Southern York County School District Instructional Plan

Name:	Dates: Rotation Basis
Course/Subject: Grade 4 Science	Unit Plan: Measurement

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed: 3.1.4.D; 3.1.4.E; 3.2.4.A; 3.2.4.C; 3.7.4.B; 3.8.4.A

S4.A.1.1 Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.

S4.A.1.3 Recognize and describe change in natural or human-made systems and the possible effects of those changes.

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.

S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible effects of those changes on the environment.

S4.D.2.1 Identify basic weather conditions and how they are measured.

Understanding(s):
Students will understand . . .

1. A standard unit of measure is necessary for consistency in communication between people.
2. A meter is the basic unit of linear measurement in the metric system.
3. The gram is the standard unit of measure used to determine mass in the metric system.
4. The liter is the standard for measuring fluid volume in the metric system.
5. Degrees Celsius is the unit scientists generally use to measure temperature.

Essential Question(s):

- What tools and units are used to measure the attributes of an object?
- How are the units of measure within a standard system related?

Learning Objectives:
Students will know . . .

- A standard is necessary for consistency among measurements.
- A meter is the standard metric unit for measuring length or distance.
- A centimeter is 1/100 of a meter.
- A kilometer is 1000 meters.
- It helps to think about a reference to estimate a measurement.
- A person's arm span and height are about the same length.
- The gram is the standard unit of measure for mass in the metric system.
- Use kilograms to measure something that weighs more than 1,000 grams.
- There are 1,000 milliliters in 1 liter.
- The standard unit for measuring volume and capacity is the liter.
- A syringe should be used to measure 50 ml at a time.

Students will be able to:

- Use a personal reference to estimate the lengths and heights of objects.
- Measure in standard metric units: meter and centimeter.
- Measure different parts of the body and look for similarities such as arm span and height.
- Use a balance to weigh objects in standard metric units: gram and kilogram.
- Use their measuring skills to compare the mass of a sponge to the mass of the water it can hold.
- Estimate and measure given volumes of water using standard metric units: liter and milliliter.
- Measure the capacity of several containers, using 50-ml syringes and graduated cylinders.

▪ A graduated cylinder should be used to measure less than 50 ml. ▪ A thermometer is used to measure temperature. ▪ Record temperature in degrees Celsius.	▪ Use their measuring skills to check the capacity of soda cans and compare their findings to the volume printed on the can. ▪ Use a thermometer to measure the temperature of water. ▪ Plan and conduct a field day with a variety of competitive events that require the winner to use measurement in some form.
Name:	**Dates: Rotation Basis**
Course/Subject: Grade 4 Science	**Unit Plan: Magnetism and Electricity**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed: 3.1.4.A; 3.1.4.B; 3.2.4.A; 3.2.4.C; 3.2.4.D; 3.4.4.B; 3.4.4.C; 3.8.4.A

S4.A.1.1 Identify and explain the application of scientific, environmental, or technological knowledge to possible solutions to problems.

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.

S4.A.3.2 Use models to illustrate simple concepts and compare the models to what they represent.

S4.C.2.1 Recognize basic energy types and sources, or describe how energy can be changed from one form to another.

Understanding(s): ***Students will understand . . .*** 1. A magnet is a material or object that produces a magnetic field. 2. The magnetic field is invisible and attracts or repels other magnets. 3. A circuit is a pathway through which electric current flows. 4. A magnetic force causes magnetic interactions. 5. Conductors and insulators are materials that are used to control the flow of electric current. 6. Electromagnetism is magnetism created by current flowing through a conductor. 7. The strength of the magnetism produced by an electromagnet can be varied. 8. Science is the knowledge of the natural world; technology is using scientific knowledge to modify the world to solve problems. 9. Through technology man has created many useful and essential applications for electricity.	**Essential Question(s):** ▪ What attracts or repels objects to a medal force? ▪ To what extent does magnetic force go through all materials? ▪ How is the force between two magnets measured? ▪ To what extent can electric current be controlled? ▪ How are motor, series or parallel circuits the same or different? ▪ How can man create and control electromagnetic forces? ▪ How can the knowledge of electricity and electromagnetismm be useful to man? ▪ How has man used electricity as a useful tool?
Learning Objectives:	

Students will know . . .	***Students will be able to:***
▪ Magnetism can be induced in a piece of steel that is close to or touching a magnet. ▪ A closed circuit allows electricity to flow; an open circuit does not. ▪ An electric circuit is a pathway along which electricity flows. ▪ A circuit that splits into two or more pathways before coming together at the battery is a parallel circuit. ▪ Electromagnets can be turned on and off. ▪ What materials are attracted or repelled by magnets. ▪ A force is a push or a pull. ▪ The greater distance between two magnets, the weaker the force of attraction. ▪ Compasses, iron filings, and iron objects can be used to detect a magnetic field. ▪ A D-cell is a source of electric energy. ▪ A bulb is an energy receiver that produces light. ▪ To make a complete circuit, electricity must travel in a circle from one end of the battery to the other. ▪ A motor is an energy receiver that produces motion. ▪ A switch is a device that opens and closes a circuit. ▪ Schematic diagrams represent circuits. ▪ Materials that allow the flow of electric current are conductors. ▪ Materials that do not allow the flow of electric current are insulators. ▪ All metals that are covered with an insulating layer will not conduct electricity. ▪ A circuit with only one pathway for current flow is a series circuit. ▪ Components in a series circuit “share” the electric energy. ▪ Cells in series must be oriented in the same direction. ▪ Components in a parallel circuit have a direct pathway to the energy source. ▪ A single D-cell can run many components when they are connected in parallel. ▪ A magnet can be made by winding an insulated wire around an iron core and running current through the wire. ▪ All the coils need to be wound in the	▪ Discover that induced magnetism disappears when steel object separates from the magnet. ▪ Explain what materials are attracted or repelled by magnetic forces? ▪ Explain how magnetic force can be temporarily transferred to other steel objects? ▪ Measure the force of attraction between two magnets. ▪ Explain why the force of attraction decreases as the distance between two magnets increases. ▪ Explore ways to detect magnetic force. ▪ Explore and create simple electric circuits. ▪ Explain concepts of the flow of electric current. ▪ Draw schematic diagrams of circuits. ▪ Build a circuit and test whether objects are conductors or insulators. ▪ Operate more than one component in a circuit. ▪ Invent a series circuit to make two bulbs shine brightly with two D-cells. ▪ Construct a parallel circuit to make many bulbs operate on one D-cell. ▪ Identify six ways to wire a parallel circuit. ▪ Simulate the research and development department of a decorative-light manufacturer by combining their knowledge of series and parallel circuits. ▪ Research inventors such as Thomas Edison who have contributed to the use of electricity in everyday life. ▪ Explain why current flows through an insulated wire wound around a steel core and the steel core becomes a magnet. ▪ Explain how electromagnetic current can be created and controlled. ▪ Propose other ways to change the strength of an electromagnet. List a set of variables, plan, and conduct an experiment. ▪ Apply knowledge of circuitry and electromagnetism to build a telegraph.

same direction. ▪ A D-cell added in series makes a stronger electromagnet; added in parallel, it does not strengthen the electromagnet. ▪ Technology uses science to solve problems. ▪ A telegraph is an electric communication device. ▪ To connect two telegraphs for two-way communication, you have to make two complete circuits. ▪ The magnetism produced by an electromagnet can be controlled by turning the current on or off, and it's strength varied by using thicker wire and making tighter and more winds around the core.	
Name:	**Dates: Rotation Basis**
Course/Subject: Grade 4 Science	**Unit Plan Structures of Life**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed: 3.2.4. A, 3.2.4. B, 3.2.4.C, 3.2.4.D, 3.3.4.A, 3.3.4.B, 3.3.4.C, 3.3.4.D,

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.

S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.

S4.B.1.1 Identify and describe similarities and differences between living things and their life processes.

S4.B.2.2 Identify that characteristics are inherited and, thus, offspring closely resemble their parents.

S4.B.3.1 Identify and describe living and nonliving things in the environment and their interaction.

Understanding(s): ***Students will understand . . .***	**Essential Question(s):**
1. The knowledge and understanding of seeds enables man to maximize their production and generate growth in different environments. 2. All living organisms are classified by specific observable characteristics and behavior. 3. The structures found on different kinds of organisms show some similarities and differences. 4. An organism's structures have functions that help it survive in its habitat. 5. We must take care not to harm animals as we learn about them.	▪ Where do seeds come from? ▪ What effect does water have on seeds? ▪ How do plants develop, grow and change over time? ▪ What conditions do plants need in order to grow? ▪ How do the similarities and differences in an organism's structure affect its survival? ▪ How does behavior affect an organism's survival? ▪ What is important to consider when planning investigations of animals? ▪ Why is it important to learn about the

	structures and functions of plants and animals? ▪ What are the basic needs of living organisms?
Learning Objectives: ***Students will know . . .*** ▪ Different fruits produce different kinds and numbers of seeds. ▪ A seed is an organism, a living thing that stores food and provides protection for the young plant. ▪ Plants need water, light, and nutrients to grow. ▪ Hydroponics is the technique of growing plants in water. ▪ The life cycle is the process of a seed growing into a mature plant, which in turn produces seeds. ▪ Seeds develop in the fruit of a plant. ▪ Water can make seeds get bigger, heavier, and grow. ▪ Seeds have common structures: cotyledons, roots, stems, and leaves. ▪ Crayfish have observable structures such as legs, eyes, antennae, carapace, swimmerets, tail, pincers, and mouth parts. ▪ Crayfish need clean, cool water; food from plants and animals; and shelter. ▪ The things animals do are behaviors. ▪ Some animals establish territories that they defend. ▪ Bess beetles have six legs, three body parts, two antennae, two jaws, and a horn. ▪ Bess beetles need water, food (wood), space, and air in their habitat. ▪ Organisms have some similar structures and some differences. ▪ An organism's structures have functions that help it survive in its habitat. ▪ The feet of the bess beetle strongly grasp rough surfaces. They can pull on wood as the beetle makes tunnels or tears wood to eat it. ▪ Scientists must conduct their investigations so that no harm is done to animals.	***Students will be able to:*** ▪ Describe the characteristics of seeds in different fruits. ▪ Observe and record the effect of water on seeds. ▪ Compare the mass of seeds that have been soaked in water overnight to mass of dry seeds. ▪ Determine how much water seeds soak up. ▪ Compare different seeds as they germinate in minisprouters. ▪ Identify and describe emerging plant structures such as seed coats, cotyledons, stems, leaves, and roots. ▪ Grow bean seedlings in a hydroponic setup. ▪ Grow seedlings in a nutrient solution; observe them throughout their life cycle, watch for emerging flowers, fruit, and new seeds. ▪ Sequence illustrations that depict different stages in the life cycle of a bean plant. ▪ Observe and record the structures of crayfish through direct interaction with live crayfish. ▪ Set up crayfish habitats and care for them. ▪ Investigate crayfish behavior by observing what crayfish do in a bare container with water, and how behavior changes when habitat is added, and when crayfish meet each other. ▪ Set up a long-term observing and recording system for investigating territorial behavior in crayfish. ▪ Observe bess beetles and handle them carefully. ▪ Describe beetle structures and behaviors. ▪ Use Venn diagram to compare crayfish and beetle structures. ▪ Discuss functions of various structures observed. ▪ Attach loads to beetles using a dental floss harness; discover how much mass a beetle can pull; compare the load to mass of the beetle.

Name:	Dates: Rotation Basis (FOSS SUGGESTS FALL/SPRING DUE TO THE USE OF LIVING ORGANISMS)
Course/Subject: Grade 4 Science	Unit Plan: Water

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed: 3.1.4.A; 3.1.4.C; 3.1.4.E; 3.2.4.B; 3.2.4.C; 3.2.4.D; 3.5.4.D; 3.8.4.A; 4.1.4.A; 4.1.4.B; 4.1.4.C; 4.2.4.A; 4.3.4.A; 4.3.4.B; 4.3.4.C; 4.6.4.B; 4.8.4; 4.8.4.C; 4.8.4.D

S4.A.1.1 Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.

S4.A.1.3 Recognize and describe change in natural or human-made systems and the possible effects of those changes.

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.3.1 Identify systems and describe relationships among parts of a familiar system.

S4.A.3.2 Use models to illustrate simple concepts and compare the modes to what it represent.

S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.

S4.B.1.1 Identify and describe similarities and differences between living things and their life processes.

S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible effects of those changes on the environment.

S4.B.3.3 Identify or describe human reliance on the environment at the individual or the community level.

S4.C.1.1 Describe observable physical properties of matter.

S4.C.3.1 Identify and describe different types of force and motion, or the effect of the interaction between force and motion.

S4.D.1.2 Identify the types and uses of Earth's resources.

S4.D.1.3 Describe Earth's different sources of water or describe changes in the form of water.

S4.D.2.1 Identify basic weather conditions and how they are measured.

Understanding(s):
Students will understand . . .

1. Water interacts differently with different materials.
2. Surface tension makes a drop of water form beads and domes with a skinlike surface.
3. Water flows downhill.
4. Water may exist as a solid, liquid, or gas, depending on its temperature.
5. Changing the temperature of water may change its properties.
6. Evaporation is the process by which liquid water changes into water vapor.
7. Condensation occurs when water vapor contacts a cool surface and changes into a liquid.
8. Evaporation and condensation contribute to the movement of water

Essential Question(s):

- How do the properties of water make it unlike any other earth material?
- How does temperature affect the properties of water?
- How do the properties of water contribute to the movement of water through the water cycle?
- How can water be used to do work?
- Does the quality of water determine how it is used?

through the water cycle. 9. Water flows more easily through some earth materials than through others. 10. Flowing water can be used to do work. 11. Water contains different materials that affect its quality.	
Learning Objectives: ***Students will know . . .*** ▪ Water is absorbed by some materials and beads up on others. ▪ Water forms a dome on a flat surface. ▪ Surface tension makes water form a sphere or dome. ▪ Soap added to water reduces its surface tension. ▪ Water flows down a slope. ▪ Bigger domes of water move down a slope faster. ▪ Water flows faster down a steep slope. ▪ Heated water expands, making the liquid column in a thermometer longer. ▪ Cooled water contracts, making the liquid column in a thermometer shorter. ▪ Hot water is less dense than room-temperature water. ▪ Cold water is denser than hot water. ▪ Water expands and turns solid when it freezes. ▪ Ice floats in liquid water. ▪ Cold water from melting ice sinks in room-temperature water. ▪ The process of evaporation causes wet materials to dry when exposed to air. ▪ Water changes into a gas called water vapor, and goes into the air. ▪ Water placed in the warmest locations has the most evaporation. ▪ Water evaporates faster when it's placed in a space where it has the greatest surface area. ▪ When water vapor in the air touches a cool surface, it condenses into liquid. ▪ Evaporation puts water in the air. ▪ Condensation turns the vapor back into water, which falls to Earth as precipitation and keeps the global water cycle operating. ▪ Water soaks into some materials and runs through others. ▪ A waterwheel works because flowing or falling water pushes on the blades, making them move. If the blades are attached to an axle, the water turns the axle. ▪ Different materials dissolve in water and	***Students will be able to:*** ▪ Conduct investigations to observe the properties of water. ▪ Compare how water interacts with a paper towel, waxed paper, aluminum foil, and writing paper. ▪ Discover how many drops of water, due to surface tension, they can place on a penny before the water spills off. ▪ Try to change water's surface tension by separately adding soap and rock salt to a dome of water on a penny. ▪ Place drops of water on a sloped surface to observe the flow of water downhill. ▪ Observe how changing the size of the water beads affects the flow. ▪ Observe how increasing the slope affects the flow. ▪ Build a bottle thermometer and conduct investigations to find out what happens when the thermometer is placed in hot and cold water. ▪ Observe that less-dense warm water rises when they lower a vial of hot water into a cup of room-temperature water. ▪ Observe what happens when they lower a vial of cold water into a cup of room-temperature water. ▪ Freeze water in soft plastic vials with caps and in syringes to observe the increase in volume. ▪ Weigh equal volumes of water and ice on a balance. ▪ Observe ice as it melts. ▪ Observe two paper towels soaked with equal amounts of water and then left to evaporate, one in a cup with a lid and the other in an open cup. ▪ Investigate the effect of location/air temperature on the rate of evaporation. ▪ Measure and compare the amount of water remaining in containers in which the surface area of the water is different in each container. ▪ Observe the process of condensation in cups of ice water and room-temperature water.

affect its quality. ▪ Different qualities of water are suited for different purposes.	▪ Set up a condensation chamber and observe the process of condensation in the chamber. ▪ Explain the water cycle. ▪ Measure the amount of water that drains through earth materials and use a balance to compare the resulting masses of soil and gravel. ▪ Design and construct simple waterwheels. ▪ Use water to power their waterwheels to lift objects. ▪ Compare samples of water collected from their homes and community. ▪ Evaporate the water samples to find out if any contain dissolved materials. ▪ Consider different types of water used for different purposes.