

SCHOOL DISTRICT OF THE CHATHAMS

Science Grade 6 Full Year

Course Overview

Students in middle school continue to develop their understanding of the core ideas in the Earth and Space, Life and Physical Sciences. The middle school performance expectations in these areas build on the elementary school ideas and skills and allow middle school students to explain more in-depth phenomena in earth and space, life and physical sciences as well. These performance expectations blend the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing usable knowledge to explain ideas across the science disciplines.

New Jersey Student Learning Standards

The New Jersey Student Learning Standards (NJSLS) can be located at www.nj.gov/education/cccs/2020/.

Physical Science

MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

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.

Life Science

MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively

MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Unit VII: Body Systems

MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Earth and Space Science

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 results 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-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.

Technology Standards

8.2.8.A.2 Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.

8.1.8.E.1 Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

8.1.8.F.1 Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

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9.3.ST.2 Use technology to acquire, manipulate, analyze and report data.

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

Interdisciplinary Connections

English Language Arts:

Reading

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- 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.
- RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.

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Writing

- WHST.6-8.1 Write arguments focused on discipline content.
- 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.
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

Speaking and Listening

- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics

- 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
- 6.SP.B.5 Summarize numerical data sets in relation to their context.
- 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- 6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
- 7.RP.7.EE.B.6 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- A.2 Recognize and represent proportional relationships between quantities.
- 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Units of Study

Unit 1: Waves and Electromagnetic Radiation (~20 days)

- Explain how knowledge of waves helps us understand our world better and improve the quality of our lives?

Unit 2: Thermal Energy (~20 days)

- How can energy be transferred from one object or system to another?

Unit 3: Weather and Climate (~20 days)

- How do changes in one part of an Earth system affect other parts of the system?
- How does understanding the properties of Earth materials and the physical laws that govern behavior lead to predictions of Earth?

Unit 4: Space Systems (~20 days)

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- What predictable, observable patterns occur as a result of the interaction between the Earth, Moon and Sun?
- What types of celestial bodies encompass our Universe?

Unit 5: Structure and Function of a Cell (~20 days)

- How do cellular structures and organelles help the cell to carry out all of the life functions?
- How do cells work together in multicellular organisms?
- How have changes in technology advanced our understanding of the cell?

Unit 6: Growth, Development and Reproduction of Organisms (~20 days)

- How do organisms obtain and use the matter and energy they need to live and grow?
- How is matter transformed, and energy transferred/transformed in living systems?

Unit 7: Body Systems (~20 days)

- How do the structures of organisms work as a system?

<h3>Learning Objectives/Discipline Standards of Practice</h3>

Lesson Objectives:

Earth and Space Science

- Distinguish between Earth's rotation and Earth's revolution
- Model how the Sun strikes Earth's surface.
- Model how solar energy spreads out over Earth's surface throughout the year.
- Simulate how the Moon moves around the Earth.
- Illustrate and demonstrate a solar eclipse and lunar eclipse.
- Design 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.
- Model the different phases of the moon.
- Demonstrate the gravitational pull between the Sun and a planet.
- Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
- Analyze and interpret data to determine scale properties of objects in the solar system.
- Differentiate the sun as it relates to other stars in the universe.

Life Science

- Compare and contrast structures of different types of cells and relate the structures to the functions the different cells perform.
- Understand the different levels of organization within an organism
- Apply an understanding of design to the process of energy transfer
- Design solutions to energy based problems
- Demonstrate understanding of the core ideas related to energy
- Describe and model an energy conversion
- Give examples of how thermal energy is always a results of energy conversions
- Develop a model to describe scientific phenomena
- Model and identify the structures of the cell.
- Observe living cells and identify the cellular structures and organelles that can be seen

Physical Science

- Produce sound at different pitches and investigate how changing wavelength and frequency changes pitch.
- Distinguish between mechanical and electromagnetic waves and their role in the transfer of energy through models.
- Conduct an experiment to interpret the interactions between mechanical waves.
- Demonstrate how waves transfer energy

Discipline Standards of Practice:

Science and Engineering Practices

- Plan and Carryout and Investigation
- Asking Questions and Defining Problems
- Analyzing and Interpreting Data
- Developing and Using Models
- Constructing Explanations and Designing Solutions
- Obtaining, Evaluating, and Communicating Information
- Engaging In Argument From Evidence

Crosscutting Concepts

- Patterns
- Cause and Effect
- Energy and Matter
- Structure and Function
- Interdependence of Science, Engineering, and Technology
- Influence of Engineering, Technology, and Science on Society and the Natural World
- System and System Models

Instructional Resources and Materials

Whole class resources have been identified with an asterisk.

Resources

- Discovery Education
- Open Sci Ed

Materials

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|-------------------------------|--------------------|-------------------------|
| ● Earth, Moon, and Sun Models | ● Hot Plate | ● Cloud Apparatus |
| ● PlayDoh | ● Popcorn Kernels | ● Large Plastic Bottles |
| ● Styrofoam Balls | ● Safety Goggles | ● Matches |
| ● Paint | ● Pie Pans | ● Hot Plate |
| ● Poster Paper | ● Jumprope | ● Heat Lamps |
| ● Heat Lamps | ● Sour patch kids | ● Sponges |
| ● Thermometers | ● Cotton balls | ● Pipettes |
| ● Sand | ● Essential oil | ● Thermometers |
| ● Gravel | ● Stationary bikes | ● Cans |
| ● Beakers | ● Mirrors | ● Water Bottles |
| ● Felt | ● Water Speakers | ● Beakers |
| ● Heat Resistant Gloves | ● Thunder Tubes | ● Plastic Wrap |
| ● Lava Lamps | ● Sound Tubes | ● Construction Paper |
| ● Hot Pots | ● Psychrometers | ● Tornado Pet |
| ● Food Coloring | ● Pasco Probe | ● Ziploc bags |
| | ● Bicycle Pump | |

Assessment Strategies

Assessment is designed to measure a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes (formative assessment) and for evaluative purposes (summative assessment).

The following is a general list of the many forms assessment may take in learning.

- Tests
- Quizzes
- Projects
- Unit Assessments
- Laboratory Investigations