

Third Grade Science Curriculum

Unit: Motion and Matter

Time: First Marking Period

Standards:

3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2 Make an observation and/or measurements of an object's motion to provide the evidence that a pattern can be used to predict future motion.
3-PS2-3 Ask questions to determine cause and effect relationship of electric or magnetic interactions between two objects not in contact with each other.
3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets.
3-5-ETS-1 Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time or cost.
3-5-ETS-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5-ETS-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Essential Questions

- What is force?
- When are forces balanced or unbalanced?
- What is motion?
- How can I use what I know about magnets, forces and motion to solve a problem?
- How can I change the pattern of motion of an object?
- How can I design a solution to a problem?
- How can I change my design to improve upon it?

Enduring Understandings

- I can predict the motion of an object based on my observations of the patterns of its motion.
- I can design a solution to a problem given a specific set of materials.
- I can improve upon my design after making observations of my design's flaws or problems.
- I can design a cart from classroom materials, then modify it with magnets to change the pattern of motion two times.
- I can use what I know about magnets to predict the force of magnets on an object.

Benchmark Assessment(s)

- SWBAT design and create a cart that will include two wheel and axles with bearings, and an index card platform that can travel down a 30 degree ramp at least 50 cm within 5 seconds. Students will be given 5 minutes to modify their carts if the initial design does not complete the task in 5 seconds. Students will then modify a successful cart to include magnets in order to make it roll farther than 50 cm and change the cart's pattern of motion two times. Students will be assessed using a checklist. (3-5-ETS-1, 3-5-ETS-2, 3-5-ETS-3)
- SWBAT, in a partnership, physically recreate an investigation using a magnet, paper clip on a string and a chair leg in which the paper clip is attached to the string and the floor at the same time and is being suspended in midair. Students will use their notebooks to draw the investigation, label all the forces at work and write about what is happening during the investigation. Students should use words such as balanced forces, unbalanced forces, magnetism, magnet, and gravity in their responses. Students will be assessed using a rubric. (3-PS2-1)
- SWBAT conduct an investigation in which they will first use one magnet, paperclip and a paper ruler to measure the distance at which the paperclip is attracted to the magnet. This

Other Assessments

- ✓ I-check assessments
- ✓ Notebook checks
- ✓ Class participation
- ✓ Teacher observations
- ✓ Lab participation
- ✓ Pre- and Post-tests

Materials

- FOSS kit materials
- Teacher's Investigation Guide
- Student interactive notebooks / packets

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investigation will be repeated at least three times. Students will then add two more magnets to the end of the paper ruler and investigate at what distance from the magnet the paperclip is attracted to the magnets and record their results. This investigation will be repeated at least three times. Students will then, based on their observations of one and three magnets, predict the distance at which the paperclip will be attracted to two magnets. Students will write their predictions in their notebooks. Students will be assessed using a checklist. (3-PS2-2)

- Prior to the start of the unit, SWBAT conduct an investigation with magnets and magnets, magnets and paperclips, and magnets and straws or popsicle sticks. Students will observe the interaction of all the objects with one another and record their observations in their notebooks. Students will use these observations to create questions that will lead them to the cause and effect relationship of magnets not touching one another. (3-PS2-3)

SUGGESTED ACTIVITIES

- Investigation 1 – Forces
 1. Ask questions about patterns of an object’s motion in various situations. Observe and measure patterns of motion. For example, ask students how they can predict an object’s continued motion, or change in motion. Discuss the underlying forces observed.
 2. Distinguish personal view point of view from the author’s when reading scientific text. (Reading sections: “Magnetism and Gravity”, “What Scientists Do”, “Change of Motion”)
 3. Define and clarify the meaning of force and motion.
 4. Construct possible solutions to engineering problems and determine the success of a designed solution in writing.
 5. Measure mass and volume with gram pieces, classroom objects, and balance.
 6. Read Forces Make Things Move, by Kimberly Brubaker Bradley.
 7. Play online games about forces on the following website:
www.sciencekids.co.nz/gamesactivities/forcesinaction.html
- Investigation 2 – Patterns of Motion
 1. Discuss designs for items in real life that have wheels-and-axles.
 2. Set up cardboard ramps, roll different sized plastic disks down them, and observe motion. Students try all types of configurations of wheel size, axle position, to meet a variety of challenges.
 3. Roll paper cups down ramps and observe the motion. Try to park the cup under the ramp, pretending it is a parking garage.
 4. Put two cups together to make them roll straight and weight them in various ways to see how weight affects rolling.
 5. Create twirly birds (flying spinners) and note interaction of forces. (gravity, air friction, air resistance) Fly twirly birds outdoors to compare outdoor forces on twirly birds to indoor forces.
 6. Make tops from plastic disks and shafts, practice spinning them, and produce your personal best top. Observe how to change the designs that tops spin.
- Investigation 3 – Engineering

REINFORCEMENT

- Virtual Tutorial: Measuring Volume and Mass – Foss Teacher Page/Digital Only Resources/Virtual Investigations
- Provide printed notes, organizers, charts, etc. for student notebooks.
- Students can pair-up with partner to share answers to focus questions.
- Read: The Giant Ball of String, by Arthur Geisert.

ENRICHMENT

- The Magic of Magnets – Enrichment Activity

Students explore magnetic forces as they use magnets to suspend a pencil and make it spin. Demonstrate to the students how to assemble the materials: using craft sticks create a C shape structure that can stand on its own (hot

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1. Discuss the features of a cart that can roll, create a cart in small lab groups, and make sure the cart can roll from a soft push or a pull. Add constraints restricting time limit for designing a better cart, and measure distance the cart can roll down a ramp in cm and m.
 2. Investigate how different start positions for carts affect travel distance.
 3. Students create their own plan for a cart travel investigation, write it out in lab groups, explain it, and write an area for improvement for it.
 4. Design cart tricks using magnets, making sure the trick can be repeated three times before sharing. Share cart tricks or stunts, and discuss predictability of the motion.
- Investigation 4 – Mixtures
 1. Discuss what happens when you mix two materials.
 2. Make four different mixtures, one that includes two solids and three than use 50 mL of water and one of three different solids (sand, chalk, or salt). Observe mixture differences.
 3. Compare mixtures and solutions.
 4. Determine the mass of a volume of vinegar and baking soda before mixing them together. Combine, observe the fizzing, and discuss how this shares evidence of a new material being formed, or a chemical reaction took place. Students then measure the mass of the new mixture.
 5. Plan an outdoor Metric Field Day to practice measuring in the metric system. Create events for estimation, speed, accuracy, or problem solving.

glue gun works best), glue a magnet to the bottom section of the top craft stick, glue a nickel to the top of the bottom craft stick, and glue another magnet to the top of the eraser side of the pencil. The pencil will need to sharpen and height adjusted to fit between the nickel and the top magnet. Students can create hypothesis about the behavior of the pencil when the pencil is placed and the magnets are close to each other. Discuss the role of magnetic force and discuss other items that could be suspended in air using magnetic force. How is this used in real life? (Magnetic levitated trains)

Suggested Websites

- Play games about forces:
<http://www.sciencekids.co.nz/gamesactivities/forcesinaction.html>
- Visit force websites in order to practice noting where friction and change of motion are located:
http://www.bbc.co.uk/schools/scienceclips/ages/10_11/forces_action_whatnext.shtml
- Play online games including simple machines on the following site: <http://www.edheads.org/activities/simple-machines/>
- Visit Kids Science Experiments online in order to locate more experiments students can do in school or at home: http://www.lovemyscience.com/cat_reaction.html
- View brainpop video clip on mixtures:
<https://www.brainpop.com/science/matterandchemistry/compoundsandmixtures/preview.weml>

Suggested Materials

- Forces Make Things Move by, Kimberly Brubaker Bradley
- Motion: Push and Pull, Fast by, Darlene R. Stille
- Waking Upside Down by, Philip Heckman

Cross-Curricular Connections

21st Century Skills- 9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes., CRP2. Apply appropriate academic and technical skills.

Technology- 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.

SEL- Students will utilize positive communication and social skills to interact effectively with others throughout labs, classroom discussions, and when turning and talking with a partner.

Language Arts and Math:

RI.3.2: Determine the main idea of a text; recount the key details and explain how they support the main idea.

3.MD.A.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

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Unit: Water and Climate	Time: 2 nd Marking Period	Standards:
<p>Essential Questions</p> <ul style="list-style-type: none">• How can I collect weather information and represent it in a table?• How can I collect weather information from around the world and use that information to create a climate map?• How can I learn about floods?	<p>Enduring Understandings</p> <ul style="list-style-type: none">• I can collect information about weather using a table.• I can analyze information that I have collected about weather to create a generalization about climate.• I can collect weather information about countries around the world to create a climate map.• I can evaluate the usefulness of a solution to a flood and write about its merits.	<p>3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p> <p>3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.</p> <p>3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.</p>
<p>Benchmark Assessment(s)</p> <ul style="list-style-type: none">➤ SWBAT collect, record, analyze and compare weather data using a table. Students will collect local weather data (temperature, precipitation, and wind direction) from a variety of sources, either in print or online for a period of 4 months. Students will use a table to record data. After collecting data, students will use the information to make a generalization about the climate for that time of year in that area. Students will be assessed using a rubric. (3-Ess2-1)➤ SWBAT obtain and combine information regarding climates in different regions to create a climate map. Students will conduct a short research project in which they will collect information about the different types of climates around the world. Students will use this information to create a world climate map. Students' projects will be assessed according to accuracy. (3-Ess2-2)➤ SWBAT draw a diagram of any one of the solutions that could be viable to prevent a flood and write a paragraph about the merits of that solution. Students will be assessed using a rubric. (3-Ess3-1)		<p>Other Assessments</p> <ul style="list-style-type: none">✓ I-check assessments✓ Notebook checks✓ Class participation✓ Teacher observations✓ Lab participation✓ Pre- and Post-test <p>Materials</p> <ul style="list-style-type: none">• FOSS kit materials• Student notebooks• Teacher manuals

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SUGGESTED ACTIVITIES

- Investigation 1: Students observe the properties of water to compare and contrast how water interacts with different materials. Students will create water domes to observe the pattern of motion of water on a sloped surface. Students are challenged to measure how much water a dry sponge can absorb. Students develop the procedures to complete the challenge. Students will go outside to collect natural materials, living and nonliving, and observe how water interacts with those materials.
- Investigation 2: Students compare temperatures of three cups of water using their fingers as gauges. Students discover that a standard is needed and a more accurate way to measure the temperature. Students are introduced to the thermometer and how to use it. Students observe objects sinking and floating and are introduced to the definition of density as it applies to sinking and floating. Students investigate density of cold and hot water. Students also investigate the behavior of water as it frozen, expands and is less dense than water. Students take 3 different ice cubes, place one in the sun, place a second in the shade, and bury the third. They monitor the ice cubes and use the information that they have gathered from the water investigations to determine where an animal would go to stay warm or stay cool.
- Investigation 3: Students collect weather data to compare to weather forecasts and historical weather data. Students use soaked paper towels and a balance scale to see that things dry because of evaporation. Students investigate evaporation rates affected by surface area and temperature. Students are introduced to the water cycle by watching condensation on a cup filled with ice water.
- Investigation 4: As a class, weather data from the previous year is analyzed and students come up with a description for the data. Students will be introduced to climate and create a world climate map using the information that they have analyzed. Students will read about and view ways that people manage natural hazards associated with floods. Students discuss methods to deal with floods and droughts.
- Investigation 5: Students investigate to find the difference in amounts of water that are absorbed or go through different soil types. They measure the soils and the amount of water that runs through the soil and the mass of the soil using a balance scale to compare. Students will investigate with soils in the school yard and time how long it takes each soil to absorb equal amounts of water and make assumptions about which soil would be best for plant growth. Students are presented with a challenge to design and construct a simple waterwheel. They will use the waterwheel to lift or pull objects. Students trial and refine their design and determine how many syringes of water it will take to move an object a specified distance.

REINFORCEMENT

- Vocabulary matching game.
- Provide printed notes, organizers, charts, etc. for student notebooks.
- Show tutorial: Weather Maps – Foss Teacher Page/Digital Only Resources/Tutorials
- My Life with the Wave by Catherine Cowan.

ENRICHMENT

- Ice Cap Melting – Enrichment Activity
Students explore the effect of ice caps melting on sea water levels. Prepare the materials for the investigation a basin half full of water, ice cubes, ruler, and marker. Have students work in groups of four or six. The students will use the ruler to mark the inside of one of the walls on the basin. They will use centimeters. Explain that each centimeter is equivalent to 10 feet of water rise the in the ocean. Fill the water basin with cold water to one half the height of the basin and record the level in cm. Then add ice and record it again. Discuss how the water level rises. Then have students observe and record the water level as the ice melts. Have groups come up with the total amount of water level increase and explain how does that compare to the buildings in the community. Then to the map and shore cities, how would it affect communities.

Suggested Websites

- View and interact with the Smartboard site on sinking and floating:
<http://exchange.smarttech.com/search.html?q=sinking+or+floating>
- Play Weather and Climate Jeopardy on the following site as a review for the written assessment:
<http://exchange.smarttech.com/details.html?id=ffod1b9f-486b-4188-8c97-5996c1c7b2dc>

Suggested Materials

- The Snowflake A Water Cycle Story by Neil Walman.
- Did a Dinosaur Drink This Water? by Robert Wells.
- A Drop of Water by Walter Wick.
- Water Dance by Thomas Locker.
- A Drop Around the World by, Barbara Shaw McKinney
- Outside Your Window: A First Book of Nature by, Nicola Davies

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- Visit the following website as a class in order to locate more information about polar climates: <http://beyondpenguins.ehe.osu.edu/issue/polar-patterns-day-night-and-seasons/>
- www.brainpop.com
- www.brainpopjr.com
- [Weather Forecasting](#) by, Gail Gibbons
- [Thunder Cake](#) by, Patricia Polacco

Cross-Curricular Connections

21st Century Skills- CRP5. Consider the environmental, social, and economic impacts of decisions.

Technology- 8.2.5.A.4 Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.

SEL- Students will recognize the importance of self-confidence in handling daily tasks and challenges as they persevere through working in lab groups and partnerships.

Language Arts and Math:

RI.3.7.: Use information gained from text features (e.g., illustrations, maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

3.MD.A.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

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Unit: Structures of Life	Time: 3 rd -4 th Marking Period	Standards:
<p>Essential Questions</p> <ul style="list-style-type: none">• What is the life cycle of living organisms? (seeds, crayfish, human)• How does living in groups help a species survive?• How can studying a species show me about its traits and adaptations?• How can an organism's traits be influenced by its environment?• What can fossils tell us about the past?• How can I explain how plants or animals may leave or become extinct in an environment as it changes?	<p>Enduring Understandings</p> <ul style="list-style-type: none">• I can study the life cycle of plants and crayfish and then create models of the life cycles.• I can show that living in a group helps a species survive.• I can support the explanation that a crayfish' traits can be influenced by its environment.• I can use fossils to tell what the past was like.• I can study at least two studies on environmental changes in order to decide if the claims are accurate or not.	<p>3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death.</p> <p>3-LS2-1 Construct an argument that some animals form groups that help members survive.</p> <p>3-LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.</p> <p>3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.</p> <p>3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.</p> <p>3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.</p> <p>3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.</p> <p>3-LS4-4 Make a claim about the merit of solution to a problem caused when the environment changes and the types of plants and animals that live there may change.</p>

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Benchmark Assessment(s)

- SWBAT create a model of the life cycle of plants and the life cycle of a crayfish. Students will create these models in their science notebooks and label each part of the life cycle. The students will also include a written description of the life cycle being modeled. Students will be assessed using a rubric. (3-LS1-1)
- SWBAT construct an argument that moving a crayfish to a new environment may be detrimental to the survival of that crayfish and possibly other species in the new environment. Students will write a paragraph about how moving a crayfish from a pond to a running stream would change the life of the crayfish and possibly create other changes in the pond. Students will be assessed using a rubric. (3-LS4-3, 3-LS4-4)
- SWBAT conduct a short research project on a chosen animal to find information about how living in groups can help a species survive. Students, working in small groups or pairs, will choose an animal that lives in a group, research that animal, and find how this enables the animal to survive. Students will write facts in list form and present their findings to the class. Students will be assessed using a rubric. (3-LS2-1)
- SWBAT read *Barn Owls* and *Fossils* and view the FOSS video *All about Fossils*. Students will use information from these readings and viewings to write about the fossil's location, and what that indicates about what the environment of was like at the time of the fossils. Students will write a paragraph to the answer to the question: "What can fossils tell us about life long ago?" Students will be assessed using a rubric. (3-LS4-1)
- SWBAT complete investigations 1, 2, 3, 4 (3-LS1-1, 3-LS2-1, 3-LS3-1, 3-LS3-2, 3-LS4-1, 3-LS4-2, 3-LS4-3, 3-LS4-4)
- SWBAT fill out an exit slip explaining how variations in crayfish may provide advantages in surviving, finding mates and reproducing. (3-LS3-1, 3-LS3-2, 3-LS4-2)
- SWBAT observe, record, graph, and interpret plant growth over a period of time to explain how they know that traits are inherited from the parent plant. (3-LS3-1,

Other Assessments

- I-check assessments
- Notebook checks
- Class participation
- Teacher observations
- Lab Group work
- Life Cycle Rubric
- Crayfish Environment Rubric
- Crayfish Exit Slip
- Animal Research Project Rubric
- Fossil Paragraph Rubric
- Pre- and Post-test
-

Materials

- FOSS kit materials
- Student notebooks
- Teacher manuals
- Reminder: Order crayfish about one month prior to teaching Investigation 3: Meet the Crayfish

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SUGGESTED ACTIVITIES

- Investigation 1: Students embark upon a seed search in a variety of fruit. Students use two different kinds of sprouters to sprout seeds to investigate the effect of water on seeds. Students will soak seeds overnight to find the mass of water absorbed by the seed. Students will modify seeds for dispersal, search for seeds and consider how they are adapted for dispersal.
- Investigation 2: Students compare germinating seeds in sprouters and identify the structures such as: seed coats, cotyledons, stems, leaves and roots. Students connect those structures to how they enhance the plant's chances of survival. Students grow beans hydroponically to observe and record the life cycle of the plant. Students will also read and discuss inherited traits that the plants display. Students will investigate roots of various plants by comparing the roots of various plants and the inherited characteristics of those plants.
- Investigation 3: Students observe and record crayfish structures through direct interaction with live crayfish. Students observe the behaviors of the crayfish to learn that those behaviors are a survival tactic. Students will observe the territorial behavior of the crayfish and consider this as a possible adaptation to improve crayfish survival rates. Students also use a computer simulation to study variation of traits and how they may affect survival of individual.
- Investigation 4: Students will observe the human body and estimate the number of bones, they will assemble a model of a human skeleton from memory, and then compare to an accurate model. Students will dissect an owl pellet and try to match rodent bones with a rodent skeletal diagram and reassemble the rodent. Students will compare and contrast the rodent bones with human bones. Students will also read about fossils and what information they provide about past environments.

REINFORCEMENT

- Provide printed notes, organizers, charts, etc. for student notebooks.
- Vocabulary matching game.
- Show video: How Seeds Get Here... And There – Foss Teacher Page/Digital Only Resources/Streaming Video
- Show tutorial: Animal Basic Needs – Foss Teacher Page/Digital Only Resources/Tutorials

ENRICHMENT

- ✓ Growth Comparison Poster – Enrichment Activity
Prepare materials such as black posters boards, markers, and science notebooks. Explain that all organisms grow and that they will create a poster with a graphic organizer comparing the growth of different individuals. Model to students an appropriate way to chart their comparison table and use the human growth as a basis. Students work with a partner to create a poster in which they compare the similarities and differences in the way different organisms grow. Examples could be: seed, fish, and cat, to a human. The students use the human as the basis for comparison listing the stages of growth of a human: embryo, baby, and child, adult.
Extension: Students can add the needs of the organisms for each stage.

Suggested Websites

- Scholastic resource Study Jam in order practice and review seed, photosynthesis, and flower skills: <http://www.scholastic.com/teachers/activity/plants-11-studyjams-interactive-science-activities>
- Brainpopjr.com Plant Adaptations: <https://jr.brainpop.com/science/plants/plantadaptations/preview.weml>
- Review or study crayfish characteristics at the following website: <http://ed101.bu.edu/StudentDoc/current/ED101fa12/eburrell/eburrell/physical-characteristics.html>
- Visit online habitats for animals site: http://www.skyenimals.com/browse_habitat.cgi
- Visit the quizlet site in order to practice using Structures of Life vocabulary: <https://quizlet.com/17670154/3rd-grade-science-structures-of-life-flash-cards/>
- Kidshealth website in order to review joints and muscles: <http://kidshealth.org/Search01.jsp?SearchSection=3&Mode=Search&SearchTextArea=muscles%20it>

Suggested Materials

- A Seed is Sleepy by, Dianna Hutts Aston (seeds, fruit, and traits of seeds)
- The Tiny Seed by Eric Carle (seed dispersal and adaptation)
- Read First Garden: The White House Garden and How it Grew by Robbin Gourley
- Crayfish by Phyllis W. Grimm
- The Crawfish Book by Glen Pitre

Cross-Curricular Connections

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21st Century Skills- CRPR4. *Communicate clearly and effectively and with reason.*

Technology- 8.2.5.B.1 *Examine ethical considerations in the development and production of a product through its life cycle.*

SEL- *Students will recognize the skills needed to establish and achieve personal and educational goals as they complete their scientific notebooks. They will review their goals and add to them after each investigation.*

Students will demonstrate an understanding of the need for mutual respect when viewpoints differ while practicing the golden rule while speaking with each other in labs and class discussions. Students will utilize positive communication and social skills to interact effectively with others throughout the day as the teacher provides continual practice.

Language Arts and Math:

RI.3.1.: *Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.*

SL.3.4.: *Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.*