Board Approved August 2017

DEPARTMENT: SCIENCE SUBJECT 6th Grade Science Curriculum 2017 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	Life Science: From Molecules to Organisms: Structures & Processes	22	Using Engineering Skills to Solve Real World Problems
3	Life Science: From Molecules to Organisms: Structures & Processes	23	Using Engineering Skills to Solve Real World Problems
4	Current Events/ Science Writing Skills	24	Using Engineering Skills to Solve Real World Problems
5	Earth Science: Earth's Systems	25	Physical Science: Matter & Its Interactions/ Scientific Practices
6	Earth Science: Earth's Systems/ Earth and Human Activity	26	Physical Science: Matter & Its Interactions/ Scientific Practices
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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	Earth Science: Earth's Place in the Universe
12	Earth Science: Earth and Human Activity	32	Earth Science: Earth's Place in the Universe
13	Earth Science: Earth and Human Activity/Engineering Design	33	Earth Science: Earth's Place in the Universe
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

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Time Frame	**10 Weeks**

Topic

- **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

- 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?
- How can we observe cells?
- How do cells stay alive?
- What organelles are inside cells and what is the function of each structure?
- 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?
- How does the ocean affect the climate?

Enduring Understandings

- 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 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.
- An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).
- 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.

NGSS
Scientific and Engineering Practices

● 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	● 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.	MS-ESS2-4

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
- 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
- Recyclables Shoebox model or 3-D poster of cell organelles
- Bacteria Swabbing Lab
- Cell in a Bag analogies
- 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
- Cloud Model Demonstration
- Weather Map Activity
- Hurricane Plotting Lab
- Severe Storm Comic Strip Activity
- Engineer a Barge STEM activity

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 engineering activity

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

Technology Integration

- Video-Streaming
- Demonstrations
- Lab Activities

Time Frame	**10 Weeks**

Topic

Earth Science: Earth and Human Activity

Essential Questions

- What resources do humans use from the Earth?
- Which type of energy sources are better: renewable or nonrenewable?
- How do windmills work?
- What are natural disasters and where do they occur?
- How do humans prepare for natural disasters?

Enduring Understandings

- 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 NGSS

● Energy may take different forms (eg. energy in fields, thermal energy, and energy of motion).	● MS-ESS3-1

Key Concepts and Skills

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Learning Activities

- Energy Research and Infographic Poster Project
- Windmill Engineering STEM activity
- Natural Disaster map tracking/analysis
- Plot earthquakes/volcanoes to discover Ring of Fire
- Analyze techniques engineers use to mitigate natural disasters
- Retrofitting existing structures research
- Design, build and test earthquake resistant structures STEM 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

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

Technology Integration

- Video-streaming
- Demonstrations
- Lab Activities

Time Frame	**4 Weeks**

Topic

Engineering to Solve Real World Problems

Essential Questions

- What is technology?
- Who is an engineer?
- 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.

Alignment to NGSS

- MS-ETS1-1
- MS-ETS1-3
- MS-ETS1-2
- MS-ETS1-4

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.
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Assessments

- Hockey Scholar on Everfi
- Rubberband Car
- Renewable Energy research project
- Section quizzes and tests
- Journal entries/reflections
- Observational assessment/ lab participation
- Writing tasks
- Performance assessments/STEM projects

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

Technology Integration

- Video-Streaming
- Demonstrations
- Lab Activities

Time Frame	6 Weeks

Topic

Physical Science: Matter and Its Interactions

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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.

Alignment to NGSS

- MS-PS1-1
- MS-PS1-2

Key Concepts and Skills

Learning Activities

- Metric Measurement stations
- Density of Solids Lab
- Density of Liquids Lab
- Density of Gases demonstration
- Fizz Quiz Lab
- Candle Lab
- Gobstoppers Lab
- Potato Lab
- Egg demonstration
- Physical vs. Chemical Changes brochure
- Power of 10 video/scale

Nanotechnology magazine

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

21st Century Skills

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

Interdisciplinary Connections

- Social Studies:
- Mathematics: Graphing
- Language Arts: Open Ended Real World Application Questions

Technology Integration

- Video-Streaming
- Demonstrations

Lab Activities

Time Frame	**8 weeks**

Topic

Earth Science: Earth's Place in the Universe

Essential Questions

- How do the sun and the moon influence Earth?
- What causes the phases of the moon?
- Why do seasons occur throughout the year?
- Why does the nighttime sky change?
- What role does gravity play in our solar system, galaxy and universe?

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.
- The model of the solar system can explain eclipses of the sun and moon.
- Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun.
- 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.
- 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 NGSS

- 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.

- MS-ESS1-1
- MS-ESS1-2

Key Concepts and Skills

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Learning Activities

- Modeling sun-earth-moon movements pantomime
- Styrofoam ball on sticks 3-D model of moon phases
- Computer visualizations of elliptical orbits of planets
- Lab Activity- Effects of gravity on weight
- Constellation Activity

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

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

Time Frame	**1 week**

Topic

Year End Review Google Slide Presentation

Essential Questions

- 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

- Specific to student topic.

Alignment to NGSS

- 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

Key Concepts and Skills

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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.

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Assessments

- Criteria met on Google Slides/Presentation

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)