Science
Kindergarten

CURRICULUM GUIDE
Approved
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This curriculum may be modified through varying techniques, strategies and materials, as per an individual student's Individualized Education Plan (IEP).

Approved by the Insert district Board of Education
At the regular meeting held on August 22, 2017
And
Aligned with the New Jersey Student Learning Standards

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Philosophy and Rationale

Science is an integral part of a child's education. With the current trend towards STEM (Science Technology Engineering Mathematics) in education and in the economy, it is increasingly important that educators focus on science. At the kindergarten level, students are exposed to many scientific principles including engineering and Earth systems that they can observe around them. In the Great Meadows Regional School District, we seek to create a vital community of learners. We believe that a solid foundation in scientific concepts, language and explorations will prepare them for their future as students of science. Through self-reflection, collaboration with peers, teacher conferences, and assessments, students discover themselves as scientists through a multitude of shared learning experiences in a supportive and positive learning environment.

Mission Statement

The Great Meadows Regional School District will provide quality educational opportunities that ensure the individual success of all students within a safe and supportive environment and to build lifelong learners who will met society's challenges into an beyond the 21st century. To that end, it is anticipated that all students will achieve the New Jersey Student Learning Standards at all grade levels.

Scope and Sequence

This curriculum is divided into six units which span the entire school year (180 days). The units are grouped based on academic standards.

Unit 1 covers Earth and Human Activity, approximately 4 weeks and ongoing weather graph
Unit 2 covers Engineering and Design, approximately 2 weeks
Unit 3 covers Motion and Stability, approximately 2 weeks
Unit 4 covers Energy, approximately 2 weeks
Unit 5 covers Molecules and Organisms, approximately 4 weeks
Unit 6 covers Earth's Systems, ongoing instruction throughout the year

Each of the six units focuses on a specific content area, however there is scaffolding that links each unit.

I. Unit 1: Science: Earth and Human Activity

Stage 1: Desired Results

Content Standards:

Science

K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather**.** [Clarification Statement: Emphasis is on local forms of severe weather.]
K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment**.** [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

ELA/Literacy

RI.K.1. With prompting and support, ask and answer questions about key details in a text. (K-ESS32)
RI.K.2. Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS33)
SL.K.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS32)
SL.K.5. Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS31)

Mathematics

MP.2. Reason abstractly and quantitatively. (K-ESS31)
MP.4. Model with mathematics. (K-ESS32)
K.CC. Counting and Cardinality. (K-ESS32)

Essential Questions:

How can we observe and measure weather?

How can weather forecasts help us?

Enduring Understandings:

Severe weather can occur and meteorologists can help people prepare and respond to weather events.

People can make choices to reduce their risk to severe weather.

All living things need water, air, and resources to survive.

Knowledge and Skills:

With prompting and support, students will be able to:

- answer questions about natural resources.
- answer how people use natural resources.
- answer how people prepare for severe weather before and after the event.
- ask and answer questions on how personal choices and behaviors to reduce, reuse, recycle impact living conditions on Earth.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations Benchmarks (embedded student proficiencies)

Students will show evidence of understanding by observing, graphing, and recording the weather over month-long intervals. They will identify patterns and compare changes in weather. Students will explain how weather affects the way we live.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

HMH Science Dimensions text, teacher observations, weather graphs, discussions, read alouds, student reflections using Self-Check assignments, in-class assessments, Read/Write/Share assignments.

Stage 3: Learning Plan

Students will be engaged through large and small group discussion allowing students to revise, rethink, and refine their understanding of topics covered. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. For example, students will take on the role of a meteorologist and record temperature, visual changes in their environment, and kinds of precipitation. They will discuss how they will need to prepare for the weather each day. Students may explore websites such as: weatherwizkids.com and http://www.learningreviews.com/Weather-Websites-for-Kids.html.

In this Unit, kindergartners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment
Science Unit 22 days and on-going weather graph

Resources

HMH Science Dimensions, Read Alouds, Smartboard Interactive Lessons
Bookflix, Scholastic Let's Find Out.

II. Unit 2: Science: Engineering Design

Stage 1: Desired Results

Content Standards:

Science

K-2-ETS1-1. 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.
K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.
K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

ELA/Literacy

RI.2.1 Ask and answer questions such as who, what, where, when why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)
W.2.8. Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1) (K-2-ETS1-3)

Mathematics

MP.2. Reason abstractly and quantitatively. (K-2-ETS1-1), (K-2-ETS1-3)
MP.4. Model with mathematics. (k-2-ETS1-1), (K-2-ETS1-3)
MP.5 Use appropriate tools strategically. (K-ETS1-1), (K-2-ETS1-3)
2.MD.D.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1), K-2-ETS1-3).

Essential Questions:

How can we use objects to help us solve a problem?

How do inventions or ideas make life easier for us?

Enduring Understandings:

Engineers use objects and materials to build things to solve a problem.

Engineers use their ideas to solve a problem or invent something that makes life easier.

There is more than one possible answer to solve a problem.

Knowledge and Skills:

With prompting and support, students will be able to:

- identify a problem.
- brainstorm and think about possible solutions to the problem.
- decide what materials are needed to carry out their plan.
- build their plan.
- observe and document their plan.
- revise their plan if their solution did not solve the problem.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations
Benchmarks (embedded student proficiencies)

Students will show evidence of understanding using steps in the design process to develop, test, modify, and compare models that solve a problem.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

HMH Science Dimensions text, teacher observations, discussions, student reflections using Self-Check assignments, in-class assessments, Read/Write/Share assignments, collaboration with peers (Think, Discuss, Share), student presentations.

Stage 3: Learning Plan

Students will be engaged through large and small group discussions allowing students to revise, rethink, and refine their understanding of topics covered to arrive at a solution. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. Think, Discuss, Share activities allow students to participate in collaborative conversations with peers and adults in small and large groups to plan their ideas. Students will be able to revise and improve their design.

In this Unit, kindergarteners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment

Science unit 12 days

Resources

HMH Science Dimensions text, HMH on-line resources, stories about people in science & engineering

III. Unit 3: Science: Motion and Stability

Stage 1: Desired Results

Content Standards:

Science

K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. (Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing each other.) *[Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include noncontact pushes or pulls such as those produced by magnets.]*
K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. (Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.) *[Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]*

ELA/ Literacy

RI.K.1. With prompting and support, ask and answer questions about key details in a text. (KPS2-2)
W.K.7. Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them.) (KPS2-1)
SL.K.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (KPS2-2)

Mathematics

MP.2. Reason abstractly and quantitatively. (KPS2-1)
K.MD.A.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (KPS2-1)
K.MD.A.2. Directly compare two objects with a measurable attribute in common, to see which object has “more” or ”less of” the attribute, and describe the difference. (KPS2-1)

Essential Questions:

How can we change the way things move?

Enduring Understandings:

Pushing or pulling an object can change the speed or direction of its motion and can start or stop it.

Pushes and pulls can have different strengths and directions.

When objects touch or collide, they push on one another and can change the motion.

A bigger push or pull makes things speed up or slow down more quickly.

Knowledge and Skills:

With prompting and support, students will be able to:

- model push and pull with objects.
- model the speed of objects by using tools such as planes, inclines and the use of force.
- design an experiment that shows how force affects motion.
- build their plan.
- observe and document their plan.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations Benchmarks (embedded student proficiencies)

Students will show evidence of understanding using steps in the design process to develop, test, modify, and observe the effects of different strengths and/or directions of pushes and pulls on an object in motion.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

HMH Science Dimensions text, teacher observations, discussions, student reflections using self-check assessments, in-class assessments, Read/Write/Share assignments, collaboration with peers (Think, Discuss, Share), student presentations.

Stage 3: Learning Plan

Students will be engaged through large and small group discussions allowing students to revise, rethink, and refine their understanding of topics covered to arrive at a solution. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. Think, Discuss, Share activities allow students to participate in collaborative conversations with peers and adults in small and large groups to plan their ideas. With prompting and support, students will gather evidence to determine the effect of force used to move an object or to change its speed or direction with a push or a pull. Students will be able to revise and improve their design.

In this Unit, kindergarteners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment

Science unit 12 days

Resources

HMH Science Dimensions text, HMH on-line resources, read alouds, marbles, dominoes, cars, books, ramps, balls, blocks, etc.
website: https://www.youtube.com/watch?v=AuUVBprLGKU

IV. Unit 4: Science: Energy

Stage 1: Desired Results

Content Standards:

Science

KPS3-1. Make observations to determine the effect of sunlight on Earth's surface. [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water] *[Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]*
KPS3-2. Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.* [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

Mathematics

K.MD.A.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of" or "less of" the attribute, and describe the difference. (KPS3-1), (KPS3-2)

Essential Questions:

How is the sun important to the earth?

How can we protect ourselves from the damaging effects of the sun?

Enduring Understandings:

Students will understand that the sun is the primary source of heat and light on Earth.

Students will understand that shelters and tools help protect living things from overexposure to sunlight.

Knowledge and Skills:

With prompting and support, students will be able to:

- give examples on how to protect themselves from the damaging rays of the sun.
- design and build structures that shield the Earth's surface from the sun.
- build their plan.
- observe and document their plan.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations Benchmarks (embedded student proficiencies)

Students will show evidence of understanding how the sun's heat affects Earth's surface and all living things by citing evidence from observations and hands-on activities.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

HMH Science Dimensions text, teacher observations, discussions, student reflections using self-check assessments, in-class assessments, Read/Write/Share assignments, collaboration with peers (Think, Discuss, Share), student presentations.

Stage 3: Learning Plan

Students will be engaged through large and small group discussions allowing students to revise, rethink, and refine their understanding of topics covered to arrive at a solution. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. Think, Discuss, Share activities allow students to participate in collaborative conversations with peers and adults in small and large groups to plan their ideas. With prompting and support, students will gather evidence to determine the effect of the sun on the Earth's surface. Students will observe the pattern of the sun lighting the sky everyday and support their observations with drawings. Students will observe and measuring the effects the sun has on soil, sand, water and gravel using hands-on exploration, a thermometer and the sun. After exploring the characteristics and effects of the sun through literature, videos and activities, students will then use their knowledge to create a simple structure that will protect them from too much exposure to the sun.

In this Unit, kindergarteners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment

Science unit 12 days

Resources

HMH Science Dimensions text, HMH on-line resources, read alouds such as "Galileo Galilei", Scholastic News Let's Find Out
Website: https://www.youtube.com/watch?v=VkW54j82e9U;

https://www.youtube.com/watch?v=6FB0rDsR_rc

V. Unit 5: Science: Molecules and Organisms

Stage 1: Desired Results

Content Standards:

Science

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]
K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. [Clarification Statement: Example of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]
K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. [Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

ELA/Literacy

W.K.7. Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS11)

Mathematics

K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of” or ‘less of” the attribute, and describe the difference. (K-LS1-1)

Essential Questions:

How do plants and animals use the environment to survive?

How do plants and animals change their environment?

Enduring Understandings:

Students will understand that living things use resources for food and protection to survive.

Students will understand that animals change their environment as they utilize resources.

Knowledge and Skills:

With prompting and support, students will be able to:

- identify the three essential elements that plants and animals needs to live.
- observe plant life over a period of time.
- compare the similarities between animals and humans.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations Benchmarks (embedded student proficiencies)

Students will demonstrate their understanding by gathering data in order to explain what basic needs are required for survival by citing evidence from observations and hands-on activities. Students will cite how a habitat is like a home and compare how they are alike or different.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

HMH Science Dimensions text, teacher observations, discussions, student reflections using self-check assessments, in-class assessments, Read/Write/Share assignments, collaboration with peers (Think, Discuss, Share), student presentations, unit project

Stage 3: Learning Plan

Students will be engaged through large and small group discussions allowing students to revise, rethink, and refine their understanding of topics covered to arrive at a solution. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. Think, Discuss, Share activities allow students to participate in collaborative conversations with peers and adults in small and large groups to plan their ideas. With prompting and support, students will gather evidence to determine why we need houses. Students will construct an argument supported by evidence for how plants and animals can change the environment to meet their needs. Students will observe and compare and measure plant growth. They will support their reasoning with evidence that plants need sunlight, water, and air to grow. Students will illustrations, labels, and writing to explain their drawings.

In this Unit, kindergarteners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment

Science unit 22 days

Resources

HMH Science Dimensions text, HMH on-line resources, read alouds about veterinarians, texts such as *A House for Hermit Crab* by Eric Carle, Scholastic News
Websites: https://www.youtube.com/watch?v=bWBrusrCmX4
https://www.youtube.com/watch?v=wOXay8rdzRg&feature=youtu.be

VI. Unit 6: Science: Earth's Systems

Stage 1: Desired Results

Content Standards:

Science

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time**.** [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [Assess*ment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.]*

ELA/Literacy

R.K.1. With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)
W.K.1. Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (KESS2-2)
W.K.2. Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2)
W.K.7. Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS11)

Mathematics

MP.2. Reason abstractly and quantitatively. (K-ESS2-1)
MP.4. Model with mathematics. (K-ESS2-1)
K.CC.A. Know number names and the count sequence. (K-ESS2-1)
K.MD.A.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1)
K.MD.B.3. Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)

Essential Questions:

How does studying weather patterns help prepare us for daily life?

Enduring Understandings:

Students will understand that weather is a combination of sunlight, wind, snow, rain, and temperature in a particular region at a particular time.

Students will understand that changes in weather affect how we live everyday life (dress, choices, activities, etc.)

Students will understand that plants, animals, and people can adapt to survive in different environments.

Knowledge and Skills:

With prompting and support, students will be able to:

- describe different kinds of weather patterns.
- recognize that different climates occur at the same time in different parts of the world and people and animals adapt to their environment.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations Benchmarks (embedded student proficiencies)

Students will show evidence of understanding about Earth's Systems by graphing weather everyday and interpreting results through group discussions, analyzing different kinds of weather, and describing clothes and tools needed in different types of weather.

Assessment Methods (formative, summative, other evidence and/or student self-assessment)

Teacher observations, discussions, in-class assessments, Read/Write/Share assignments, collaboration with peers (Think, Discuss, Share), student presentations, student calendar, student weather graph

Stage 3: Learning Plan

Students will be engaged through large and small group discussions allowing students to revise, rethink, and refine their understanding of topics covered to arrive at a solution. Differentiation will be provided through written, visual, auditory and hands-on activities to meet all learning styles. Students will be provided with individualized instruction as needed. Introduction of new vocabulary will help students express their ideas, opinions, and feelings. Think, Discuss, Share activities allow students to participate in collaborative conversations with peers and adults in small and large groups to discuss their ideas. Students will observe, graph and record weather over time to recognize and describe patterns overtime in order to explain how weather affects our lives. Students will write about weather and how animals and people adjust to the weather patterns (seasons, climate).

In this Unit, kindergarteners will practice the 21st Century Skills of Communication and Collaboration. We also focus on many Life and Career Skills by supporting students' interactions with peers and teachers throughout their school day.

Time Allotment

Science unit on-going

Resources

HMH Science Dimensions text, HMH on-line resources, read alouds about the weather, Scholastic News
Websites: https://www.youtube.com/watch?v=QZVtgOK8uTw, https://www.youtube.com/watch?v=UtgFHHhm1xU

http://www.state.nj.us/education/cccs/

Integration of 21st Century Theme(s)

The following websites are sources for the following 21st Century Themes and Skills:
http://www.nj.gov/education/code/current/title6a/chap8.pdf
http://www.p21.org/about-us/p21-framework .
http://www.state.nj.us/education/cccs/standards/9/index.html

21st Century Interdisciplinary Themes (into core subjects)
- **Global Awareness**
- **Financial, Economic, Business and Entrepreneurial Literacy**
- **Civic Literacy**
- **Health Literacy**
- **Environmental Literacy**

Learning and Innovation Skills
- **Creativity and Innovation**
- **Critical Thinking and Problem Solving**
- **Communication and Collaboration**

Information, Media and Technology Skills
- **Information Literacy**
- **Media Literacy**
- **ICT (Information, Communications and Technology) Literacy**

Life and Career Skills
- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

Integration of Digital Tools
- **Classroom computers/laptops**
- **Technology Lab**
- **FM system**
- **Other software programs**