lesson 2**

**Core Lesson Description:** Each force acts on one particular object and has both strength and a direction. (PS2.A)

**Core Lesson Student Learning Objectives:** Students will investigate the variables that may affect how objects move across a floor, down a ramp, etc. (3-PS2-1)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Acceleration  
Force  
Speed  
Velocity

### Topic: Lesson 3

**Core Lesson Description:** An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. (PS2.A)

**Core Lesson Student Learning Objectives:** Students will construct an explanation for why an object subjected to multiple pushes and pulls might stay in one place or move. (3-PS2-1)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Systems

### Topic: Lesson 4

**Core Lesson Description:** Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (PS2.A)

**Core Lesson Student Learning Objectives:** Students will, through the use of objects, design an investigation and demonstrate that forces can cause changes on an object's speed or direction of motion. (3-PS2-1)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Design  
Direction  
Investigation

Motion

Speed

**Topic: Lesson 5**

**Core Lesson Description:** Patterns of an object's motion in various situations can be observed and measured. (PS2.A)

**Core Lesson Student Learning Objectives:** Students will take measurements of objects in motion and represent the movement of objects in multiple representations. (3-PS2-1)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Motion  
Net Zero  
Pattern  
Prediction

**Topic: Lesson 6**

**Core Lesson Description:** When past motion exhibits a regular pattern, future motion can be prediction from it. (PS2.A)

**Core Lesson Student Learning Objectives:** Students will investigate the motion of objects to determine observable and measurable patterns to predict future motions. (3-PS2-2)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Force  
Gravity  
Net force  
Pattern  
Predict

**Topic: Lesson 7**

**Core Lesson Description:** When past motion exhibits a regular pattern, future motion can be predicted from it. (PS2.A)

**Core Lesson**

**Student Learning Objectives:** Students will provide evidence that a pattern can be used to predict future motion. (3-PS2-2)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

**Core Lesson Key Terminology & Definitions:** Force  
Pattern

#### Topic: Lesson 8

**Core Lesson Description:** Objects in contact exert forces on each other. (PS2.B)

**Core Lesson Student Learning Objectives:** Students will design and implement an investigation to demonstrate that objects in contact exert forces on each other. (3-PS2-1)

**Core Lesson Essential Questions:** How can one explain and predict interactions between objects within systems?

**Core Lesson Big Ideas:** Interactions between any two objects can cause changes in one or both.

#### Topic:

#### Topic: Lesson 9

**Core Lesson Essential Questions:** How is energy transferred and conserved?

**Core Lesson Big Ideas:** Interactions of objects or systems can be predicted and explained using the concept of energy transfer and conservation.

#### Topic: Lesson 10

**Core Lesson Essential Questions:** How are waves used to transfer energy and information?

**Core Lesson Big Ideas:** Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.

### Unit: Life Science-Inheritance and Variation of Traits: Life Cycles and Traits and Interdependent Relationships in Ecosystems

**Month:** 2nd Week of November-Middle of April (17 weeks)

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

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.

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

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.

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

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

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.

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.

**Essential Questions:**

How do organisms live, grow, respond to their environment, and respond?

How and why do organisms interact with their environment and what are the effects of these interactions?

How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?

How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Vocabulary:**

Adapt

Basic needs

Characteristics

Consumer

Endangered

Environment

Environmental

Evidence

Extinct

Factors

Fossil

Fossil record

Generation

Habitat

Heterotroph

Influence

Inheritance

Inherited

Life cycle

Living

Miscoscopic

Non-Living  
Offspring  
Organism  
Parents  
Populations  
Representation  
Reproduce  
Siblings  
Stable  
Survival  
Traits  
Variation  
Visible

**Topic: Lesson 1**

Minutes for Topic: 45

**Core Lesson Description:** Reproduction is essential to the continued existence of every kind of organisms. (LS1.B)

**Core Lesson Student Learning Objectives:** Students will use models to explain how reproduction is essential for every kind of organism. (3-LS1-1)

**Core Lesson Essential Questions:** How do organisms live, grow, and respond to their environment and reproduce?

**Core Lesson Big Ideas:** All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

**Core Lesson Key Terminology & Definitions:** Life cycle  
Offspring  
Parents  
Reproduce  
Survival

**Topic: Lesson 2**

Minutes for Topic: 45

**Core Lesson Description:** Plants and animals have unique and diverse life cycles that include birth, growth, reproduction, and death. (LS1.B)

**Core Lesson Student Learning Objectives:** Students will develop a model to describe the commonalities of life cycles of different organisms. (3-LS2-1)

**Core Lesson**

**Essential Questions:** How do organisms live, grow, and respond to their environment and reproduce?

**Core Lesson Big Ideas:** All organisms are made of cells and can be characterized by common aspects of their structure and functioning.

**Core Lesson Key Terminology & Definitions:** Life cycle  
Offspring  
Parents  
Reproduce  
Survival

**Topic:**

**Topic: Lesson 3**

**Core Lesson Description:** Animals depend on each other and their surroundings to get what they need, including food, water, shelter, and a stable temperature. Groups serve different functions and vary in size. (LS2.D)

**Core Lesson Student Learning Objectives:** Students will (based on observations) construct an argument that some animals form groups that help members survive. (3-LS2-1).

**Core Lesson Essential Questions:** How and why do organisms interact with these environment and what are the effects of these interactions?

**Core Lesson Big Ideas:** Organisms grow, reproduce, and perpetuate their species by obtaining necessary resources through interdependent relationships with other organisms ad the physical environment.

**Core Lesson Key Terminology & Definitions:** Basic needs  
Consumer  
Heterotroph  
Representation  
Stable

**Topic: Lesson 4**

**Core Lesson Description:** When the environment changes in physical characteristics, temperature, availability of resources, some organisms survive, others move, yet others may die. (LS4.C).

**Core Lesson Student Learning Objectives:** Students will construct an argument with evidence that within a specific habitat, some organisms survive well, some not so well, and others cannot survive at all. (3-LS4-3).

**Core Lesson Essential Questions:** How and why do organisms interact with their environment and what are the effects of these interations?

**Core Lesson Big Ideas:** Organisms grow, reproduce, and perpetuate their species by obtaining necessary resources through interdependent relationships with other organisms and the physical environment.

**Topic: Lesson 5**

<b>Core Lesson Description:</b>	Different organisms vary in how they look and function because they have different inherited information. (LS3.B).
<b>Core Lesson Student Learning Objectives:</b>	Students will 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. (3-LS3-1; 3-LS3-2)
<b>Core Lesson Essential Questions:</b>	How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?
<b>Core Lesson Big Ideas:</b>	Heredity refers to specific mechanisms by which characteristics or traits are passed from one generation to the next via genes, and explains why offspring resemble, but are not identical to, their parents.
<b>Core Lesson Key Terminology &amp; Definitions:</b>	Inheritance Traits

**Topic: Lesson 6**

<b>Core Lesson Description:</b>	The environment also effects the traits that an organism develops. (LS3.B).
<b>Core Lesson Student Learning Objectives:</b>	Students will use evidence to support an explanation that the environment can influence traits. (3-LS3-2).
<b>Core Lesson Essential Questions:</b>	How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?
<b>Core Lesson Big Ideas:</b>	Heredity refers to specific mechanisms by which characteristics or traits are passed from one generation to the next via genes, and explains why offspring resemble, but are not identical to, their parents.

**Topic: Lesson 7**

<b>Core Lesson Description:</b>	Many characteristics involve both inherited traits and environmental factors. (LS3.B)
<b>Core Lesson Student Learning Objectives:</b>	Students will use evidence to compare characteristics inherited from parents, characteristics caused by the environment, and those resulting from both. (3-LS3-1; 3-LS3-2)
<b>Core Lesson Essential Questions:</b>	How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?
<b>Core Lesson Big Ideas:</b>	Heredity refers to specific mechanisms by which characteristics or traits are passed from one generation to the next via genes, and explains why offspring resemble, are not identical to their parents.
<b>Core Lesson Key Terminology &amp; Definitions:</b>	Characteristics Environmental Factors Generation Inherited Siblings Traits

Variation

**Topic: Lesson 8**

- Core Lesson Description:** Some plants and animals that once lived on earth are no longer found anywhere. (LS4.A)
- Core Lesson Student Learning Objectives:** Students will analyze and interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago. (3-LS4-1)
- Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?
- Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.
- Core Lesson Key Terminology & Definitions:** Extinct  
Fossils

**Topic: Lesson 9**

- Core Lesson Description:** Fossils provide evidence about types of organisms that lived long ago as well as about the nature of the environment. (LS4.A)
- Core Lesson Student Learning Objectives:** Students will analyze and interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago. (3-LS4-1)
- Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?
- Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.
- Core Lesson Key Terminology & Definitions:** Extinct  
Fossils

**Topic: Lesson 10**

- Core Lesson Description:** Changes in an organism's habitat can be beneficial or harmful to the organism. (LS4.D)
- Core Lesson Student Learning Objectives:** Students will use evidence to argue that when the environment changes in ways that affect a place's physical characteristics, organisms may survive, move to a new location, or die. (3-LS4-3)
- Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?
- Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Adapt  
Endangered  
Habitat

**Topic: Lesson 11**

**Core Lesson Description:** Populations live in a variety of habitats and changes in those habitats impacts the organisms living there. (LS4.D)

**Core Lesson Student Learning Objectives:** Students will use evidence and make a claim about merits of solutions to problems caused when the environment changes and types of animals and plants that live there may change. (3-LS-4-4)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Habitats  
Populations

**Topic: Lesson 12**

**Core Lesson Description:** Sometimes differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

**Core Lesson Student Learning Objectives:** Students will 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.

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Topic: Lesson 13**

**Core Lesson Description:** Fossils provide evidence about the types of organisms (both visible and microscopic) that lived long ago and also about the nature of their environments (LS4.A)

**Core Lesson Student Learning Objectives:** Students will use evidence to construct an explanation that some rocks and minerals record the remains of organisms. (3-LS4-1)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key** Fossils

**Terminology & Definitions:** Microscopic

**Topic: Lesson 14**

**Core Lesson Description:** Fossils provide evidence about the types of organisms (both visible and microscopic) that lived long ago and also about the nature of their environments. (LS4.A)

**Core Lesson Student Learning Objectives:** Students will obtain and communicate information that some organisms that one lived on earth are no longer found anywhere, although other organisms now may resemble them. (3-LS4-1)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Microscopic organism  
Organism  
Visible Organism

**Topic: Lesson 15**

**Core Lesson Description:** Fossils can be compared with one another and to living organisms according to their similarities and differences. (LS4.A)

**Core Lesson Student Learning Objectives:** Students will use evidence from fossil records to construct an explanation of the relationship between types of organisms living today and types of organisms that lived in the past. (3-LS4-4)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Explanation  
Fossil record

**Topic: Lesson 16**

**Core Lesson Description:** Fossils can be compared with one another and to living organisms according to their similarities and differences. (LS4.B)

**Core Lesson Student Learning Objectives:** Students will use evidence to construct explanations for how environments today may be different from past environments in which fossilized organisms once lived. (3-LS4-4)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the

**Ideas:** history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Fossil

**Topic: Lesson 17**

**Core Lesson Description:** Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (LS4.B)

**Core Lesson Student Learning Objectives:** Students will use evidence to explain how some characteristics that vary among individuals of the same kind of organism can provide advantages to survive, find mates, and reproduce. (3-LS4-2)

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Reproduce  
Survive

**Topic: Lesson 18**

**Core Lesson Description:** Humans, like all other organisms, obtain living and nonliving resources from their environments.

**Core Lesson Student Learning Objectives:** Students will use evidence to demonstrate how humans, like all other organisms, obtain living and non-living resources from their environment.

**Core Lesson Essential Questions:** How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?

**Core Lesson Big Ideas:** Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.

**Core Lesson Key Terminology & Definitions:** Living  
Non-Living

**Unit: Earth and Space Science-Weather and Climate- Earth's Systems**

**Month:** Middle of April-May (5 Weeks)

**Skills:** Represent data in table 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.

**Essential Questions:** What is the universe and what is Earth's place in it?  
How and why is Earth constantly changing?  
How do Earth's processes and human activities affect each other?

**Content:** In this unit of study, students 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. The crosscutting concepts of patterns, cause and effect, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in asking questions and defining problems, analyzing and interpreting data, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

**Vocabulary:** Atmosphere  
Climate  
Conditions  
Data  
Weather

**Topic:**

**Topic: Lesson 1**

**Core Lesson Essential Questions:** What is the universe, and what is Earth's place in it?

**Core Lesson Big Ideas:** The universe is composed of a variety of different objects, which are organized into systems each of, which develops according to accepted physical processes and laws.

**Topic: Lesson 2**

**Core Lesson Description:** Scientists record patterns of the weather across different times and areas of the weather so that they can make predictions about what kind of weather might happen next. (ESS2.D)

**Core Lesson Student Learning Objectives:** Students will organize simple weather data sets to record local weather data and identify day-to-day variations, as well as, long-term patterns of weather. (3-ESS2-1)

**Core Lesson Essential Questions:** How and why is Earth constantly changing?

**Core Lesson Big Ideas:** The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.

**Core Lesson Key Terminology & Definitions:** Atmosphere  
Data  
Weather

**Topic: Lesson 3**

- Core Lesson Description:** Climate describes a ranges of an area's typical weather conditions and the extent to which those conditions vary over a period of many years. (ESS2.D)
- Core Lesson Student Learning Objectives:** Students will record and communicate information to describe climates in different regions of the world. (3-ESS2-2)
- Core Lesson Essential Questions:** How and why is Earth constantly changing?
- Core Lesson Big Ideas:** The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere,biosphere) that interact over a wide range of temporal and spatial scales.
- Core Lesson Key Terminology & Definitions:** Climate  
Conditions  
Weather

**Topic: Lesson 4**

- Core Lesson Description:** Climate describes a ranges of an area's typical weather conditions and the extent to which those conditions vary over a period of many years. (ESS2.D)
- Core Lesson Student Learning Objectives:** Display simple data sets in tables and graphs to display previous weather conditions to make predictions for future seasons. (3-ESS2-2)
- Core Lesson Essential Questions:** How and why is Earth constantly changing?
- Core Lesson Big Ideas:** The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere,biosphere) that interact over a wide range of temporal and spatial scales.
- Core Lesson Key Terminology & Definitions:** Climate  
Weather

**Topic: Lesson 5**

- Core Lesson Essential Questions:** How do Earth's processes and human activities affect each other?
- Core Lesson Big Ideas:** How do Earth's processes and human activities affect each other?