



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

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/Alignment to NJCCCS
June 2011	Patrick Sullivan	Revisions
July 2017	Patrick Sullivan	Alignment to NJSLs
August 2018	Patrick Sullivan	Prepare for Block

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6th Grade Science Curriculum---2018---NGSS Aligned

Timeline			
Week	Marking Period 1	Week	Marking Period 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	Marking Period 2	Week	Marking Period 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 Activity/Engineering Design	33	Physical Science: Matter & Its 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	36	Earth Science: Earth's Place in the Universe

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	Activity/ Engineering Design		
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

Time Frame	12 Weeks
Topic	
<ul style="list-style-type: none"> ● Science Practices / Engineering Design Process: ● Understanding Scientific Explanations; Generate Scientific ● Evidence through Active Investigations; Reflect on ● Scientific Knowledge; Participate Productively in Science ● Earth Systems 	
Essential Questions	
<ul style="list-style-type: none"> ● 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? ● How is scientific knowledge constructed? ● What are the needs of all living things? ● What makes water essential to life on Earth? ● How does water move on Earth? ● How do humans access as well as impact the water on Earth? ● What is the difference between weather and climate? ● What causes seasons? ● How does the ocean affect the climate? ● What are tides? ● How does the movement of the moon create tides and moon phases? 	
Enduring Understandings	
<ul style="list-style-type: none"> ● 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. ● In the United States, we use both standard and metric systems of measurements. Metric measurements are use to communicate with 	

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scientists worldwide.

- Lab safety should always be used in pursuit of observation.
- All living things are made up of cells, which is the smallest unit that can be said to be alive.
- Compound microscopes assist us in seeing cells, the basic unit of life.
- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell.
- Water continually cycles among land, ocean and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.
- Global movements of water and its changes in form are propelled by sunlight and gravity.
- The complex patterns of change and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.
- Because these patterns are so complex, weather can only be predicted probabilistically.
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.
- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect the oceanic and atmospheric flow patterns.
- The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally distributing it through ocean currents.
- The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.
- The tilt of the Earth and its revolution around the sun causes seasons,
- The revolution of the moon causes the tides and moon phases

Scientific/Engineering Practices/Alignment to Standards

<ul style="list-style-type: none"> ● Ask questions and define problems ● Develop and use models ● Plan and carry out investigations ● Analyze and interpret data ● Use mathematics and computational thinking ● Construct explanations and design solutions ● Engage in argument from evidence ● Obtain, evaluate and communicate information 	<ul style="list-style-type: none"> ● Graphs, charts, and images can be used to identify patterns in data. ● Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. 	<p>MS-ESS2-4 LA-6-8.RST.6-8.3 LA-6-8.RST.6-8.9 LA-6-8.WHST.6-8.2A-8.2F</p>
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Key Concepts and Skills

- Results of observation and measurement can be used to build conceptual based models and to search for core explanations.
- Predictions and explanations are revised based on systematic observations, measurements, and data/evidence.
- Carefully constructed evidence is used to construct and defend arguments.
- Predictions and explanations are revised to account more completely for available evidence.
- Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of scientific objects and events.
- 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.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- 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.
- 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 Activities

- Lab Safety Rules and Quiz
- Cooperative learning Tangrams puzzle
- Save Fred Lab update to include Google Drawing/Google Doc
- Current events summarizing
- Compound Microscope diagram/function/quiz
- Compound microscope used to see prepared slides of amoeba and protista, plant part.
- Outdoor Observation and Explanation: Fall brochure
- Bacteria Swabbing Lab
- Water's Diary
- Watershed Lab
- Analyzing point vs nonpoint source pollution maps
- Salty versus. Fresh Lab
- Cold vs. Warm Currents Lab
- Effects of Acid Rain on Sculptures Lab
- Density Tank Salt water vs Fresh Lab
- Cloud Model Demonstration
- Weather Map Activity
- Hurricane Plotting Lab
- Severe Storm Comic Strip Activity

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- Engineer a Barge STEM activity
- Modeling sun-earth-moon movements pantomime
- 3-D model movement of moon phases
- Mapping Discovery Activity of tides
- STEM Scopes
- Seasons/Moon Phases/Space brochure

Assessments

- Formative assessments (check-out slips or Google forms)
- Section quizzes and tests
- Journal entries/reflections
- Observational assessment/ lab participation
- Writing tasks
- Performance assessments, Benchmark and Summative
- STEM engineering activity
- STEM scopes

21st Century Skills

x	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Skills	x	Information Literacy	x	Media Literacy		

Interdisciplinary Connections

- Language Arts: Open-Ended Real World Application Questions, Writing Predictions Activity, Lab Report
- Language Arts: Cross-curricular novel “The Boy Who Harnessed the Wind” by Bryan Mealer and William Kamkwamba
- Mathematics: metric measurement, graphing results
- Social Studies- latitude/longitude, map reading, plotting ocean currents
 - Social Studies: Latitude/Longitude , hemispheres- reasons for the seasons

Technology Integration

- Video-Streaming
- Demonstrations
- Lab Activities
- STEM scopes

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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Time Frame	10 Weeks
Topic	
Earth Science: Earth and Human Activity	
Essential Questions	
<ul style="list-style-type: none">• What resources do humans use from the Earth?• Which type of energy sources are better: renewable or nonrenewable?• How do the use of renewable resources affect the Earth/humans long term?• How do windmills work?• What are natural disasters and where do they occur?• How do humans prepare for natural disasters?	
Enduring Understandings	
<ul style="list-style-type: none">• 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.	
Alignment to Standards	
<ul style="list-style-type: none">• Energy may take different forms (eg. energy in fields, thermal energy, and energy of motion).	<ul style="list-style-type: none">• MS-ESS3-1 LA-6-8.RST.6-8.3; LA-6-8.RST.6-8.9; LA-6-8.WHST.6-8.2A-8.2F
Key Concepts and Skills	
<ul style="list-style-type: none">• Results of observation and measurement can be used to build conceptual based models and to search for core explanations.• Predictions and explanations are revised based on systematic observations, measurements, and data/evidence.• Carefully constructed evidence is used to construct and defend arguments.• Predictions and explanations are revised to account more completely for available evidence.• Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of scientific objects and events.• 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.• Evaluate competing design solutions using a systematic process to determine how well they	

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meet the criteria and constraints of the problem.

- 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.
- 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 Activities

- Energy Research and Infographic Poster Project
- Windmill Engineering STEM activity
- Natural Disaster map tracking/analysis
- Nearpod Research Project: Weather related
- Plot earthquakes/volcanoes to discover Ring of Fire
- Analyze techniques engineers use to mitigate natural disasters
- Retrofitting existing structures research
- 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)
- “Life of a Rock” rock cycle stations activity
- Using Earth Materials: Rock Project

Assessments

- Formative assessments (check-out slips or Google forms)
- Section quizzes and tests
- Journal entries/reflections
- Observational assessment/ lab participation
- Writing tasks
- Performance assessments/STEM projects, Benchmark and Summative

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

Interdisciplinary Connections

- Social Studies: map reading/plotting data
- Mathematics: interpreting measurement data
- Language Arts: Cross-curricular novel “The Boy Who Harnessed the Wind” by Bryan Mealer and William Kamkwamba

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Technology Integration

- Video-streaming
- Demonstrations
- Lab Activities

Time Frame	6 Weeks
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Topic

Engineering to Solve Real World Problems

Essential Questions

- What is technology?
- Who is an engineer?
- How much mass (pennies) can a tiny foil boat hold?
- How can a rubber band powered car be designed to travel a distance of 10 meters?
- How do the criteria and constraints of a design problem affect the possible solutions?
- How can a design model be modified to ensure a successful solution?
- What scientific principles will have an effect on the distance the car will move?

Enduring Understandings

- 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.

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Alignment to Standards

- MS-ETS1-1
- MS-ETS1-3
- MS-ETS1-2
- MS-ETS1-4
- LA-6-8.RST.6-8.3; LA-6-8.RST.6-8.9; LA-6-8.WHST.6-8.2A-8.2F

Key Concepts and Skills

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

Assessments

- Hockey Scholar on Everfi
- STEM professions Everfi
- Rubberband Car
- Penny Boat
- Women in STEM Research project
- Differentiated Engineering Design station lab
- Mars colony STEM project
- Section quizzes and tests
- Journal entries/reflections
- Observational assessment/ lab participation
- Writing tasks
- Performance assessments/STEM projects, Benchmark and Summative

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

Interdisciplinary Connections

Mathematics: Power of 10 video; scale

- Language Arts: Open-Ended Real World Application Questions, analogies

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Technology Integration

- Video-Streaming
- Demonstrations
- Lab Activities

Time Frame

6 Weeks

Topic

Physical Science: Matter and Its Interactions

Essential Questions

- What is matter?
- How does matter change?
- How does heat (adding or removing) cause phase changes?

Enduring Understandings

- Substances are made from different types of atoms, which combine with one another in various ways.
- Atoms form molecules that range in size from two to thousands of atoms.
- Each pure substance has chemical and physical properties that can be used to identify it.
- 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 liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide.
- In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations.
- The change of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.

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Alignment to Standards

- MS-PS1-1
 - MS-PS1-2
- LA-6-8.RST.6-8.3; LA-6-8.RST.6-8.9;
LA-6-8.WHST.6-8.2A-8.2F

Key Concepts and Skills

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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'

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<ul style="list-style-type: none"> ● Claim-Evidence-Reasoning:Egg demonstration ● Physical vs. Chemical Changes brochure ● Cooking Lab for chemical/physical changes ● Station Lab for physical/chemical changes <p>Nanotechnology magazine</p>							
Assessments							
<ul style="list-style-type: none"> ● Formative assessments (check-out slips or Google forms) ● Section quizzes and tests ● Journal entries/reflections ● Observational assessment/ lab participation ● Writing tasks ● Performance assessments/STEM projects, Benchmark and Summative 							
21st Century Skills							
x	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	x	Media Literacy		
Interdisciplinary Connections							
<ul style="list-style-type: none"> ● Social Studies: ● Mathematics: Graphing ● Language Arts: Open Ended Real World Application Questions 							
Technology Integration							
<ul style="list-style-type: none"> ● Video-Streaming ● Demonstrations <p>Lab Activities</p>							

Time Frame	8 weeks
Topic	
Earth Science: Earth's Place in the Universe	
Essential Questions	
<ul style="list-style-type: none"> ● Why does the nighttime sky change? ● What role does gravity play in our solar system, galaxy and universe? 	

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Enduring Understandings

- 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 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.

Alignment to Standards

- | | |
|--|---|
| <ul style="list-style-type: none">● Models can be used to represent systems and their interactions.● Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. | <ul style="list-style-type: none">● MS-ESS1-1● MS-ESS1-2 <p>LA-6-8.RST.6-8.3; LA-6-8.RST.6-8.9
LA-6-8.WHST.6-8.2A-8.2F</p> |
|--|---|

Key Concepts and Skills

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Learning Activities

- Computer visualizations of elliptical orbits of planets

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- Lab Activity- Effects of gravity on weight
- Constellation Activity
- Build a Mars landing explorer STEM activity
- Bottle Rocket STEM activity
- Claim Evidence Reasoning - The Mysterious Planet Nine
- Rotate, Revolve or both CER activity
- Big Bang graphic organizer

Assessments

- Formative assessments (check-out slips or Google forms)
- Section quizzes and tests
- Journal entries/reflections
- Observational assessment/ lab participation
- Writing tasks
- Performance assessments/STEM projects, Benchmark and Summative

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

Interdisciplinary Connections

- Social Studies: Latitude/Longitude , hemispheres- reasons for the seasons
- Mathematics: Graphing and calculating weight on different planets
- Language Arts: Open Ended Real World Application Questions

Technology Integration

- Video-Streaming
- Planetary orbit animation
- Demonstrations
- Lab activities

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Time Frame	1 week
Topic	
Year End Review Google Slide Presentation	
Essential Questions	
<ul style="list-style-type: none">• 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?	
Enduring Understandings	
<ul style="list-style-type: none">• Specific to student topic.	
Alignment to Standards	
<ul style="list-style-type: none">• ESS 1-1, 1-2• ESS 2-4, 2-5, 2-6• ESS 3-1, ESS 3-2, ESS 3-3, ESS 3-4, ESS 3-5,• PS 1-1, PS 1-2, PS 1-4• LS 1-1, 1-2• LA-6-8.RST.6-8.3; LA-6-8.RST.6-8.9• LA-6-8.WHST.6-8.2A-8.2F	
Key Concepts and Skills	
<ul style="list-style-type: none">• Results of observation and measurement can be used to build conceptual based models and to search for core explanations.• Predictions and explanations are revised based on systematic observations, measurements, and data/evidence.• Carefully constructed evidence is used to construct and defend arguments.• Predictions and explanations are revised to account more completely for available evidence.• Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of scientific objects and events.• 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.• Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.• Analyze data from tests to determine similarities and differences among several design	

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solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

- 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 Activities

- Student driven topic determination.
- Develop minimum of seven Google Slides.
- Create 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

- Criteria met on Google Slides/Presentation
- Benchmark and Summative

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

Interdisciplinary Connections

- Mathematics- Data analysis, Computational skills
- Language Arts -Research , Open-ended Real World Application Questions
- Technology- Research (demonstrate appropriate use of Chromebooks)

Technology Integration

- Technology- Research (demonstrate appropriate use of Chromebooks)
- 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 pattern

Modifications (ELL, Special Education, Gifted and Talented, and 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily

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- 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

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
- 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

Integrated 21st-Century Skills and Career Ready Practices (NJSL 9):

All students will demonstrate how to:

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.

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- Attend to personal health and financial well-being.
- Communicate clearly and effectively and with reason.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

Standard 9.2 Personal Financial Literacy: All students will develop skills and strategies that promote personal and financial responsibility related to financial planning, savings, investment, and charitable giving in the global economy.

Standard 9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Standard 9.4 Career and Technical Education: All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professions that lead to technical skill proficiency, credentials, certificates, licenses, and/or degrees.

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Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

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