PRESTON PUBLIC SCHOOLS
Science Curriculum Revision to Align with NGSS
Unit Plan Organizer
2nd Grade

Grade Level	Unit Name	Unit Theme/Description	NGS Standards Included
2	Animal Adventures and Animal Biodiversity	This unit helps students develop a sense of wonder for biodiversity. Students gain practical experience in identifying animals and sorting them into scientific groups, and apply their knowledge in an engineering design challenge. This unit introduces two critically important concepts in biology: "habitat" and "species," foundational concepts which will be revisited and refined at higher grade levels. Lesson 1 – How many different kinds of animals are there? Overview: students examine how scientists organize animals into groups based on their characteristics. In the activity, students sort animal cards into groups, classify three "challenge" animals. Materials: • Animal cards; • 4 pieces of blank paper; • Challenge cards. Assessment: Students match animals to their characteristics through multiple choice and open ended questions.	2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats. Science & Engineering Practices: --Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool; --Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem; --Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. Cross-cutting Concepts: --Students identify patterns in animal's characteristics in order to group them; --Students explore the cause and effect relationship between bird feeder design and the type of food in it and the types of birds that visit it.

		Lesson 2: *Why do frogs say "ribbit"?* Overview: This lesson is a case study in biodiversity using the frogs of North America. In the activity, students learn to identify frogs by their unique calls and investigate which of two locations has a greater variety of frogs. Materials: • 1 "Who's Calling?" worksheet; • 1 "How Many Kinds of Frogs?" worksheet. Assessment: Students answer multiple choice and open ended questions about frogs and toads, and their habitats. Lesson 3: How could you get more birds to visit a bird feeder? Overview: students investigate which kinds of birds are likely to visit a bird feeder, based on what they eat. In the activity, students design and create prototypes of their own bird feeders. Materials: • paper plates & paper cups; • pencils/skewers; • aluminum foil; • tape or stickers (to be used in place of tape); • binder clips or clothes pins; • pipe cleaners; • scissors; • paper punch; • inspiration sheets; • My Bird Feeder worksheets.	

		Assessment: Students design a prototype bird feeder and explain how bird feeders are designed to attract different birds in an assessment.	
2	Material Magic: Properties and Phases of Matter	This unit develops the idea that by taking advantage of the properties of materials, we can solve many problems in our lives. Students will develop an appreciation for the manmade materials of everyday objects, and learn to recognize that those materials are chosen based on their properties. Lesson 1: Why do We Wear Clothes? Overview: In this lesson, students explore the different properties of materials used for clothing. In the activity, students select materials they need to construct a hat that protects them from the sun. Materials: • a paper towel; • a paper plate; • a paper lunch bag; • a square of aluminum foil (about 12" square); • a 3-foot piece of thick string, yarn, or ribbon; • a large rubber band (the bigger the better); • two clothespins (or hair clips or binder clips); • a pencil (for writing on the worksheet); • For each table of students, you'll need a cup of water and a few spoons.	2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties; 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose; 2-PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object; 2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. Science & Engineering Practices: --Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool; --Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem; --Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. Cross-cutting Concepts: --Students consider the pattern that different materials share similar properties. Students test the effect a material's properties have on its function;

		Assessment: Students describe properties of materials and provide examples. Lesson 2: Can You Really Fry an Egg on a Hot Sidewalk? Overview: In this lesson, students consider the insulating and conducting properties of different materials. In the activity, students test different materials to determine which material is best for making oven mitts. Materials: For each pair of students, you will need: • A pair of socks (have each student bring in a pair); • 2 aluminum foil squares torn off the roll (about 12" square); • 2 Styrofoam cups; • A "Feel the Heat" worksheet; For each table of students, you will need: • 2 plastic bottles — one filled with hot/warm water and one filled with cold/cool water. Assessment: Students answer questions and give examples about what materials conduct heat and those that are good insulators. Lesson 3: Why Are so Many Toys Made Out of Plastic? Overview: Students learn about melting and the solid & liquid states of matter then discover why plastic was invented. In the activity, students test the "meltable" property of candy.	--Students consider the cause and effect of heat being added to meltable substances. They observe that when heat (energy) is applied to a meltable substance (matter), it changes shape; --Some materials have properties that cause them to be better suited to a purpose. Students begin to explore how the structure of a designed object relates to its function.

		Materials: For each student, you will need: • a ziplock bag (snack-size or sandwich-size); • a "push stick" — that is, a spoon, popsicle stick, or ruler; • a "Testing Candy for Camp Way-Too-Hot" worksheet; For each pair of students, you will need: • a container with a lid; • a styrofoam plate; • a dozen chocolate chips or a square of milk chocolate. You'll also need: • a source of hot water; • a small bag of candy with a high melting point, such as jelly beans, gumdrops, OR Swedish fish; • a small bag of candy with a low melting point, such as gummy bears, Life Savers Gummies, OR gummy worms. Look for gelatin in the ingredient list; • a small bag of candy with an intermediate melting point, such as Starburst, caramels, OR butterscotch chips; • (Optional: a cooler or a cardboard box and a bath towel). Assessment: Students answer questions about properties of some materials**.** Students construct an argument with evidence that some changes caused by heating or cooling can be	

		reversed and some cannot. Lesson 4: What Materials Might Be Invented in the Future? Overview: In this lesson, students learn how new materials are invented. In the activity, they create a design for an invention that uses a futuristic material. Materials: • Watch activity video on Mystery Science Website; • A board where you can write student ideas; • A copy of the "Invention sheet" for each student. Assessment: Students describe the properties and draw pictures of inventions. Lesson 5: Could You Build a House Out of Paper? Overview: Students examine how large structures like houses are built from smaller pieces. In the activity, they design their own structures using an unconventional building material: paper! Overview: Materials: Assessment: • Watch activity video on Mystery Science website; • A board where you can write student ideas; • A copy of the "Invention Sheet" for	

		each student. Assessment: Students describe the properties and draw pictures of inventions.	
2	Plant Adventures: Structure, Function and Adaptations	This unit develops the idea that plants are truly alive and face challenges every bit as dramatic as those of animals. Students will learn that plants have needs and will reason from evidence to understand how plants meet their needs. Lesson 1: How Did a Tree Travel Halfway Around the World? Overview: students will learn how seeds must get away from their parent plant in order to survive. Materials: Each student will need: • a copy of paper templates and instruction sheets for the "Spinner", the "Glider", or the "Rotocopter." Each student will make one flyer; • scissors; • a pen or pencil; • a paper clip. The teacher will need: • medium size binder clip or clothespin; • a chair for the "official seed dropper" to stand on; • a dark piece of paper labeled ZONE OF DARKNESS. The smaller the paper, the easier it is for students to succeed. To make it easy, use a letter-sized page. To make it more difficult, go with a	2-LS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land; 2-LS2-2: Use information from several sources to provide evidence that Earth events can occur quickly or slowly; 2-LS4-1: Develop a model to represent the shapes and kinds of land and bodies of water in an area. Science & Engineering Practices: --Students model seed dispersal by creating three different seed flyers. They investigate how each seed flyers' structure helps the seed disperse; Students conduct an investigation using a root viewer to observe how roots grow. Students record what the seed looks like for 2 days, turn the root viewer to the side on Day 3, and record the growth until Day 4; --Students make a Grass Head and conduct an investigation to determine the sun's impact on the direction plants grow. After analyzing data, students predict growth patterns of plants; --Students analyze the Grass Head data. They compare their growth pattern prediction with the actual results to determine if the grass grew in the direction of the sunlight; --Students engage in a model simulation of a farm with different growing conditions in different areas of the farm. Students consider the needs of a plant in order to determine where it will grow best. Cross-cutting Concepts: --Students explore how the structure of a seed helps it disperse (function);

		larger sheet. Assessment: Students answer open ended questions, explaining how seeds travel, and complete a fill in the blank. Lesson 2: Do Plants Eat Dirt? Overview: students will learn the importance of water (which is taken in by the roots) for plants, and what it is about dirt that plants really need. They'll build a Root Viewer to see up close how roots behave. Materials: Each student will need: • a CD case; • 5 radish seeds (a3-gram seed packet from your local garden/hardware store contains about 240 seeds); • a pencil; • a small piece of masking tape; • a plastic sandwich bag (to hold the CD case); • a wet paper towel; • a "Root Viewer" worksheet. Assessment: students answer open ended questions, applying what they learned in the lesson about what plants' roots need to survive. Lesson 3: Why Do Trees Grow So Tall? Overview: students will learn the importance of sunlight to plants which is collected by their leaves. Knowing how plants respond to sunlight, they will build creative Grass Heads.	--Students evaluate the effect minerals have on plant growth. Students consider how the structure of plants helps them get the water and minerals they need to survive (function); --Students consider the effect sunlight has on plant growth. Students analyze the role of the leaves (structure) in helping the plant capture sunlight (function); --Students consider the cause and effect relationship between a plant's needs and the habitat it survives best in. Students consider how plants have structures that help them survive in their environment (function); --Students consider the cause and effect relationship between a plant's needs and the habitat it survives best in.

		Materials: Each student will need: • a Grass Head worksheet; • a ruler; • a ballpoint pen or Sharpie (water-soluble markers will not work); • a popsicle stick; • 3 small rubber bands; • 2 paper towels; • a paper plate; • a nylon kneesock cut as described. In addition, you will need: • about 2 cups (about one pound) of fast-sprouting grass seeds; • bowls or plates to hold ¼ cup of grass seed (one bowl for each group of 4 students); • cups of water (one cup for each group of 4 students); • a few ceramic coffee mugs and four plates (styrofoam, plastic, or ceramic) for the grass heads while they are sprouting. (Plates must have raised edges so they'll hold water.) Assessment: Students answer open ended questions explaining how sunlight effects plant growth. Lesson 4 continued Materials: • the Grass Head they made earlier; • the Grass Head worksheet from last week's lesson;	

		• a pencil; • a paper plate to put their grass head on. Assessment: Students answer open ended questions about how water and sunlight can affect different plants. Lesson 5: Where Do Plants Grow Best? Overview: students will practice thinking like gardeners. We will play "Plant Survivor!" Materials: • a pencil; • three Plant Cards. Assessment: Students answer open ended questions about what happened to their plant. What helped it to survive, or what caused it to die?	
2	Work of Water	This unit helps students develop the idea that water is a powerful force that reshapes the earth's surface. Students see that water isn't just something we drink. It carries sand to create beaches, carves out canyons and valleys and, as ice, scrapes entire areas flat. Lesson 1: If You Floated Down a River, Where Would You End Up? Overview: students develop a model of the earth's surface and use it to discover an important principle about how rivers work. Materials: • Students make mountain models out of paper. Then students take turns using a spray bottle to make rain fall on their models to observe patterns of how	2-ESS1-1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly; 2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land; 2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area; 2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be solid or liquid. Science & Engineering Practices: --Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool;

		water and rivers flow. Assessment: Students will answer open ended questions pertaining to the lesson. Lesson 2: Why Is There Sand at the Beach? Overview: Students will learn the importance of water (which is taken in by the roots) for plants, and what it is about dirt that plants really need. They'll build a Root Viewer to see up close how roots behave. Materials: • Students pretend to be a river and tear up pieces of construction paper to model what happens to rocks as they travel along the river. Assessment: From the results of their investigation, students construct an explanation for why there is sand at a beach. Lesson 3: What's Strong Enough to Make a Canyon? Overivew: Students use a model of rain and land to explain what causes a canyon to form. Materials: Each student needs: • a spoon; • 2 3-oz Dixie® cups (or similar cups) • "How did water change your land?" handout (2 pages). Each pair of students needs: • paper plate to build on; • plastic plate to catch the water; • 2 binder clips;	--Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem; --Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs; Cross-cutting Concepts: --Students identify patterns about where rivers start and end on earth's surface; --Students reason about the cause and effect of rocks tumbling in a river (cause) and turning into sand (effect). Students begin to explore that changes to the earth's surface can happen slowly through the process of erosion; --Students consider the cause and effect of how heavy rains (cause) create canyons on earth's surface (effect). Students begin to explore that changes to the earth's surface can happen slowly through the process of erosion; --Students apply the concept that changes to earth's surface can happen rapidly during a landslide. Students mimic natural structures and their functions to create a design solution that lessens the impact of landslides.

		• 2 Solo® plastic cups;
		• Solo® plastic cup filled with water;
		• a "shaker":
		  ○ Solo® plastic cup with holes poked in the bottom (or a salt shaker);
		  ○ cinnamon, or pepper, or flour (about 1 tsp);
		• a "drip cup":
		  ○ ruler;
		  ○ small plastic condiment cup (a paper cup will not work);
		  ○ a piece of sticky tack.
		Each table of 4 students needs:
		• newspaper or plastic for covering the table;
		• paper towels for mopping up spills;
		• food storage container big enough to hold about 1½ cups of cornmeal "land";
		• 1½ cups of cornmeal "land":
		  ○ Cornmeal;
		  ○ Salt;
		  ○ Water.
		Assessment: Students explain what causes a canyon to form.
		
		Lesson 4: How Can You Stop a Landslide?
		Overview: Students compare multiple solutions for preventing erosion.
		Materials:
		Each student needs:
		• Scissors;	

		• paper towel; • paper plate; • plastic plate; • 1 3-oz Dixie® cup (or similar cup) for scooping up the "land"; • Save the Hills worksheet; • Plate Pocket worksheet. Each pair of students needs: • 10 toothpicks; • 10 cotton balls; • 4 paper-towel strips, each about 1" x 5"; • 2 pieces of aluminum foil, each about 1½" square; • 2 plastic cups (or Dixie cups) made into a "rainmaker." Each table of 4 students needs: • newspaper or plastic for covering the table; • paper towels for mopping up spills; • food storage container big enough to hold about 1½ cups of cornmeal "land"; • 1½ cups of cornmeal "land"; • Water. Assessment: Students design and test ways to keep water from washing away a hill modeled out of cornmeal.	