Davison Community Schools
ADVISORY CURRICULUM COUNCIL
Phase II, *May 8, 2018*

Fifth Grade Science

Phase I: Course Essential Questions

What is matter?
What effect does gravitational force have on an object?
How is energy transferred through the ecosystem?
How do plants acquire the materials necessary to grow?
How do Earth's systems interact and affect each other?
How does an engineer go about developing possible solutions to a problem?

Phase II Curriculum

Unit: Matter and Its Interactions

Essential Questions:	**Essential Understanding:**
What is matter?	Matter is made up of particles and takes up space, even when the particles are too small to be seen.
What happens to matter when it changes form?	The Law of Conservation of Matter (Matter cannot be created or destroyed, only transformed from one substance to another).

Curriculum Standards- DOK noted where applicable with Standards

5 PS 1-1 Develop a model to describe that matter is made of particles too small to be seen.

5 PS 1- 2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

5 PS 1-3 Make observations and measurements to identify materials based on their properties.

5 PS 1-4 Conduct and investigation to determine whether the mixing of two or more substances results in new substances.

Knowledge/Content **I Know** …(includes academic vocabulary)	**Skills/Processes** **I Can** …
• Matter is made up of tiny particles called, too small to be seen, called molecules. • Molecules are made up of atoms. • Atoms are made up of protons, electrons, and neutrons. • Tiny particles too small to be seen make up the matter we do see.	• Create a model to describe the structure of matter from particles too small to be seen. • Identify and describe how tiny particles too small to be seen make up all matter. • Use a model to explain how the tiny particles making up matter result in observable phenomena (an inflating basketball, melting ice into water…).

• The three states of matter are solids, liquids and gases. • Physical change is a change in size, shape, or state of matter. • A chemical change changes the composition of the matter and is indicated by a change in color, odor, fizzing or foaming, the production of heat, sound or light. • Properties of matter include: color, hardness, reflectivity, electrical conductivity, thermal conductivity, magnetic, and solubility. • The elements of an investigation (collect, record, analyze data and observations). **<u>Academic Vocabulary</u>** Atoms Protons Electrons Neutrons Molecules Matter Physical properties Chemical properties Mixing Reflectivity Electrical conductivity Thermal conductivity Magnetic Soluble Phenomena Investigation Model Graphic Organizers Data Observations Record Analyze Collect	• Give examples of the three states of matter. • Determine when there is a chemical or physical change. • Measure and graph substances when cooled, heated, or mixed with other substances to show physical or chemical change. • Design and conduct an experiment to demonstrate the Law of Conservation of Matter. • Make observations and measurements to identify materials based on their properties. • Design and conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Phase II Curriculum
Unit: Motion and Stability

Essential Questions:	Essential Understanding:
What causes motion? What affect does gravitational force have on an object?	Motion occurs when unbalanced forces act on an object. Gravity is the attractive force between two or more objects. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.

Curriculum Standards- DOK noted where applicable with Standards

PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down.

Knowledge/Content **I Know** …(includes academic vocabulary)	Skills/Processes **I Can** …
• Earth has a force called gravity that pulls objects "down" towards the earth. • Gravity is an attractive force that exists between two or more objects. • Earth has a spherical shape. **<u>Academic Vocabulary</u>** Gravity Gravitational forces Spherical	• Design and conduct an experiment to demonstrate the effect of the earth's gravitational pull. • Use data or models to support the claim that the earth's gravitational force pulls objects "down" towards the earth. • Find evidence and present a supported argument that proves the Earth is a sphere.

Phase II Curriculum
Unit: Energy

Essential Questions:	Essential Understanding:
How is energy transferred from the sun to our food?	Energy produced by the sun and captured used by plants in the chemical process that forms plant matter.
What are the benefits and effects of the energy from food on an animal's body?	Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

Curriculum Standards- DOK noted where applicable with Standards

PS 3-1 Use models to describe that energy in animal's food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

Knowledge/Content **I Know** …(includes academic vocabulary)	Skills/Processes **I Can** …
• Energy from the sun is used by plants. • Animals obtain energy from food. • Energy pyramids are models used to show energy transfer from the sun to plants and animals **<u>Academic Vocabulary</u>** Energy pyramid	• Construct and use models to describe that energy in animal's food comes from the sun. • Describe how energy in food is used to repair the body, help the body grow, keep the body warm, and keep the body in motion.

Phase II Curriculum

Unit: From Molecules to Organisms: Structures and Processes

Essential Questions:	**Essential Understanding:**
From where do plants acquire the material necessary for growth?	Plants acquire their material for growth from the sun, air and water.

Curriculum Standards- DOK noted where applicable with Standards

LS 1 Support an argument that plants get the materials they need for growth chiefly from air and water.

Knowledge/Content **I Know** …(includes academic vocabulary)	**Skills/Processes** **I Can** …
• Plants grow from matter that comes from the air and water, not the soil. • Air is matter. • Plants need sunlight, air and water to grow. • The weight of soil does not change as the plant grows, therefore the soil does not account for the changes in the plants growth. **<u>Academic Vocabulary</u>** Hydroponic growth Closed system Plant material = plant matter	• Design and conduct an investigation to support the argument that plants get the materials they need for growth from the sun, air and water.

Phase II Curriculum

Unit: Ecosystems: Interactions, Energy, and Dynamics

Essential Questions:	**Essential Understanding:**
How is energy transferred through an ecosystem?	Food webs or food chains show energy is transfer in an ecosystem.
What roll do decomposers play in an ecosystem?	Decomposition eventually restores (recycles) some materials back to the soil.
How does one know an ecosystem is healthy?	A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.
What is the effect of a new species to an already balanced ecosystem?	Newly introduced species can damage the balance of an ecosystem.
How is matter cycled through an ecosystem?	Matter cycles through air, water, plants, animals, and microbes as these organisms live and die.

Curriculum Standards- DOK noted where applicable with Standards

LS 2 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Knowledge/Content **I Know** …(includes academic vocabulary)	**Skills/Processes** **I Can** …
• Plants get their energy from the sun. • Plants are producers. They produce their own food using energy from the sun, air and water. • Animals are consumers, they consume food. • Animals that eat producers are first-level consumers. • Animals that eat first-level consumers are second-level consumers. • Matter is moved between organisms during consumption. • Fungi and bacteria that eat dead organisms are decomposers.	• Develop a model to describe the movement of matter and energy among plants, animals and decomposers within the environment.

• Decomposers help return nutrients to the soil. • Decomposed material goes back (recycles) into the ecosystem. **<u>Academic Vocabulary</u>** Food web Food chain Producers First-level consumers Second-level consumers Decomposers Organic Inorganic Biotic Abiotic Ecosystem Environment Web (graphic organizer)	

Phase II Curriculum
Unit: Earth's Place in the Universe

Essential Questions:	Essential Understanding:
How does the distance from a star affect how it looks to us here on Earth?	The sun appears larger and brighter than other stars because it is closer to Earth.
What causes patterns like day and night, "shorter days" vs. "longer days", years, months and seasons	The Earth's orbit around the sun, and the rotation of the earth on its axis cause observable patterns such as day/night, length of day and seasons.

Curriculum Standards- DOK noted where applicable with Standards

ESS 1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

ESS 1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Knowledge/Content **I Know** …(includes academic vocabulary)	Skills/Processes **I Can** …
• The sun and other stars are natural bodies that give off their own light. • The apparent brightness of a luminous object appears brighter and larger the closer it is. • The sun is many times larger than Earth but appears small because it is so far away. • Stars have different locations in the sky depending on the season. • The length and direction of shadows changes throughout the day depending on the Earth's position relative to the sun. • Days in the summer are longer than days in the winter in the northern hemisphere. • The Earth's axis is an imaginary line from the North Pole to the South Pole running through the middle of the earth.	• Support an argument that differences in how bright the sun appears is due to the distance from Earth. • Graph data to show patterns of daily changes in length and direction of shadows, day and night, and the seasonal changes of some stars in the night sky. • Construct a model to illustrate how the earth's revolution, rotation and tilt result in increasing/decreasing day/night, calendar years and seasonal changes.

• The Earth's rotation on its axis I is responsible for day and night • The tilt of the earth's axis as it orbits the sun results in seasons. . • The sun appears to move across the sky from east to the west due to the rotation of the earth. **<u>Academic Vocabulary</u>** Orbit Earth's axis Luminous Seasons North Pole South Pole East, west, north, south Year = 365 days	

Phase II Curriculum
Unit: Earth's Systems

Essential Questions:	Essential Understanding:
What are the four (4) major systems on Earth? How do Earth's systems interact and affect each other? How is Earth's salt water and fresh water distributed around Earth?	• Earth has four (4) major systems: geosphere, hydrosphere, atmosphere, and biosphere. • Earth systems interact in multiple ways to affect earth's surface materials and processes. • Nearly all of earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

Curriculum Standards- DOK noted where applicable with Standards

ESS 2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

ESS 2-2 Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

Knowledge/Content **I Know** …(includes academic vocabulary)	Skills/Processes **I Can** …
• The geosphere is outer crust of the earth consisting of solid and molten rock, soil, and sediments (continents, mountains). • The hydrosphere is water in all states, liquid (rivers, lakes, ocean), solid (ice in glaciers), and gas (water vapor in the air). • Water on earth exists in reservoirs, oceans, lakes, rivers, glaciers, as ground water, and in polar ice caps • The majority of water is in the ocean and is salt water. • Most fresh water is in glaciers or underground.	• Develop a model using an example to describe ways geosphere, biosphere, hydrosphere, and/or atmosphere interact. • Describe and graph the amounts of salt water and fresh water to provide evidence about the distribution of water on Earth. • Construct a model of the water cycle to describe how water moves throughout the four major earth systems. • Construct a supporting argument explaining the impact of humans on the four major earth systems. • Construct a model to explain how and why weather (wind, rain, snow…)

• A small fraction of fresh water is found in lakes, rivers, wetlands, and the atmosphere. • The atmosphere is the air surrounding the earth. • Weather, winds and clouds occur in the atmosphere. • The biosphere consists of living things, including humans.. **<u>Academic Vocabulary</u>** Geosphere System Biosphere Weather Hydrosphere Climate Atmosphere Salt water: oceans (one body of water) Fresh water: lakes, rivers Frozen fresh water: glaciers, polar ice caps Underground fresh water: ground water	happens

Phase II Curriculum
Unit: Earth and Human Activity

Essential Questions:	Essential Understanding:
How has human activity had an effect on Earth's resources and environment? What can humans do to protect Earth's resources and environment?	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. Individuals and communities are doing things to help protect Earth's resources and environments.

Curriculum Standards- DOK noted where applicable with Standards

ESS 3 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Knowledge/Content **I Know** …(includes academic vocabulary)	Skills/Processes **I Can** …
• Human activity such as agriculture, industry, and everyday life can affect earth's resources by using them all up and can damage the environment. • There are ways to conserve, reuse, and recycle to protect earth's resources and environment. **<u>Academic Vocabulary</u>** Environment Earth's resources Agriculture Industry Uses of resources Conservation Recycle Reuse Communities	• Gather and combine information about ways individuals and communities use science ideas to protect the earth's resources and environment.

Phase II Curriculum
Unit: Engineering Design

Essential Questions:	Essential Understanding:
What problems might engineers have when looking for a solution?	Possible solutions to a problem are limited by available materials and resources (constraints).
How does an engineer go about developing possible solutions to a problem?	Research on a problem should be carried out prior to designing a solution.
How does an engineer know if this solution will solve the problem?	Different solutions need to be tested in order to determine which of them best solves the problem given the criteria and the constraints.

Curriculum Standards- DOK noted where applicable with Standards

ETS 1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

ETS 1-2 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.

ETS 1-3 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.

Knowledge/Content **I Know** …(includes academic vocabulary)	**Skills/Processes** **I Can** …
• Types of materials, the amount of time necessary or available, and the cost of the materials are serious considerations when designing a solution to solve a problem. • How to use compare and contrast and cause and effect to determine if possible solutions are possible for a problem. • A variables is something that can affect the outcome of an experiment. • A prototype is a kind of model that could become a usable item after testing and improvements are made. **<u>Academic Vocabulary</u>** Design solutions Prototype Constraints Fair tests Criteria/criterion	• Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • Create multiple possible solutions based on how likely they will meet the success criteria and constraints. • 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.

Failure points Compare/contrast Boundaries of a system Cause/effect	