Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
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DEPARTMENT: Science COURSE: Science, Grade 6

Curriculum Development Timeline

School: Township of Ocean Intermediate School

Course: Science, Grade 6

Department: Science

Board Approval	Supervisor	Notes
February 2009	Patrick Sullivan	Born Date
June 2011	Patrick Sullivan	Revisions
August 2017	Patrick Sullivan	Revisions
March 2019	Patrick Sullivan	Review
August 2021	Patrick Sullivan	Alignment to Standards and Revisions
August 2022	Patrick Sullivan	Incorporate State Mandates

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Township of Ocean Pacing Guide			
Week	**Quarter 1**	**Week**	**Quarter 3**
1	Science Lab Safety/ Scientific Practices	21	Using Engineering Skills to Solve Real World Problems
2	Current Events/ Science Writing Skills	22	Using Engineering Skills to Solve Real World Problems
3	Earth Science: Human Impact	23	Using Engineering Skills to Solve Real World Problems
4	Earth Science: Human Impact	24	Using Engineering Skills to Solve Real World Problems
5	Earth Science: Earth's Systems	25	Using Engineering Skills to Solve Real World Problems
6	Earth Science: Earth's Systems/ Earth and Human Activity	26	Using Engineering Skills to Solve Real World Problems
7	Earth Science: Earth's Systems	27	Physical Science: Matter & Its Interactions/Scientific Practices
8	Earth Science: Earth's Systems	28	Physical Science: Matter & Its Interactions/Scientific Practices
9	Earth Science: Earth's Systems	29	Physical Science: Matter & Its Interactions/Scientific Practices
10	Earth Science: Earth's Systems	30	Physical Science: Matter & Its Interactions/Scientific Practices
Week	**Quarter 2**	**Week**	**Quarter 4**
11	Earth Science: Earth and Human Activity/ Engineering Design	31	Physical Science: Matter & Its Interactions/Scientific Practices
12	Earth Science: Earth and Human Activity	32	Physical Science: Matter & Its Interactions/Scientific Practices
13	Earth Science: Earth and Human	33	Physical Science: Matter & Its

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	Activity/Engineering Design		Interactions/Scientific Practices
14	Earth Science: Earth and Human Activity	34	Earth Science: Earth's Place in the Universe
15	Earth Science: Earth and Human Activity	35	Earth Science: Earth's Place in the Universe
16	Earth Science: Earth and Human Activity/Engineering Design	36	Earth Science: Earth's Place in the Universe
17	Earth Science: Earth's Systems	37	Earth Science: Earth's Place in the Universe
18	Earth Science: Earth's Systems	38	Earth Science: Earth's Place in the Universe
19	Earth Science: Earth's Systems	39	Earth Science: Earth's Place in the Universe
20	Earth Science: Earth's Systems	40	Year End Review Google Slide Presentation

Climate Change: Earth's Systems (NJSLS-S: MS-ESS3-5)

Core Instructional & Supplemental Materials including various levels of Texts

Texts:
Holt/Science + Technology Series: Holt, Reinhart, Winston
Inside the Restless Earth
Water on Earth
Introduction to Matter

Digital Resources Across All Levels: (D=differentiated)
Gizmos (D)
Defined Learning (STEM) (D)
Generation Genius
Gimkits
Freckle
Edpuzzle (D)

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Science World Articles
YouTube Streaming Videos
PhET Interactive Simulations (D)
ScienceSpot

Time Frame	**Unit 1 (10 weeks)**

Topic

- Science Practices/Engineering Design Process
- Understanding Scientific Explanation
- Evidence through Active Investigations
- Earth Systems

Alignment to Standards

MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused climate change over the past century.
MS-ETS1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Learning Objectives and Activities

Learning Objectives:

- How do we safely gather information to describe and explain the natural and designed world?
- Why is cooperation and sharing of information critical to science?
- Observations are used to categorize, represent and interpret the natural world.
- Evidence is gathered for building, refining, and/or critiquing scientific explanations.
- Scientific knowledge builds upon itself over time and changes to fit new evidence.

Learning Activities:

- Lab Safety Protocols/Guidelines

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- Cooperative learning Tangrams puzzle
- Water's Diary
- Watershed Lab
- Analyzing point vs nonpoint source pollution maps
- Effects of Acid Rain on Sculptures Lab
- Density Tank Salt water vs Fresh Lab
- Weather Map Activity
- Engineer a Barge STEM activity

Assessments

Formative:

- Formative assessments-Exit slip-What are examples of point and nonpoint source pollutants?
- Gizmos: Journey through the water cycle activity and journal entry
- Gizmos: Impact of currents on climate and journal entry
- Discussion of the different types of storms students have experienced.

Summative:

- Model the global movements of water
- Model water changing form
- Prediction of weather patterns
- Explain interactions involving sunlight, the ocean, the atmosphere, ice, landforms and living things

Benchmark:

- Using lab tools for measuring/calculating density (skills)

Alternative:

- Hurricane Project
- Defined Stem engineering activity: Ferries
- Weather Map Activity
- Engineer a Barge STEM activity

Interdisciplinary Connections

ELA:
Open-Ended Real World Application Questions, Writing Predictions Activity, Lab Report
Cross-curricular novel "The Boy Who Harnessed the Wind" by Bryan Mealer and William Kamkwamba

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RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Mathematics:
Metric measurement, graphing results-Statistics+Probability-6SP

Career Readiness, Life Literacies, and Key Skills

9.2.8.CAP.2: Develop a plan that includes information about science career areas of interest.

Technology Integration

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Career Education

CRP1: Act as a responsible and contributing citizen and employee.
CRP4: Communicate clearly and effectively and with reason.
CRP12: Work productively in teams while using cultural global competence.

Time Frame	**Unit 2 (10 weeks)**

Topic

Earth Science: Earth and Human Activity/Earth Systems

Alignment to Standards

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MS-ESS3-1:Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects
MS-ESS1-4: Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
MS-ESS2-2:Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS2-1:Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process
MS-ESS2-3: Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Learning Objectives and Activities

Learning Objectives:

- Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming).
- Humans depend on Earth's land, ocean, atmosphere and biosphere for many different resources.
- Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes.
- Resources are distributed unevenly around the world as a result of past geologic processes.

Learning Activities:

- Windmill Engineering STEM activity
- Natural Disaster map tracking/analysis
- Analyze techniques engineers use to mitigate natural disaster
- Energy Friendly Treehouse/ Tiny House Project
- Design, build and test earthquake resistant structures STEM activity
- Design, build and test a hurricane proof structure (wind/water affect)

Assessments

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Formative:
- Exit slip-what are the causes of plate movements, volcanoes, earthquakes?
- Discussion-Alternative energy sources pros and cons of each
- Describe different climates
- Reflection-human activity and link to weather patterns and climate shift

Summative:
- Model plate interactions
- Model earthquake and volcano formation

Benchmark: N/A

Alternative:
- Defined Stem Mt. St. Helens project
- Alternative energy presentation
- Formulate hypotheses on how/why meteorological data differs from one location to another

Interdisciplinary Connections

ELA:
Cross-curricular novel “The Boy Who Harnessed the Wind” by Bryan Mealer and William Kamkwamba
RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Mathematics:
Interpreting measurement data- Statistics+Probability-6SP

Career Readiness, Life Literacies, and Key Skills

9.4.8.CT.1: Evaluate diverse solutions to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective.

Technology Integration

Career Education

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DEPARTMENT: Science COURSE: Science, Grade 6

CRP1: Act as a responsible and contributing citizen and employee.
CRP4: Communicate clearly and effectively and with reason.
CRP12: Work productively in teams while using cultural global competence.

Time Frame	**Unit 3 (6 weeks)**

Topic

Engineering to Solve Real World Problems

Alignment to Standards

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Learning Objectives and Activities

Learning Objectives:

- How can a design model be modified to ensure a successful solution?
- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful.
- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
- Models of all kinds are important for testing solutions.
- Parts of different solutions can be combined to create a solution that is better than any of its predecessors.

Learning Activities:

- Use technology to research rubber band powered cars.
- Use the Engineering Process to design, build and test a rubber band powered car.
- Collect and analyze data.
- Evaluate competing design solutions based upon agreed-upon design criteria.

Assessments

Formative:

- Discussion: How does technology help our lives?
- Collection and analysis of data to determine similarities and differences among design solutions
- Modifying designs to produce the best solution

Summative:
- Choose a real-world problem and develop a solution to that problem
- Present information to the class
- Use the Engineering Process to design, build and test a rubber band powered car

Benchmark: N/A

Alternative:
- Hockey Scholar on Everfi
- STEM professions on Everfi
- Women in STEM Research project
- Tin foil boats and mass

Interdisciplinary Connections

ELA:
Open-Ended Real World Application Questions, analogies
RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Mathematics:
Power of 10 video; scale- Statistics+Probability-6SP

Career Readiness, Life Literacies, and Key Skills

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short and long-term effects to determine the most plausible option.

Technology Integration

Career Education

CRP1: Act as a responsible and contributing citizen and employee.

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CRP4: Communicate clearly and effectively and with reason.
CRP12: Work productively in teams while using cultural global competence.

Time Frame	**Unit 4 (7 weeks)**

Topic

Physical Science: Matter and Its Interactions

Alignment to Standards

MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.
MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
MS-PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
MS-PS3-4: Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Learning Objectives and Activities

Learning Objectives:

- Substances can react chemically in characteristic ways. In a chemical process, the atoms that make up the original substance are regrouped into different molecules, and these new substances have different properties from those of the reactants.
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The changes of state that occur with variations in temperature or pressure can be described and predicted using the models of matter.

Learning Activities:

- Metric Measurement stations
- Metric Olympics
- Density of Solids Lab

- Density of Liquids Lab
- Density Liquid Layering Activity
- Lava lamp engineering activity
- PhET Module Density Activity
- PhET Module: States of Matter Activity
- Density of Gases demonstration
- Fizz Quiz Lab
- Candle Lab
- Gobstoppers Lab
- Potato Lab'
- Claim-Evidence-Reasoning:Egg demonstration
- Physical vs. Chemical Changes brochure
- Cooking Lab for chemical/physical changes
- Station Lab for physical/chemical changes

Assessments

Formative:

- Exit slips-What are the three states of matter?
- Do Now: Which state of matter has the most motion in the particles?
- Journal entry: Choose a room in your house and explain how chemistry is used there

Summative:

- Model the three states of matter
- Describe chemical and physical changes
- Density scenarios

Benchmark: N/A

Alternative:

- States of matter comic strip
- Defined Stem: Icy roads
- Build and test a solar cooker (heater)

Interdisciplinary Connections

ELA:
Open Ended Real World Application Questions
RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

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WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. **Mathematics:** Graphing- Statistics+Probability-6SP
Career Readiness, Life Literacies, and Key Skills
Technology Integration
Career Education
CRP12: Work productively in teams while using cultural global competence.

Time Frame	**Unit 5 (6 weeks)**
Topic	
Earth Science: Earth's Place in the Universe	
Alignment to Standards	
MS-ESS1-1:Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. **MS-ESS1-2**:Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. **MS-ESS1-3:**Analyze and interpret data to determine scale properties of objects in the solar system.	
Learning Objectives and Activities	
Learning Objectives: • What role does gravity play in our solar system, galaxy and universe? • Patterns of the apparent motion of the sun, the moon and stars in the sky can be observed, described, predicted and explained with models. • Earth and its solar system are part of the Milky Way galaxy, which is one of many	

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galaxies in the universe.
- The solar system consists of the sun and a collection of planets, their moons and asteroids that are held in orbit around the sun by its gravitational pull on them.
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.

Learning Activities:
- Computer visualizations of elliptical orbits of planets
- Lab Activity- Effects of gravity on weight
- Constellation Activity
- Bottle Rocket STEM activity
- Claim Evidence Reasoning - The Mysterious Planet Nine
- Rotate, Revolve or both CER activity
- Big Bang graphic organizer

Assessments

Formative:
- Discussion: How did the Earth form?
- Discussion: Revolution or rotation?
- Reflection: Formation of the universe

Summative:
- Model the cyclic patterns of lunar phases
- Model eclipses of the Sun and Moon
- Describe the relationship between the sun and change of seasons

Benchmark: N/A

Alternative:
- Gravity lab
- Defined Stem: Spaceport
- Mars colony STEM project
- Build a Mars landing explorer STEM activity

Interdisciplinary Connections

ELA:
Open Ended Real World Application Questions

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WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Mathematics:
Graphing and calculating weight on different planets- Statistics+Probability-6SP

Career Readiness, Life Literacies, and Key Skills

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Technology Integration

Career Education

CRP1: Act as a responsible and contributing citizen and employee.
CRP12: Work productively in teams while using cultural global competence

Time Frame	**Conclusion (1 week)**

Topic

Year End Review Google Slide Presentation

Alignment to Standards

See NJSLS-S from previous topics

Learning Objectives and Activities

Learning Objectives:

- How can you use technology appropriately to research one key concept studied this year?
- What type of presentation is visually appealing and informative?
- How can you create a presentation that demonstrates the student's understanding of the topic?

Learning Activities:

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- Student driven topic determination.
- Develop a minimum of seven Google Slides.
- Create a presentation to include: explanation of topic, at least 10 detailed facts, description of lab project or activity, and pictures, games, animations or videos to enhance presentation.
- Presentation to class.

Assessments

Formative: Discussion of presentation styles and options most correlated to the student.

Summative: Presentation of completed project

Benchmark: End of year assessment (content)

Alternative: N/A

Interdisciplinary Connections

ELA:
Research, Open Ended Real World Application Questions
WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Mathematics:
Data analysis, Computational skills- Statistics+Probability-6SP

Career Readiness, Life Literacies, and Key Skills

Technology Integration

9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (W6.8).

Career Education

CRP1: Act as a responsible and contributing citizen and employee.
CRP4: Communicate clearly and effectively and with reason.

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Modifications (ELL, Special Education, At Risk Students, Gifted & Talented, & 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:

- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:

- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:

- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts

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- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:

- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns