Unit 1 Topic/Storyline: Motion and Stability	Grade 3	Days: 18

Question:

How do unbalanced and balanced forces such as gravity, friction, and magnetism affect my life and cause objects around me to move?

Essential Questions:

1. What is a force?
2. What is the difference between an unbalanced and a balanced force?
3. Why do some forces require two objects to touch, while others do not (magnetism)?
4. What causes an object to move?
5. How can I predict how an object will move?
6. How do “unseen” forces (i.e. friction, gravity, wind resistance) impact our lives?
7. How does understanding how magnets attract (pull) and repel (push) other objects help us?

Enduring Understandings

- Motion is caused by a push or a pull. A push or pull is called a force. An object can be set in motion by forces that come from direct contact, moving air, magnets or by gravity pulling it down toward the earth. Pushes and pulls can start motion, stop motion, speed it up, slow it down or change its direction.
- A magnet’s push or pull can cause a magnetic object or another magnet to move without direct contact. The strength of a magnet’s attractive force can be measured by recording the number or mass of the objects it attracts or the distance.
- The greater the force, the greater the change in motion.
- The amount of force needed to move (accelerate) an object is related to the object’s mass. The greater the object’s mass, the greater the force needed to move it, stop it or change its speed or direction.
- When an object does not move in response to a push or a pull, it is because another equal-sized force, such as gravity or friction, is counteracting the push or pull. Gravity (the Earth’s pulling force) and friction (the force between two surfaces) are common forces that work against motion.
- Different forces are responsible for the transfer of the different forms of energy (namely kinetic and potential).

Storyline Narrative / Big Ideas:

This introductory unit on forces will give students a new understanding of the invisible pushes and pulls that operate in the world around them. They will gain a very basic understanding of Newton’s Three Laws of Motion, which involve concepts such as inertia, momentum, and acceleration.

In addition, students learn to determine the effects of balanced and unbalanced forces on the motion of an object as well as the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

What students learn in this unit will connect to the world around them, leading them to think about such things as the force of friction as they slide down a playground slide, how forces acting on an object can affect the object's motion, or the invisible force that makes magnets cling to certain objects / surfaces. Hands-on activities focus on engineering, investigation, and discovery.
Key Words: force, motion, rest, push, pull, potential energy, kinetic energy, Newton's Laws, gravity, magnetism, friction, pendulum, swing, circular motion, inertia

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Asking Questions and Defining Problems: Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. ● 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) **Planning and Carrying Out Investigations:** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)	**S2.A: Forces and Motion** 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.) 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.) **PS2.B: Types of Interactions** Objects in contact exert	**Patterns:** Patterns of change can be used to make predictions. **Cause and Effect:** Cause and effect relationships are routinely identified. Cause and effect relationships are routinely identified, tested, and used to explain change.

• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)	forces on each other. (3-PS2-1) Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.	

Consolidated Supply List -
Science Notebook, pen/pencils, rulers, scissors, stiff cardboard (needs to measure at least 12" by 16"), different sized rubber bands, styrofoam or craft foam, sandpaper, glue/tape, 30 buttons, 84 pennies (or metal bottle caps), 2 feet of string, 2in ball, 15 marbles, popsicle sticks, large straws, yard/meter stick, large cardboard pieces, toilet paper tubes, wrapping paper tubes, paper towel tubes, marbles, chipboard, paper plates, round magnets (2 per student), paper clips, plastic cups

Episode 1
Engage/Elicit Ideas
Days: 2

Lessons	Resources
Lesson 1: Phenomenon **Gather:** Explain to students that today they will be watching a video of a roller coaster as their anchor phenomenon. **Reason:** Explain that there are a lot of forces that are involved in roller coasters, and they will be learning more in detail about them throughout the unit. **Communicate:** In your science notebook, jot down some ideas you had about the roller coaster's motion. What did you notice? What do you wonder? Chart Noticings / Wonderings on chart paper. **Lesson 2: Introduce forces by using Newton's Cradle.** If you don't have access to a Newton's cradle, use a video of one. **Gather:** Take one of the spheres on the end of the cradle, lift it up high, and drop it down. Ask students to draw observations of what happens in their science notebook. If you feel students need more guidance, use a beginning,	Episode Supply List: Phenomenon powerpoint with video of Nitro at Six Flags Great Adventure Newton's cradle Beginning, middle end graphic organizer

middle end graphic organizer **Reason:** After students draw a picture, ask students to try and explain in words what is happening to the other spheres once the sphere on the end hits it. (What is actually happening is that the force from the one ball is being transferred to the other balls as they touch each other, causing the last ball to swing upward) Ask guiding questions such as: “Who wants to try and explain what they think is happening?” “What do you think causes the sphere on the opposite end to move?” “Do you think a force can be transferred from one object to the next?” Then, pick up two spheres together and drop two at the same time. Allow students to observe what happens, and draw it in their science notebook (the two spheres on the opposite end will lift up) **Communicate:** Ask students what to predict what will happen when you lift up three spheres and allow them to all fall at the same time. Students will draw an explain their predictions in their science notebooks. If time allows, as if students can think up any similarities between the roller coaster and Newton’s cradle. Have students brainstorm a list of questions that they have about how this works. The teacher will chart the questions on the board. (Newton’s Cradle proves that Newton’s 3rd Law (For every action, there is an equal and opposite reaction) is true. Keep referring back to Newton’s cradle throughout the unit as students learn about Newton’s 3rd Law, kinetic energy (what starts as potential energy is transferred to kinetic energy as energy is transferred from one sphere to another as the energy moves down the line), potential energy (When the spheres are raised before they drop, they have potential energy - just like a roller coaster at the top of the hill), and that a force can be transferred from one object to another.	
Episode 2 **Explore** Days: 6	
Lessons	Resources

Lesson 1: Balanced and Unbalanced Forces Experiment (Will take two days) **Day 1:** **Gather:** Gather the students on the carpet and explain that they will be learning about balanced and unbalanced forces by thinking about the game "Tug of War." **Reason:** What do we know about the game "Tug of War?" What causes a team to win or lose? Show students the Mystery Science video "How can you win a game of tug of war against adults" (part 1: Exploration). **Communicate:** Have students write down their ideas in their science notebook. Use this possible recording sheet. - Either students can all use this recording sheet, or the teacher can use it under the document camera to chart the students ideas. Here's a sample recording sheet with some really great ideas that the students came up with on how to make the students win against adults. -How do you win the game Tug of War? -How do you lose the game Tug of War? -What causes a team to win or lose? -How do you think this applies to balanced or unbalanced forces? **Make sure to stop the videos before the "Hopper Popper" hands on activity - they will do that the following day. **Day 2: Experiment: Creating and Experimenting with "Hopper Poppers"** **Gather:** Gather the students on the carpet and review their ideas from the previous day. Introduce the Mystery Science Experiment and walk students through the construction and experimentation of "Hopper Poppers." Have students work in partnerships to experiment with their poppers. **Reason:** Have partnerships discuss: How did the rubber band affect the popper in this experiment? How did it act as a force? **Communicate:** How did this experiment relate back to the tug of war game? What does it show us about	Episode Supply List: Balanced and Unbalanced Forces Supplies: High Hop Scorecard Hopper Popper Teacher Tips Launch Pad Printout Pen Rulers Scissors Chipboard (or recycled cardboard) Rubber Bands (different sizes and thicknesses, or hair ties) Science Notebook Tug of War Recording Sheet Experiment 2: Friction and Pattern of Motion: Friction Investigation Worksheet Rulers Chipboard (or cardboard for "slides" Foam (styrofoam) Glue / Tape Buttons Pennies (to be used as weights on "sliders") Hardcover books (to create incline) Science Notebook Experiment 3: Force and Motion Ruler Tape 2 feet of string 2in ball Rock A Bye Pendulum Worksheet Marble Popsicle Sticks Large Straw Yard or Meter Stick Science Notebook Possible extension: Newton's 2nd Law virtual simulation https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

balanced and unbalanced forces? Have students discuss then reflect in their science notebooks. *Possible extension:* Play a game of tug of war! **Lesson 2: Friction and Pattern of Motion** Experiment: How Can you Go Faster Down a Slide? **Day 1: Introduction to the Experiment** **Gather:** Gather the students on the carpet and explain that we are going to explore slides and how we can make people go slower or faster down a slide. Show the video (part 1 - about 15 mins) in the Mystery Science Lesson. Stop to discuss the questions posed by the narrator. Stop the video at the "natural stopping point." **By this time, students will have looked at their materials and made some theories based on what they learned in the phenomenon videos - this is a natural stopping point, giving time for students to reflect on their ideas.* **Reason:** Discuss: What is your idea? How do you think you can go faster down a slide WITHOUT making it steeper? **Communicate:** Draw a diagram in your science notebook of your idea. Challenge! Try to use the vocabulary words introduced in the lesson: friction, gravity. **Day 2: Experimentation** **Gather:** Bring students to the carpet and pose the question: -What ideas did you have from yesterday's time working with your materials? How do you and your group think you can make your object go down the slide faster? **Go through the steps and complete the experiment with trails.** Friction Investigation! Work with your groupmates to experiment what makes the "sliders" go fastest. **Reason:** After the experiment: Reflect with your group: What made the sliders go the fastest?	Friction Video Demonstration: https://video.link/w/woRS

Is that what you expected? **Communicate:** Draw and reflect in your science notebook using pictures, labels, vocabulary and an explanation. **Lesson 3: Force and Motion** Experiment: Rock-a-Bye Pendulum **Gather:** Gather students on the carpet and show them a pendulum. Ask: What do you think happens when you apply force to an object in motion? Conduct the experiment: Have students work in their partnerships (or small groups) to construct the pendulum and experiment (all of those instructions are here on the Rock a Bye Pendulum Worksheet). **Reason:** After the experiment: Bring students back to the carpet to discuss the question at the end of the experiment: Name three things that could happen when a force acts on a moving object. **Communicate:** Have students reflect in their science notebook using a diagram, labels and writing to describe how a force affects an object. **Lesson 4: The Magnetic Force Field** Experiment: Investigating the Magnetic Force Field Part 1: **Gather:** Have students gather on the carpet and ask students what a magnet is. They will probably mention fridge magnets or point out magnets in the classroom. Ask them if they ever took the time to play with magnets and investigate all the cool properties they have. Students should each be given two magnets. Give students about 5 - 7 minutes to just play with the magnets and time to explore their properties. Students can pull materials out of their pencil cases, or folders to see if a magnet's pull will go through paper, through a folder, and so on. If students are stuck on what to test, display Ideas for Magnet Investigators on the Smart Board to inspire them. Pose the questions: How far do you think a magnet can reach?" Allow them to have a short discussion and set them up for the experiment. The procedure can be found here.	

Reason: At the conclusion of the experiment, partnerships and / or groups will discuss the findings from their experiment and form theories about what they learned about magnetic fields. **Communicate:** Bring students together as a whole class to discuss what they have learned. Have them draw a diagram with labels in their scientific notebook. They can then explain their drawings to their groups / the class.	
Episode 3 **Explain** Days: 4	
Lessons	Resources
Lesson 1:- Vocabulary Splash **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class. **Lesson 2: Read aloud Equal Schmequal by Virginia Kroll** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** As the animals are trying to figure out what is equal, pause the book and ask students to predict how they can make the teams even. (Students will have background knowledge of this concept from the previous introduction lesson on Tug of War.) Students might say something like (make the weight even, put the bear on one side and all the rest of the animals on the other) Also ask students how this relates to a whole team of children winning tug or war against adults. Page 14: When mouse turtle and rabbit are easily dragged over the line, ask students why the ropes still aren't even though they have 3 students on each side. **Reason:** Use this book to explain the concept of balanced	Episode Supply List: Read Aloud links NGSS: https://www.youtube.com/watch?v=HjadnQufeIs https://www.youtube.com/watch?v=vOGG5MF3i54 Use this website with the students, or for background information on how Tug of War Shows Newton's 3rd Law. Forces and Motion Video: https://www.youtube.com/watch?v=fnCDk-SnNGQ Roller Coaster Powerpoint that reinforces the vocabulary words students have learned so far, and connects them back to the anchor video of roller coasters Magnet maze materials: Paper plates Two magnets per student/ pair of students Circular mazes printed from the internet such as this one

and unbalanced forces. Point to different pictures in the book and ask students to identify if the forces are balanced or unbalanced. Explain that tug of war isn't just a game of pulling, but also pushing. The floor exerts an upward force on your feet, just as your feet push down on the floor. Newton's 3rd Law can also be explained using tug of war. Students should write down the definition of the underlined words in their science notebooks. **Lesson 3: Potential and Kinetic Energy** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Say to students, "We started this unit by watching a video on roller coasters, and today we are going to take a moment to connect the vocabulary words we've learned, and the types of forces we have been learning about to see how they work on roller coasters." Then, show students this powerpoint **Reason:** The powerpoint reinforces all of the vocabulary words we have been learning, and connects them back to the anchor of roller coasters. **Communicate:** Have students make a list of forces they have learned about so far, and have them draw a diagram of each one in their science notebook. **Lesson 4: Motion and Forces using the Read Aloud: Move It! Motion, Forces and You!** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Gather the students on the carpet and ask: What do you already know about forces from the experiments we have been doing? What kind of forces do you know about? Discuss with a partner (chart responses on chart paper.) Share the read aloud link, stopping at specific times - to observe the pictures. Ex: at 1:52 you may ask: What forces do you see in this picture?" *Hint, the reader in the video asks questions you may want students to consider.	

You could also discuss the experiments presented and have students hypothesize what may happen. **Reason:** What did this book teach us or confirm what we've learned about forces (push, pull, gravity, friction)? Write in your science notebook with diagrams, labels and words to describe your thinking. **Communicate:** Have a class discussion: What did this book teach us or add to what we know about forces and motion? What experiments did this connect to? **Lesson 5: Learning more about Magnets** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Gather students on the carpet and ask: "From our experiments, what have we learned about magnetism?" Show Brainpop's Magnetism Video **Reason:** Pose the following questions for students to answer with their partner or group: "What does this video teach us about magnets?" "Does a magnet have to be touching an object to make it move?" "What happens if a magnet moves far, far away from an object?" **Communicate:** Have a class discussion, answering the focus questions, and jotting big ideas in science notebook. Provide students with two magnets, paper plates, and a maze printed from online. Have them glue the maze to the paper plate. Students should place one magnet underneath the plate and the other magnet on top of the plate. While holding the magnet underneath the plate, students should try and see if they can get the magnet on top to the center of the maze. **Lesson 6: Vocabulary** **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason** - partners sort these words in an open sort using	

their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class.	
Episode 4 **Elaborate/Build New Content/Apply new Content** Days: 3	
Activity	Resources
Lesson 1: **Day 1** Marble Run Challenge (3 days) Students will work in groups to create a marble run, which replicates a small roller coaster. Their challenge is to create a track that makes a marble run for the longest period of time. Student designs will place their marble on the track, and the teacher will time each marble as it flows through the track. There are two methods of doing this. Option 1: If you have cardboard tubes available, groups of students can use these, attach them to the foam or cardboard board, and use these to make their track. See this resource for more information about this type of marble run. The second method if you don't have cardboard tubes available, is to print roller coaster foldable pieces (found here) onto cardstock. Students will work in groups to fold and assemble them. The video shows how. You may still want to provide students with a board to build on top of. Gather: Say to students, "Today you are going to use what you learned about forces and motion to build your own marble run." To get students thinking, quickly review some important concepts that they learned by asking questions such as - "What is the vocabulary term that we learned for what a roller coaster has when it is at the top of the lift hill?" (potential energy) - Do you think it is important for your roller coaster to start at a high place and end at a low place? - How can you build pieces that work like a real roller coaster? It may be helpful to show students the video of Nitro that they watched at the beginning of the unit to jog their memories.	Episode Supply List: Option 1: Paper towel rolls Toilet paper rolls Wrapping paper rolls Cardboard 4 - 6 pieces of thick foam board or large flat cardboard pieces (for students to build on top of) Tape (masking or duct works best) Plastic cups Scissors Marble Run Information PDF marbles Option 2: Cardstock with roller coaster pieces printed on it Sample Paper Roller Coaster video that shows students how to do it. 4 - 6 pieces of thick foam board or large flat cardboard pieces (for students to build on top of) Tape Scissors Marbles Plastic cups

Students should get together with their groups and begin planning. They should draw or write their plan in their science notebooks. Once students are finished planning, they should check with the teacher to get approval before beginning to build. **Day 2**: Students are given the entire period to receive materials and time to build. The teacher should walk around and help students test their designs throughout the period so that students have time to make changes if necessary. **Day 3**: Students finish up their designs, and the teacher begins to time the marble runs to see how long the marble can flow through the track. Gather students as a whole class and discuss what worked and what didn't work. Have students respond to this question in their journals. "If you had unlimited time to design your creation, what would you work to improve about your roller coaster?" If time allows, have students share their journal entries. Possible extension: Give students time to improve their designs with their groups.	
Episode 5 **Evaluate** Days: 3	
Assessment	Resources
Robo Arm STEM project: 3 Days Day 1: Introduction and Brainstorming Day 2: Building and trying out greetings Day 3: SHaring and extending challenge Some context for the challenge: The Robo Arm is a lever system. Ask students what part is the fulcrum? Which part is the lever arm? What is the effect of moving a fulcrum, changing the length of a lever arm, or changing the string's attachment point? The brass fastener is the fulcrum and the cardboard is the lever arm. Changes will alter the force required to move the lever. It will be helpful to make the connection between balance/unbalanced forces and the forces created by the lever system. To fully address the physical science aspect	Episode Supply List: • 1 large strip of corrugated • cardboard (about 5 x 20 • centimeters [2 x 8 inches]) with a hole punched in one corner • 1 small strip of corrugated cardboard (Cut a large strip in half.) Punch a hole in one corner. • 1 medium (i.e., 1-inch) brass fastener • 1 straw, cut into 2.5-centimeter (1-inch) lengths • 100 centimeters (39 inches) of

of forces on the motion of an object, further activities should be done. Students can explore activities that compare the effects of a gentle force and a harder force on an object in motion such as a pendulum. Worksheet / Instructions for the project Videos to show students before introducing the design challenge. Design Squad Video Related NASA video Engineer Video This project is set up for a series of challenges to allow students to build a robo arm, similar to one NASA may build. Here are the main components of the project: 1. IDENTIFY THE PROBLEM AND BRAINSTORM • ● How will you connect the cardboard strips so they pivot efficiently? ● Where will you tape the end of the string so that the "hand" moves the way you want it to? ● How can you use the straws as guides for the string? 2. DESIGN AND BUILD Below are some Robo Arm ideas. Invent your own design or improve on one of these. ● If the sections don't move freely… Loosen the brass fasteners to reduce friction. ● If the hand doesn't move in the direction it should… Check where you taped the end of the string to the cardboard. Also check that the guides make the string pull in the right direction. 3. TEST, EVALUATE, AND REDESIGN ● Play Kick the Cup. Lay your Robo Arm flat on the table. Put a paper cup by your arm's "hand." Pull the string quickly. How far can you kick the cup? ● Pick up a target cup. Add a hook to the end of	smooth string (e.g., kite string) ● 2 large paper clips ● 2 paper cups (3-ounce) ● Tape (any kind)

your Robo Arm. Can you pick up the target cup? ● Play Round Robin. Have a few kids stand around a table. Use the Robo Arms to pass a cup all the way around. Can you do it faster? 4. TRY THIS NEXT! ● Add a third section to the arm, like a person's upper arm.	

Unit 2 Topic/Storyline: Ecosystems/ Interactions	Grade 3	Days: 15 - 16
Question:		
How does being a part of a group benefit animals?		
Essential Questions:		
1. How does being a part of a group help animals survive? 2. What role(s) do different animals in the group fulfil? 3. How do different groups of animals vary in size? 4. What are some ways that organisms interact within ecosystems?		
Enduring Understandings		
- Some animals form groups in order to survive. - Forming groups can be helpful to some animals in order to find food, shelter, and protection against predators. - Groups of animals may vary in function and size. - Animals interact with the nonliving parts of their environment to form an ecosystem. (soil, water, air, - All animals and most plants depend on both other organisms and their environments for their basic needs.		
Storyline Narrative / Big Ideas: This introductory unit will give students an understanding that organisms rely on each other in unique relationships that ensure each other's survival. Students will study different animal groups and learn about how they rely on each other to get food, defend themselves, and adjust to changes. Students will make lots of observations about different animal groups and come to the big understanding that living in a group helps animals survive and thrive.		

Key Words:		
Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Engaging in Argument from Evidence: Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model.	**LS2.D: Social Interactions and Group Behavior** Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.	**Cause and Effect:** Cause and effect relationships are routinely identified and used to explain change.
Consolidated Supply List - Science Notebooks, Notetaking sheets (linked for each applicable lesson), Boxes of different sizes to represent servings of food		
Episode 1 Engage/Elicit Ideas: Days: 2		
Lessons	Resources	
Lesson 1: Phenomena **Gather:** Show the two phenomenon videos about how ants work together. Have students draw and label a diagram of what they saw and hypothesize what the ants are doing (through writing or drawing). **Reason:** Students write down what they notice and wonder about both of the ant colonies. Chart common ideas on a chart paper that you may return to over time. Possible Prompts: ● What do you think the ants were doing? ● Why do you think the ants were behaving that	Episode Supply List: Phenomenon: Video 1: Colony of Ants Dragging a Worm All Together Video 2: Weaver Ants Build a Horizontal Bridge Possible graphic organizer for student note taking: https://www.teachersnotepad.com/beginning-middle-end-graphic-organizer/	

way? ● Does this remind you of any other animal group you've seen? Communicate: Have a class discussion: encourage students to share their ideas and hypotheses about the ants in the videos. **Lesson 2: Ecosystem** **Gather:** Introduce what an ecosystem is using brainpop. Show Brainpop video: https://www.brainpop.com/science/ourfragileenvironment/ecosystems/ **Reason:** Ask students to brainstorm other habitats not included in the Brainpop, which focuses on forests. Other examples could be deserts, oceans, ponds, tundra, lakes, etc. Using their new vocabulary, have students draw animals that live there, and label the producers, consumers, and decomposers. Have students label things that are not alive such as soil, water, air, wood, sand and so forth to show that these are also important in an ecosystem. **Communicate**: Students can get up and move to demonstrate understanding of new vocabulary. Have them act it out by standing up and spreading their arms as wide as they can and making a big circle around them. Explain that his movement represents the word ecosystem. Have them spread their arms wide,but not make a circle. Explain that represents the vocab word community. Students should squat down a bit and bring their arms in a little. Explain that this movement represents population. Have students squat down as close as they can to the floor, explaining that this movement represents a really small organism. The idea is that they understand the hierarchy of these words inside an ecosystem. Students can share their ideas/ drawings by having a class discussion, by making videos through Flipgrid, or by placing their drawings under the document camera.	Introductory Powerpoint that gives definitions of ecosystem vocabulary, examples of different ecosystems Brainpop on Ecosystems
Episode 2 **Explore** Days: 4	
Lessons	Resources

Lesson 1: Pond Ecosystem **Gather:** explain that students will be working on a scavenger hunt to learn about the pond ecosystem, and how all the non living and living things come together and interact. Read the directions slide together and model how to put the slideshow into present mode, how to move pictures out of the way, how the pictures disappear when you click them, and how to highlight text to change the color of it. **Reason:** As students go through the scavenger hunt powerpoint **Communicate:** Have students share with a partner or table group what they learned from going through the scavenger hunt. If time allows: Give them a few minutes to reflect in their science notebooks using pictures, labels and writing. **Lesson 2: Wolf Island** **Gather:** Teacher should read "Wolf Island" by Celia Godkin to students. Ask students guiding questions along the way such as, "Make a prediction: what will happen to the _____ population now" (Insert one of the populations from the book). **Reason:** Page 7, "If the cubs could talk, what would they be saying right now?" Page 17, "What do you think is happening to the other animals like the rabbits and the mice, since the deer are eating so many plants?" Page 22, "Listen carefully to this page. When I'm done, you're going to jot the reasons why this winter is so difficult in your science notebook." Page 31, "How will the wolves return affect the island?" ● If time allows, students can discuss in partnerships, with their table, or the teacher can call on a few students to share. Students can then jot down their ideas in their notebooks. Page 36, "Only one animal left the food web. How many others were affected by that?" **Communicate**: Students can jot down their answers as they read, or the teacher can discuss the book with the students afterwords. Students can jot down ideas in their notebook, or make a Flipgrid discussing how one animal is so important to a food chain of an ecosystem. Discuss what would happen in other ecosystems in different locations. (desert, tundra, rainforest, ocean, etc).	Episode Supply List: Pond Ecosystem Scavenger Hunt: (Each teacher should make their own copy so that you can edit) Note taking worksheet. Students will list why each living and non-living thing is important to the ecosystem (Folder with resources)

Lesson 3: Roles of Bees **Gather:** Today we are going to do a gallery walk to learn about the roles of the bees in a hive. (Before this lesson, the teacher should print out these cards and hang them around the classroom. It may also be a good idea to provide your students with a note-taking sheet/ graphic organizer if you feel it's necessary. Students can also take notes in their science notebooks) **Reason:** As students go around, circulate the room and listen to class discussion. Ask guiding questions such as, "Wow, what do you think would happen if this type of bee didn't exist? How would the rest of the bees be affected? Could the hive live on without these bees?" **Communicate:** Students should come back to their seats and write a journal or create a Flipgrid discussing which type of bee they would want to be if they had the choice, and why they chose that bee job. Have students also answer what would happen to the hive if bees didn't work together the way they do. **Lesson 4: Honeybees** Teaching point: Today I want to teach you that honeybees perform a dance in order to help the other bees find good and resources. **Gather:** Engage: sometimes even dances as humans give us directions! Play a dance that gives directions and ask students to follow the directions. ● Play bit of Cha Cha slide that has the lyrics/ directions https://www.youtube.com/watch?v=I1gMUbEAUFw ● Students should dance along ● Then play it instrumentally. https://www.youtube.com/watch?v=KzukIblNjSI ● Have students try to dance. Can they follow it? Ask students if it was hard to follow the movements of the song without the words. **Reason:** "Guess what. Bees have to follow directions from other bees just by dancing!" Then, show students the waggle dance video. a short video on their "dance" https://www.youtube.com/watch?v=12Q8FfyLLso	

Have students go to this game: a short video on their “dance” https://www.youtube.com/watch?v=12Q8FfyLLso Read directions and explain to students. Teacher will demo one time. **Communicate:** Have students come back together and ask them if they were able to find the correct nectar the first time. Ask if you think it would be hard to follow directions without the teacher talking.	
Episode 3 **Explain** Days: 4-5	
Lessons	Resources
Lesson 1:- Vocabulary Splash **Gather** - display all the unit’s vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason -** partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class. **Lesson 2: Insects Work That Work Together: learn about how different animal groups rely on each other to survive** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Read the text: Insects That Work Together By: Bobbie Kalman, Molly Aloian **Reason:** Model Reading Chapter 2 (pages 6-7): Working Together. **Communicate:** Have students share at least three things that they learned from this section and hypothesize what insects they know that live and work together. (This can be done in a Science notebook, then shared out with	Episode Supply List: Insects that Work Together: Available on Epic! (Lesson 2) Termite Mound Video: https://www.youtube.com/watch?v=ta2rF6Syi0U

partnerships, small groups, or the whole class). **Lesson 2: Learning About Termites** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Gather the class on the carpet and review the previous day's learning. Chart out some big ideas students have about how insects work together. Read Aloud the sections on Termites in Insects that Work Together (pages 18 - 21). **Reason:** Have students discuss big ideas they learned about termites, their roles in their community, and how they work together to build their termite mounds. Watch this video about termites (repeat as needed) **Communicate:** In your notebook, draw a diagram or write a paragraph about how termites work together to live and build their homes. **Lesson 3: Insects That Work Together: Small Group Exploration** **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Review big ideas from yesterday's lesson and explain that students will be split into groups to research insect groups and present to the class how they work together to survive. They can use the book Insects that Work Together to drive their learning. Group 1: Honey Bees Group 2: Wasps Group 3: Ants **Reason:** Have students work in groups (with teacher support) to describe the different roles the insects have, and how they work together. They can present using a JamBoard, Google Slide, or Paper Diagram. **Communicate:** Have each group share, then discuss: -How were the different groups of insects similar? -How were the different groups of insects different? -How do you think these groups work together to survive? -Why do you think they live and work together?	

Lesson 4: How Animals Protect Each Other **Vocab. Focus** - choose a few vocabulary words to focus on. Students write the word, draw a picture of the word and write the word in a sentence in their journals. **Gather:** Gather students on carpet area and show this video of Water Buffalos Saving a Calf from Lions. **Reason:** Let students watch video once through. The second time, stop periodically and ask: -What are the buffalos doing? -Why are they doing it? -How does this video show the benefits of living in a group? **Communicate:** Have students move into partnerships / small groups to discuss the phenomenon. Pose the question: When thinking about the insect groups, and now the water buffalo, what are some of the benefits of animals living in groups? If time allows, have them respond to that question in their science notebook. **Lesson 5: Vocabulary** **Gather** - display all the unit's vocabulary words on the board. Read each word to the class with a brief explanation of the words. **Reason** - partners sort these words in an open sort using their prior knowledge. Label each group of words. **Communicate** - share how they sorted these words to the class.	
Episode 4 **Elaborate/Build New Content/Apply new Content** Days: 3	
Activity 1:	Resources
Day 1: Gather: Show students this video. Have students write down predictions in their science notebooks for the questions raised in the video. Tell students that today we are going to do an experiment that shows one reason that animals live in groups.	Click here to see the "Who Has The Advantage" Teacher Overview Episode Supply List: https://www.youtube.com/watch?v=fP54QWi-aiM

Reason: Run “Who Has The Advantage Part 1” experiment. For teacher directions, please click here. Communicate: After running the activity, discuss with the class how to calculate the number of days that each animal can survive. Example: If a group of 4 collects a total of 20 servings of food, it is enough for each animal to survive for 5 days. Guide students in discovering that division is necessary in this calculation. ● Create a class data table at the front of the room, so that students can compare solitary and group animals. In the solitary column, list the number of days that each solitary animal is able to survive, based on the food they collected. In the group area, list the number of days that each group animal is able to survive. Ask the students: what does this tell us? **Day 2** Gather: In this project, students will work in a group. They will be provided with a box with a flag attached. They will plan and design an experiment to test who is better at defending their territory: A single animal, or a group of animals. The box will be their “territory” that they must protect, and other students will try to take the box. For teacher directions, click here. Communicate: ● Note: rules should be discussed as a class ahead of time as to what will be allowed and what will not be allowed when “defending” their box ● Have students come up with possible guidelines and rules as a class before running the experiment. Reason: For the paper that students will fill out as they design, click here. **Day 3** Gather: Teacher will say, “You have been working on designing experiments to see whether a solitary animal or a group of animals is better at defending themselves and finding food. You have had some guidance with both of these projects, but today you will be coming up with your own materials and procedure with your group mates. You will design and conduct an experiment to see if a group of	- Boxes of different sizes to represent servings of food. Some boxes will need to be big enough for more than one student to carry. If you have trouble obtaining boxes, you can also use different sized balls and have students work together to pick them up with spoons. - Box with a paper flag attached for each student. (This is the “territory”) - Animal figurines or pictures of animals to tape, attach to “Territory” boxes - Open space (consider going outside on the playground/ to the gym if available) - For part 3, students will tell you what supplies they need to represent one of the three scenario’s of environmental change. They must come up with their own materials, but suggested possible materials include water, spray bottles, animal figurines, plastic containers, hair dryer (represents wind for a storm or heat) - Encourage students to find materials from home and bring them in as well. - Teacher Notes for Part 3

animals or a solitary animal is better at reacting to environmental change." Students are given 3 scenarios of environmental change to choose from: (feel free to include more for exceeding students or change them up at you see fit.) - Scenario 1: The temperature suddenly changes from warm to very cold. - Scenario 2: A new group of predators enters the area. - Scenario 3: A large storm causes flooding in the forest. Reason: Students will fill out this project design sheet as they plan with their group. Communicate: Students run experiment and discuss with the class their data.	
Episode 5 **Evaluate** Days: 2	
Assessment:	Resources
Journal: Give students the option of how they want to synthesize all they have learned. Students can be scored on the third grade Narrative Writing rubric, or the third grade Informational Writing Unit. This may take up to two days for students to complete. Prompt 1: Write a story from the viewpoint of an ant explaining your role in helping the colony survive. Prompt 2: Compare the group behavior of humans and ants. How are they alike? How are they different?	Narrative Writing Rubric Informational Writing Rubric

Unit 3 Topic/Storyline: New Unit: Biological Evolution	Grade 3	Days
Question		

Essential Questions:

1. What is biological evolution?
2. How do organisms change over time?
3. What causes organisms to change over time?

Enduring Understandings

- Students should understand that some animals that lived on earth long ago are no longer alive today (analyze and interpret data from fossils)
- 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 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.*
-

Storyline Narrative / Big Ideas:

Key Words:

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. ● Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ● Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. **LS4.A: Evidence of Common Ancestry and**	**Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2),(3-LS4-3) **Scale, Proportion, and Quantity** ● Observable phenomena exist from very short to very long time periods. (3-LS4-1) **Systems and System Models** ● A system can be described in terms of its components and their interactions. (3-LS4-4) - ***Connections to Engineering, Technology, and Applications of Science*** **Interdependence of Engineering, Technology, and Science on Society and the Natural World** ● Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-4) - ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ● Science assumes consistent patterns in

Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ● Construct an argument with evidence. (3-LS4-3) ● 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. (3-LS4-4)	**Diversity** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **LS4.B: Natural Selection** Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. **LS4.C: Adaptation** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **LS4.D: Biodiversity and Humans** Populations live in a variety of habitats, and change in those habitats affects the organisms living there.	natural systems. (3-LS4-1)
Consolidated Supply List -		
Episode 1 Engage/Elicit Ideas Days: Instructional Goals: Motivates students Phenomena - short video, text, picture, gifs, song, demonstration, maps		

Notice and Wonder Statements (10 observations and 10 Questions) Model Students draw a model to explain or predict. Then write about what they drew or label the model. Claim - make a claim about the phenomena.	
Lessons	Resources
Lesson 1: Gather: Show anchor phenomenon video about the tale of two birds. The video raises good questions that will get students excited for the unit. Reason: Ask students to think about/ discuss the questions the video raises: - Have these juncos evolved into a different species in such a short amount of time? - Are they different species? - What is going on? - Could it be possible that all of these different juncos once looked alike? Communicate: Lesson 2: Gather Reason Communicate	Episode Supply List: Anchor Phenomenon Video: A Tale of Two Birds https://www.scientificamerican.com/article/how-dinosaurs-shrank-and-became-birds/ https://www.scienceworld.ca/stories/chickens-take-step-closer-dinosaurs/

Episode 2 **Explore** Days: Instructional Goals: Experience - Students explore and carry out investigations from wonder statements or claims from the first episode. Data - Collect data from the investigations. Research - obtain information. Model - Students revise their models	
Lessons	Resources
Lesson 1: Gather Reason Communicate	Episode Supply List:

Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate	
Episode 3 **Explain** Days: Instructional Goals: Learn information to make sense of their science explorations from the explore phase. Analyze and interpret the data (SP4) . How does the Evidence support this claim? Reading, listening and/or discussing text, articles, videos Vocabulary Instruction Teacher directed lessons.	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate Lesson 4: Gather Reason Communicate	Episode Supply List:
Episode 4 **Elaborate/Build New Content/Apply new Content** Days:	

Instructional Goals: Students have the opportunity to practice what they have learned in the introduction section to consolidate learning and develop understanding. Use what they learned to apply to another experience. Back to phenomena to explain the Reasoning Independent Activities STEM projects Choice Boards Debates	
Activity	Resources
	Episode Supply List:
Episode 5 **Evaluate** Days: Instructional Goals: Assessment -problem solving, system analysis, decision making, rubrics, project, student self assessment, journal writing Reflect	
Assessment	Resources
	Episode Supply List:

Unit 4 Topic/Storyline:	Grade 3	Days
Question		
Essential Questions:		

8.
Enduring Understandings
-
Storyline Narrative / Big Ideas:
Key Words:

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts

Consolidated Supply List -

Episode 1
Engage/Elicit Ideas
Days:

Instructional Goals:
Motivates students Phenomena - short video, text, picture, gifs, song, demonstration, maps
Notice and Wonder Statements (10 observations and 10 Questions)
Model
Students draw a model to explain or predict. Then write about what they drew or label the model.
Claim - make a claim about the phenomena.

Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate	Episode Supply List:

Episode 2 **Explore** Days: Instructional Goals: Experience - Students explore and carry out investigations from wonder statements or claims from the first episode. Data - Collect data from the investigations. Research - obtain information. Model - Students revise their models	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate	Episode Supply List:
Episode 3 **Explain** Days: Instructional Goals: Learn information to make sense of their science explorations from the explore phase. Analyze and interpret the data (SP4) . How does the Evidence support this claim? Reading, listening and/or discussing text, articles, videos Vocabulary Instruction Teacher directed lessons.	
Lessons	Resources
Lesson 1: Gather Reason Communicate	Episode Supply List:

Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate Lesson 4: Gather Reason Communicate	
Episode 4 **Elaborate/Build New Content/Apply new Content** Days: Instructional Goals: Students have the opportunity to practice what they have learned in the introduction section to consolidate learning and develop understanding. Use what they learned to apply to another experience. Back to phenomena to explain the Reasoning Independent Activities STEM projects Choice Boards Debates	
Activity	Resources
	Episode Supply List:
Episode 5 **Evaluate** Days: Instructional Goals: Assessment -problem solving, system analysis, decision making, rubrics, project, student self assessment, journal writing Reflect	
Assessment	Resources
	Episode Supply List:

Unit 5 Topic/Storyline:	Grade 3	Days
Question		
Essential Questions:		
9.		
Enduring Understandings		
-		
Storyline Narrative / Big Ideas:		
Key Words:		

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts

Consolidated Supply List -

Episode 1
Engage/Elicit Ideas
Days:

Instructional Goals:
Motivates students Phenomena - short video, text, picture, gifs, song, demonstration, maps
Notice and Wonder Statements (10 observations and 10 Questions)
Model
Students draw a model to explain or predict. Then write about what they drew or label the model.

Claim - make a claim about the phenomena.	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate	Episode Supply List:
Episode 2 **Explore** Days: Instructional Goals: Experience - Students explore and carry out investigations from wonder statements or claims from the first episode. Data - Collect data from the investigations. Research - obtain information. Model - Students revise their models	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate	Episode Supply List:
Episode 3 **Explain** Days:	

Instructional Goals: Learn information to make sense of their science explorations from the explore phase. Analyze and interpret the data (SP4) . How does the Evidence support this claim? Reading, listening and/or discussing text, articles, videos Vocabulary Instruction Teacher directed lessons.	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate Lesson 4: Gather Reason Communicate	Episode Supply List:
Episode 4 **Elaborate/Build New Content/Apply new Content** Days: Instructional Goals: Students have the opportunity to practice what they have learned in the introduction section to consolidate learning and develop understanding. Use what they learned to apply to another experience. Back to phenomena to explain the Reasoning Independent Activities STEM projects Choice Boards Debates	
Activity	Resources

	Episode Supply List:
Episode 5 **Evaluate** Days: Instructional Goals: Assessment -problem solving, system analysis, decision making, rubrics, project, student self assessment, journal writing Reflect	
Assessment	Resources
	Episode Supply List:

Unit 6 Topic/Storyline:	Grade 3	Days
Question		
Essential Questions:		
10.		
Enduring Understandings		
-		
Storyline Narrative / Big Ideas:		
Key Words:		

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts

Consolidated Supply List -

Episode 1
Engage/Elicit Ideas
Days:

Instructional Goals:
Motivates students Phenomena - short video, text, picture, gifs, song, demonstration, maps
Notice and Wonder Statements (10 observations and 10 Questions)
Model
Students draw a model to explain or predict. Then write about what they drew or label the model.
Claim - make a claim about the phenomena.

Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate	Episode Supply List:

Episode 2
Explore
Days:

Instructional Goals:
Experience - Students explore and carry out investigations from wonder statements or claims from the first episode.
Data - Collect data from the investigations.
Research - obtain information.
Model - Students revise their models

Lessons	Resources

Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate	Episode Supply List:
Episode 3 **Explain** Days: Instructional Goals: Learn information to make sense of their science explorations from the explore phase. Analyze and interpret the data (SP4) . How does the Evidence support this claim? Reading, listening and/or discussing text, articles, videos Vocabulary Instruction Teacher directed lessons.	
Lessons	Resources
Lesson 1: Gather Reason Communicate Lesson 2: Gather Reason Communicate Lesson 3: Gather Reason Communicate Lesson 4: Gather Reason Communicate	Episode Supply List:

Episode 4 **Elaborate/Build New Content/Apply new Content** Days: Instructional Goals: Students have the opportunity to practice what they have learned in the introduction section to consolidate learning and develop understanding. Use what they learned to apply to another experience. Back to phenomena to explain the Reasoning Independent Activities STEM projects Choice Boards Debates	
Activity	Resources
	Episode Supply List:
Episode 5 **Evaluate** Days: Instructional Goals: Assessment -problem solving, system analysis, decision making, rubrics, project, student self assessment, journal writing Reflect	
Assessment	Resources
	Episode Supply List: