Southern York County School District Instructional Plan

Name:	**Dates: Rotation Basis**
Course/Subject: Science, Grade 5	**Unit Plan 1: Solar Energy**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed:
State Standards: 3.1.7. B, 3.2.7.A, B, C, D, 3.4.7.B, 3.7.7.B
Assessment Anchors:

S8.A.1.1. Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g. visuals, scenarios, graphs).
S8.A.1.2. Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems.
S8.A.1.3. Identify and analyze evidence that certain variables may have caused measurable changes in natural or human-made systems.
S8.A.2.1. Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.
S8A.3.2. Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.
S8A.3.3. Describe repeated processes or recurring elements in natural, scientific, and technological patterns.
S8.B.3.2. Identify evidence of change to infer and explain the ways different variables may affect change in natural or man-made systems.
S8.C.2.1. Describe energy sources, transfer of energy, or conversion of energy.

Understanding(s):
Students will understand . . .

1. The earth's position in relationship to the sun produces the amount of energy available for use.
2. Solar energy produces light and energy.
3. Areas of shadow indicate the amount of solar energy availability is limited.
4. Energy transfer is the change of energy from one form to another or from one object to another.
5. Solar energy is the radiant light and heat produced by the sun.

Essential Question(s):

- What is solar energy?
- How can solar energy most effectively be used as a resource?
- What influences the availability and potential power of solar energy?

Learning Objectives:
Students will know . . .

- The definition of solar energy
- How to relate rate and amount of change in temperatures of the earth materials.
- Relationship of black and white collectors in solar water heaters.
- How surface area collectors influence the temperature change of water in solar heaters.
- The components of a solar house.
- How window exposure, interior color and insulation influence air temperature.
- Shadows are the dark areas that result

Students will be able to:

- Explain how solar energy is produced and how it can be used as a resource.
- Trace shadows in morning and afternoon and compare tracings to determine position of the sun as it moves throughout the day.
- Measure temperatures in degrees Celsius.
- Construct a shadow tracker using a compass in order to make hourly records of shadows that an object casts.
- Use a thermometer to measure and compare temperatures in the sun and

when light is blocked. ▪ How the earth's position in relationship to the sun affects the ability to collect and use solar energy.	shade over elapsed time. ▪ Set up an investigation to explain what happens when the sun shines on 4 earth materials (water, sand, wet soil, and dry soil) over 20 minutes and organize results into a graph. ▪ Set up solar water heaters with black and white collectors to explain how color affects temperature change in water. ▪ Experiment with the surface area of black collectors to explain the relationship between the size of the collector and the temperature change of water. ▪ Assemble a model solar house and conduct experiments to explain how the color of the interior of a house affects space heating. ▪ Explain the relationship of the earth to the sun and how it influences the amount of energy produced.

Name:	**Dates: Rotation Basis**
Course/Subject: Science, Grade 5	**Unit Plan 2: Levers & Pulleys**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed: 31.7.D, 3.2.7.A, 3.2.7.B, 3.2.7.C, 3.2.7.D, 3.4.7.C, 3.6.7.C, 3.8.7.A, 3.8.7.B, 4.1.7.B, 4.3.7.A,C,D, 4.6.7.A

Assessment Anchor(s):

S8.A.1.1 Explain, interpret and supply scientific, environmental, or technological knowledge presented in a variety of formats

S8.A.2.1 Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems

S8A.2.2 Apply appropriate instruments for a specific purpose and describe the information the instrument can provide

S8.A.3.1 Explain the parts of a simple system, their roles, and their relationships to the system as a whole

S8.A.3.2 Apply knowledge of models to make predictions, draw inferences, or explain technological concepts

S8.A.C.3 Describe the effect of multiple forces on the movement, speed, or directions of an object

Understanding(s): ***Students will understand . . .*** 1. A simple machine is used by people to gain an advantage to make work easier. 2. Symbols and diagrams help people communicate more efficiently. 3. The relationship between the parts of the lever system (fulcrum, effort, and load) determines the class of lever, which refers to the amount and type of work the lever can do.	**Essential Question(s):** ▪ How are various levers used to make work easier? ▪ How are classes of levers the same or different? ▪ What variables need to be considered when designing a lever system to gain the greatest advantage? ▪ How can the effort, fulcrum, and load of a lever system be adjusted to gain the greatest advantage? ▪ Why are conventions necessary for consistent and efficient communication? ▪ How can pulley systems be designed and

	created to gain the greatest advantage?
Learning Objectives: ***Students will know . . .*** ▪ Advantage is a gain in effort, distance, or change of direction resulting from the use of a simple machine. ▪ A single-pulley system can be set up in two ways, fixed or movable. ▪ A single-movable-pulley system provides mechanical advantage for its user. ▪ A single-fixed pulley system provides no mechanical advantage, but changes the direction of the effort. ▪ A two-pulley system can be made with one fixed and one movable pulley. ▪ A two-pulley system in which the effort is applied upward provides a greater advantage than one in which the effort is applied downward. ▪ The effort needed to lift a load with a pulley system can be predicted. ▪ The amount of work put into a system is equal to the work output of the system. Effort is the force needed to move a load or overcome a resistance. ▪ Fulcrum is the point where a lever arm pivots. ▪ Load is a mass lifted, or a resistance overcome by a lever. ▪ A class-1 lever has the fulcrum between the load and the effort. ▪ A class-2 lever has the load between the effort and the fulcrum. ▪ A class-3 lever has the effort between the fulcrum and the load. ▪ Levers are devices that help lift weight or overcome resistance. ▪ The number of ropes pulling on the load and the effort needed to lift it are related to each other.	***Students will be able to:*** ▪ Diagram a class-1, class-2, and class-3 lever after investigation. ▪ Measure the effort to lift a load when the load remains constant and the effort changes position. ▪ Measure the effort to lift a load when the effort remains stationary and the load moves. ▪ Organize observations on a record sheet. ▪ Explain the relationships between the parts of a lever to determine the class of lever. ▪ Observe and compare the effort to lift loads with different kinds of levers. ▪ Diagram the relative positions and sizes of lever components in different systems. ▪ Analyze tools in terms of their application as levers. ▪ Organize information on a data sheet. ▪ Diagram and compare the components of four kinds of pulley systems. ▪ Observe, measure, and record the effort to lift a load with one-and two-pulley systems. ▪ Determine the advantage and disadvantage of pulley systems. ▪ Measure and compare the distance the effort and load travel in different pulley systems.
Name:	**Dates: Rotation Basis**
Course/Subject: Science, Grade 5	**Unit Plan 3: Variables**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed:

State Standards: 3.1.7.A, B, E, 3.2.7.A, B, C, D, 3.7.7.B

Assessment Anchors:

S8.A.1.1. Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g. visuals, scenarios, graphs).

S8.A.1.2. Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems.

S8.A.1.3. Identify and analyze evidence that certain variables may have caused measurable changes in natural or human-made systems.

S8.A.2.1. Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.

S8.A.3.1. Explain the parts of a simple system, their roles, and their relationships to the system as a whole.

S8A.3.2. Apply knowledge of models to make predictions, draw inferences, or explain technological patterns.

S8.B.3.2. Identify evidence of change to infer and explain the ways different variables may affect change in natural or man-made systems.

Understanding(s):
Students will understand . . .

1. A variable is anything that can be changed in an experiment that might affect the outcome.
2. In a controlled experiment all variables are controlled except one, allowing the experimenter to observe the effect of that one variable on the outcome.
3. Graphs can be used to display results, look for experimental errors, and make predictions.
4. A system is a set of related objects that can be studied in isolation.
5. Conducting multiple experimental trials adds validity to results.

Essential Question(s):

- What can graphs tell us about results, and how can they be used to make predictions?
- How do variables influence an experiment?

Learning Objectives:
Students will know . . .

- How to conduct controlled experiments to find out what variables affect the number of cycles a pendulum will complete in a unit of time.
- Capacity is the maximum volume of fluid a container can hold.
- How to relate pendulum length to number of cycles it can complete in a unit of time.
- How to use concrete, pictorial, and two-coordinate graphs to show experimental results.
- How to use graphs to look for errors and make predictions.
- How to identify variables that might

Students will be able to:

- Build and observe standard pendulums made from string and pennies, identifying the variables that could affect the number of swings in 15 seconds.
- Use controlled experimentation of the variables of mass, release position, and length of string to test which will affect the number of swings a pendulum will make in 15 seconds.
- Use a concrete and pictorial graph to show results of experiments.
- Use a two-coordinate graph showing results of swinger experiment and compare to concrete and pictorial graphs.
- Construct paper cup boats of various sizes and capacities to identify variables

affect the number of passengers a paper cup boat can hold without sinking. ▪ How to measure the capacity of paper cup boats in metric units. ▪ How to relate capacity (displacement) of a boat to number of passengers it can hold. ▪ How to identify variables that might affect the flight of a model plane. ▪ How to relate length of flight to number of winds on a rubber band powering a propeller. ▪ How to explore and identify the variables of the flipper system. ▪ How to measure the height and distance an object travels. ▪ How to conduct multiple trials manipulating the same variable and calculate averages of the outcomes.	that influence the ability to sink or float. ▪ Use graphs of lifeboat experiment to make predictions. ▪ Construct a model propeller-driven plane that flies along a flight line and explore the number of winds needed to fly the length of the line. ▪ Conduct experiments testing other variables that could affect the flight of the plane. ▪ Construct a model catapult (flipper system) and determine what variables affect the distance and height an object will go. ▪ Explain the components of a valid experiment.

Name:	**Dates: Rotation Basis (FOSS SUGGESTS FALL/SPRING DUE TO THE USE OF LIVING ORGANISMS)**
Course/Subject: Science, Grade 5	**Unit Plan 4: Environments**

Stage 1 – Desired Results

PA Standard(s)/Assessment Anchors Addressed:

State Standards: 3.1.7.A, E, 3.2.7.A, B, C, D, 3.3.7.A, 3.7.7.B, 4.6.7.A, B, C

Assessment Anchors:

S8.A.1.1. Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g. visuals, scenarios, graphs).

S8.A.1.2. Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems.

S8.A.1.3. Identify and analyze evidence that certain variables may have caused measurable changes in natural or human-made systems.

S8.A.2.1. Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.

S8.A.3.1. Explain the parts of a simple system, their roles, and their relationships to the system as a whole.

S8.B.1.1. Describe and compare structural and functional similarities and differences that characterize diverse living things.

S8.B.3.1. Explain the relationships among and between organisms in different ecosystems and their abiotic and biotic components.

S8.B.3.2. Identify evidence of change to infer and explain the ways different variables may affect change in natural or man-made systems.

Understanding(s):	**Essential Question(s):**

Students will understand . . . 1. Everything that surrounds an organism makes up the organism's environment. 2. Environmental factors can be both living or nonliving. 3. A relationship exists between a number of environmental factors and how well organisms grow. 4. Organisms have specific requirements (optimum conditions) for successful growth, development, and reproduction. 5. An organism can survive within its range of tolerance for environmental factors.	▪ How do environmental factors affect living things? ▪ How do living things affect their environment?
Learning Objectives: ***Students will know . . .*** ▪ Definition of environment ▪ Factors that make up environments. ▪ Changes that occur in environments over time. ▪ How to organize information using a key and a map. ▪ How to determine an organism's environmental preferences for various environmental factors. ▪ Observation and comparison procedures and strategies. ▪ How to conduct experiments with plants to discover their range of tolerance for water. ▪ The optimum water conditions for early growth of seeds. ▪ Environmental factors in a freshwater environment. ▪ How salt concentration influences the hatching of brine shrimp eggs in four salt concentrations. ▪ The effect of salinity on the germination and early growth of four kinds of seeds.	***Students will be able to:*** ▪ Explain how living organisms and their environments interact and influence each other. ▪ Identify environmental factors and explain how they affect the environment. o Plant terrariums, mapping where to put pea, corn, barley, radish, and clover seeds, and deciding how much water to add. o Record observations about the changes taking place in the terrariums every 2 to 3 days. o Construct aluminum foil runways in order to conduct investigations of organisms' environmental preferences. o Conduct investigations to determine how isopods and beetles respond to the environmental factor of water. o Isolate one factor, water, in the environment of plants, and set up an experiment to determine the range of water tolerance for the early growth of four different plants. o Use a plant profile to compare the growth of each plant in the different environments. o Assemble freshwater aquariums and observe them over a period of time, monitoring the environmental factors of water and temperature. o Relate the acidity in water to the carbon dioxide produced by fish and determine how this affects the fish. o Conduct experiments to determine which of four salt concentrations allow brine shrimp eggs to hatch. o Manipulate the environment to see if dormant brine shrimp eggs can hatch and grow. o Set up a controlled experiment to test the effect of salinity on four kinds of

	plants: radish, corn, barley, and peas.