

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Original Adoption: Original Adoption: 2023 NJSLs English Language Arts and English as a Second Language (8-21-24); Math NJSLs Mathematics (8-21-24); 2020 NJSLs Science, Social Studies, Career Readiness, Life Literacies & Key Skills, Computer Design & Thinking, Visual & Performing Arts, World Language, Comprehensive Health and Physical Education (5-11-22)</p>
<p>Created By:</p>

Recommended Pacing Guide	
Unit 1: Microbiome	20 days
Unit 2: Metabolism	20 days
Unit 3: Metabolism Engineering Internship	10 days
Unit 4: Traits and Reproduction	23 days
Unit 5: Thermal Energy	21 days
Unit 6: Ocean, Atmosphere, and Climate	21 days
Unit 7: Weather Patterns	21 days
Unit 8: Earth’s Changing Climate	23 days
Unit 9: Earth’s Changing Climate Engineering	11 days

Alignment with State Mandates
<p>The following colors are used throughout this document to indicate areas in which the curriculum is aligned with the following NJSA requirements:</p> <ul style="list-style-type: none"> ● Holocaust and genocides (N.J.S.A. 18A:35-28) ● History and contributions of African-Americans (Amistad Law) (N.J.S.A. 18A:35-4.43) ● Highlight and promote diversity and inclusion (Diversity & Inclusion Law) (N.J.S.A. 18A:35-4.36a) ● History of disabled and LGBT persons included in middle and high school curriculum (Section 18A:35-4.35) ● Climate Change - to prepare students to understand how and why climate change happens, the impact it has on our local and global communities and to act in informed and sustainable ways. Please click here for specific examples (by subject).

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

Unit 1: Microbiome	Duration: 20 days
--------------------	-------------------

New Jersey Student Learning Standards	
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 the parts of cells contribute to the function.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions</p> <ul style="list-style-type: none"> As students investigate single-celled organisms, they analyze data in order to make explanations about the role that bacteria play in the human microbiome. They also have many opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read science articles. <p>Practice 2: Developing and Using Models:</p> <ul style="list-style-type: none"> In order to learn about the tiny microorganisms that inhabit the human microbiome, students use the Scale Tool. This digital model allows students to explore and compare the relative sizes of different objects in order to 	<p>LS1.A: Structure and Function:</p> <ul style="list-style-type: none"> All living things are made up of cells. A cell 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). (MS-LS1-1) Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3) <p>LS2.A: Interdependent</p>	<p>Scale, Proportion, and Quantity</p> <ul style="list-style-type: none"> Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) <p>Systems and System Models</p> <ul style="list-style-type: none"> Systems may interact with other systems; they may have subsystems and be a part of larger complex systems. (MS-LS1-3) <p>Structure and Function</p> <ul style="list-style-type: none"> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>develop a conceptual understanding of scale. Students also create their own scale drawings of microorganisms</p> <p>Practice 3: Planning and Carrying Out Investigations:</p> <ul style="list-style-type: none">Students carry out a simulated investigation of the bacteria that live on the human hand to gather observable evidence about the microorganisms on the human body that are too small to see. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none">Students analyze a series of pie charts representing the changing microbiome of a case study patient. <p>Practice 5: Using Mathematics and Computational Thinking:</p> <ul style="list-style-type: none">Using the digital Scale Tool, students explore the concept of scale in comparing the sizes of molecules, cells, and other objects. <p>Practice 6: Constructing Explanations:</p> <ul style="list-style-type: none">As students explain the roles of both helpful and harmful bacteria in the human microbiome, they learn about scientific explanations and have multiple opportunities to construct increasingly complex explanations (and defend them through argumentation) over the course of the unit. <p>Practice 7: Engaging in Argument from Evidence</p> <ul style="list-style-type: none">Students receive instruction about the structure of a scientific argument and are supported in evaluating	<p>Relationships in Ecosystems:</p> <ul style="list-style-type: none">In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, which consequently constrains their growth and reproduction. (MS-LS2-1)Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)	<p>Connections to Engineering, Technology, and Applications of Science</p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none">Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1) <p>Connections to Nature of Science</p> <p>Science is a Human Endeavor</p> <ul style="list-style-type: none">Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)
---	--	---

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>evidence, engaging in scientific reasoning, and producing both oral and written arguments.</p> <p>Practice 8: Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> Students are introduced to Active Reading, an approach to obtaining information from science texts, and have multiple opportunities to engage in this practice. Students also evaluate evidence to determine its relevance to a particular claim. 		
--	--	--

New Jersey Social and Emotional Competencies and Sub-Competencies

Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> Develop, implement, and model effective problem-solving and critical thinking skills. Identify the consequences associated with one’s actions in order to make constructive choices. Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> Establish and maintain healthy relationships. Utilize positive communication and social skills to interact effectively with others.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	<ul style="list-style-type: none"> ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.
--	---

<u>Interdisciplinary Connections</u>

ELA Standards

RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.3c	Find a percent of a quantity as a rate per 100; solve problems involving finding the whole given a part and the percent.
6.RP.3.d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

6.NS.7.d	Distinguish comparisons of absolute value from statements about order.
6.SP.5	Summarize numerical data sets in relation to their context.

<u>Computer Science & Design Thinking</u>	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

<u>Career Readiness, Life Literacies & Key Skills</u>	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one’s goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Evidence of Student Learning	
-------------------------------------	--

<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills	
-------------------------------	--

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Many organisms are microscopic—so small that they cannot be seen with the naked eye. ● All living things are made of cells. ● Almost all cells are microscopic. ● Even though they are both too small to see, cells are much bigger than molecules. ● The human microbiome contains approximately 100 trillion microorganisms. Most of these are bacteria. ● The human body provides an environment (food and space) for bacteria to survive. ● A healthy microbiome has various helpful types of bacteria. ● An infection of harmful bacteria in the human microbiome can make a person sick. ● Antibiotics reduce the number of helpful and harmful bacteria in the microbiome. ● Living things with fewer than normal helpful bacteria in their guts can become infected more easily because there is more food and space available for harmful bacteria. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How can having 100 trillion microorganisms on and in the human body keep us healthy? ● How small are the microorganisms that live on and in the human body? ● How can fecal transplants cure patients infected with harmful bacteria? ● What is the human microbiome? ● How is a healthy gut microbiome different from an unhealthy gut microbiome? ● How do antibiotics affect the microbiome? ● How can fewer than normal bacteria in the gut microbiome affect the overall health of the human body? ● How does having a healthy microbiome keep the body healthy?
--	---

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Content

Students will know...

- Life science is the study of living things.
- Asking questions is an important part of scientists' work.
- Many organisms are microscopic—so small, they cannot be seen with the naked eye.
- Science is both a body of knowledge and the processes and practices used to add to that body of knowledge.
- All living things are made of cells.
- Almost all cells are microscopic.
- Cells are typically measured in micrometers, which are one million times smaller than meters.
- Even though they are both too small to see, cells are much bigger than molecules.
- Molecules are typically measured in nanometers, which are 1000 times smaller than micrometers.
- Scientists can use bacterial cultures to gather evidence about microorganisms that are too small to see with the naked eye.
- Reading actively means thinking about one's own understanding as one reads.
- Most bacteria in the human microbiome are harmless.
- Scientists answer questions by using data and information from text.
- The human microbiome contains approximately 100 trillion microorganisms. Most of these are bacteria.
- The human body provides an environment (food and space) for bacteria to survive.
- The purpose of a scientific argument is to convince others, using evidence and reasoning.
- A scientific argument begins with a question, includes a claim and evidence, and explains how the evidence supports the claim.
- Scientists use relevant evidence to support a claim.
- Antibiotics reduce the number of helpful and harmful bacteria in the microbiome.
- A healthy microbiome has various helpful types of bacteria.
- An infection of harmful bacteria in the human microbiome can make a person sick.
- Scientists can only make arguments about things that can be observed and investigated.
- Antibiotics reduce the number of helpful and harmful bacteria in the microbiome.

Skills

Students will be able to ...

- Identify life science as the study of living things and distinguish it from other branches of science.
 - Generate investigable scientific questions related to living organisms and microscopic life.
 - Explain why many organisms cannot be seen with the naked eye and describe how scientists study microscopic life.
 - Describe science as both a body of knowledge and a set of practices used to build that knowledge.
 - Explain that all living things are made of cells and recognize that most cells are microscopic.
 - Compare and contrast the relative sizes of cells and molecules using appropriate units (micrometers and nanometers).
 - Use scale and measurement language to explain why cells are much larger than molecules even though both are invisible to the naked eye.
 - Describe how scientists use bacterial cultures as evidence to study microorganisms.
 - Read scientific texts actively by monitoring understanding, identifying key ideas, and using evidence from the text.
 - Explain that most bacteria in the human microbiome are harmless or helpful.
- Use data and information from text to answer scientific questions about microorganisms and the human body.
- Describe the human microbiome as a large community of microorganisms living in the body.
 - Explain how the human body provides food and space that allow bacteria to survive.
 - Construct a scientific argument that includes a question, a claim, evidence, and reasoning.
 - Use relevant evidence to support a claim about the human microbiome.
- Explain how antibiotics affect both helpful and harmful bacteria in the microbiome.
- Describe characteristics of a healthy microbiome, including diversity of helpful bacteria.
 - Explain how harmful bacteria can cause illness when they infect the microbiome.
 - Explain why scientific arguments must be based on observable and investigable evidence.
 - Analyze how reducing helpful bacteria can increase the risk of infection by harmful bacteria.
 - Explain how fecal transplants can restore balance in the gut by limiting food and space for harmful bacteria.
 - Describe the roles of specific bacteria in supporting immune function and gut protection.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Living things with fewer-than-normal helpful bacteria in their guts can become infected more easily because there is more food and space available for harmful bacteria. ● Bacteria from a fecal transplant can fill the space in the gut, which limits available food and space for invading harmful bacteria. ● B. fragilis bacteria help the body produce immune cells that can kill invading, harmful bacteria. ● L. reuteri bacteria help the body produce mucus that can line the gut and protect it from harmful bacteria. ● A scientific argument is convincing when it includes evidence that strongly supports the claim. ● In a convincing argument, the connections between the evidence and the claim are made clear. ● Scientific values function as criteria in distinguishing between science and nonscience. 	<ul style="list-style-type: none"> ● Evaluate the strength of a scientific argument by examining the quality of evidence and clarity of reasoning. <ul style="list-style-type: none"> ● Explain how scientific values help distinguish science from nonscience.
---	--

Core Instructional & Supplemental Materials

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ “Cells” ○ “The Human Microbiome” ○ “Meet a Scientist Who Studies the Human Microbiome” ○ “Salmonella”, “C. difficile”, “B. fragilis”, “L. reuteri”, “B. animalis”, “C. jejuni”, and “E. coli” ○ “Viruses: On the Edge of Life” 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Using the Scale Tool ● Multi-language glossary ● Hands-On Flextension: <ul style="list-style-type: none"> ○ Microscopic Evidence of Life
---	--

Suggested Accommodations

<p>English Language Learners:</p> <ul style="list-style-type: none"> ● Multi-sensory instruction ● Flexible grouping ● Small group instruction ● Provide peer tutoring ● Use a strong student as a “buddy” (does not necessarily have to speak the primary language) ● Chunking information ● Scaffolded questioning ● Academic language support ● Vocabulary support

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 2: Metabolism	Duration: 20 days
---------------------------	--------------------------

New Jersey Student Learning Standards	
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 the parts of cells contribute to the function.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells
MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
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.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
--	---	------------------------------

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Practice 1: Asking Questions</p> <ul style="list-style-type: none"> Throughout the unit, students employ the Active Reading approach as they engage with a rich and varied collection of science articles and other forms of text. They are encouraged to ask questions as they read, making note of these questions as they annotate the text. <p>Practice 2: Developing and Using Models:</p> <ul style="list-style-type: none"> Students create a physical model of human body systems and spend extensive time exploring and investigating a simulation that models the human body. They also use a digital modeling tool to create models that show their ideas about body systems and cellular respiration. <p>Practice 3: Planning and Carrying Out Investigations:</p> <ul style="list-style-type: none"> As medical interns working to diagnose a fictional patient, students plan and conduct investigations to figure out how body systems work together to take molecules from the environment and get them, in usable form, to the cells. <p>Practice 4: Analyzing and Interpreting Data:</p> <ul style="list-style-type: none"> The use of the Metabolism Simulation leads students to generate data related to possible diagnoses. Students analyze, interpret, then use this data as evidence when they make their diagnoses. Students again analyze and interpret data in order to apply their understanding about metabolism to a new problem concerning blood doping to 	<p>LS1.A: Structure and Function:</p> <ul style="list-style-type: none"> All living things are made up of cells, which are the smallest units 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). Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. <p>LS1.C: Organization for Matter and Energy Flow in Organisms:</p> <ul style="list-style-type: none"> Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) <p>LS1.D: Information Processing:</p> <ul style="list-style-type: none"> Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8) <p>PS3.D: Energy in Chemical Processes and Everyday Life:</p> <ul style="list-style-type: none"> Cellular respiration in plants 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) <p>Scale, Proportion, and Quantity</p> <ul style="list-style-type: none"> Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) <p>Systems and System Models</p> <ul style="list-style-type: none"> Systems may interact with other systems; they may have subsystems and be a part of larger complex systems. (MS-LS1-3) <p>Energy and Matter</p> <ul style="list-style-type: none"> Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7) <p>Structure and Function</p> <ul style="list-style-type: none"> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2) <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of
---	--	---

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>improve athletic performance</p> <p>Practice 6: Constructing Explanations:</p> <ul style="list-style-type: none"> Students learn about scientific explanations and have multiple opportunities to make increasingly complex explanations (and defend them through argumentation) over the course of the unit as they explain how body systems work together to get needed molecules to cells for energy release and growth and repair. <p>Practice 7: Engaging in Argument from Evidence:</p> <ul style="list-style-type: none"> Students receive instruction about the structure of a scientific argument and are supported in evaluating evidence, engaging in scientific reasoning, and producing both oral and written arguments. <p>Practice 8: Obtaining, Evaluating, and Communicating Information:</p> <ul style="list-style-type: none"> Students have multiple opportunities to engage in Active Reading, an approach to obtaining information from science texts. Students also evaluate evidence to determine its relevance to a particular claim. 	<p>and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (MS-LS1-7)</p>	<p>entire industries and engineered systems. (MS-LS1-1)</p> <p>Connections to Nature of Science</p> <p>Science is a Human Endeavor</p> <ul style="list-style-type: none"> Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)
---	--	--

New Jersey Social and Emotional Competencies and Sub-Competencies	
<p>Self-Awareness</p>	<ul style="list-style-type: none"> Recognize one's feelings and thoughts. Recognize the impact of one's feelings and thoughts on one's own behavior. Recognize one's personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Self-Management	<ul style="list-style-type: none"> ● Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. ● Recognize the skills needed to establish and achieve personal and educational goals. ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> ● Recognize and identify the thoughts, feelings, and perspectives of others. ● Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds. ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> ● Develop, implement, and model effective problem-solving and critical thinking skills. ● Identify the consequences associated with one’s actions in order to make constructive choices. ● Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> ● Establish and maintain healthy relationships. ● Utilize positive communication and social skills to interact effectively with others. ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

MP3	Construct viable arguments and critique the reasoning of others.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems.
6.RP.3b	Solve unit rate problems including those involving unit pricing and constant speed.
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.SP.5a	Summarize numerical data sets in relation to their context, by reporting the number of observations.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Computer Science & Design Thinking	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Career Readiness, Life Literacies & Key Skills	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

9.1.8.PB.5	Identify factors that affect one’s goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Knowledge & Skills

Enduring Understandings:

- A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells.
- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- Systems can work together to form a larger more complex system.
- A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells.
- In order to release energy, cells need both glucose and oxygen molecules.
- Inside the cell, the atoms that make up glucose and oxygen can be rearranged to make different molecules. This chemical reaction is called cellular respiration and releases energy.
- Cells can grow and repair themselves by combining amino acid molecules to form larger protein molecules. This growth and repair requires energy release from cellular respiration.

Essential Questions:

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?
- Why does Elisa feel tired all the time?
- What does the human body need to function?
- Which molecules do cells need to function?
- What is happening in Elisa's body that could be preventing molecules from getting to her cells?
- How do molecules from food and air get to the cells in the body?
- How can having a medical condition affect the delivery of molecules to cells in the body?
- How do molecules in the cells of the body release energy?
- Which molecules do the cells need to release energy?
- How do oxygen and glucose molecules release energy in the cells?
- What can happen in the cell as a result of energy released through cellular respiration?
- How did the athlete increase his cellular respiration and improve his performance?

Content

Students will know...

- The body takes in molecules by eating and breathing.
- Some of these molecules travel to the cells of the body
- A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells.
- Scientists consider how much data was collected in an investigation when they evaluate whether the investigation provides high-quality evidence.

Skills

Students will be able to ...

- Explain how the human body takes in molecules through eating and breathing.
- Describe how molecules from food and air travel to cells throughout the body.
- Identify glucose, amino acids, and oxygen as essential molecules found in the cells of a functioning human body.
- Explain why only molecules small enough can enter cells.
- Describe how the respiratory system brings oxygen into the body and delivers it in a usable form for cells.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- Scientists use models to understand the processes that happen inside the human body because they are difficult to observe directly due to being too small or hidden from view.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- Medical conditions can affect the functioning of body systems, resulting in the cells of the body not getting enough of the important molecules they need to function.
- Understanding of difficult texts, such as science texts, can be enhanced when you pay attention and ask meaningful questions while reading.
- Systems can work together to form a larger more complex system.
- With anemia, less oxygen gets into the circulatory system and the cells.
- With diabetes, less glucose gets into the cells.
- With asthma, less oxygen gets into the respiratory system, the circulatory system, and the cells.
- With a pancreas injury, less glucose gets into the circulatory system and the cells.
- Scientists create models to express their ideas about how something works.
- Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination, and creativity.
- A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells.
- A diagnosis in medicine is a form of scientific argumentation in which evidence is used to rule out claims and support the best conclusion.
- The body requires energy to function.
- In order to release energy, cells in the body need both glucose and oxygen molecules.
- Explain how the digestive system breaks down food into smaller molecules that can enter cells.
- Describe the role of the circulatory system in transporting oxygen, glucose, and amino acids to body cells.
- Explain how multiple body systems work together as a larger system to support cellular function.
- Use models to represent how molecules move through body systems to reach cells.
- Explain why scientists use models to study processes that cannot be directly observed.
- Analyze how medical conditions can interfere with the delivery of important molecules to cells.
- Compare how different conditions affect the movement of oxygen or glucose in the body.
- Use evidence from text and models to explain how anemia, diabetes, asthma, and pancreas injury impact cells.
- Demonstrate active reading strategies by asking questions and monitoring understanding while reading science texts.
- Explain that the body requires energy to function.
- Describe how cells release energy using glucose and oxygen through cellular respiration.
- Explain that cellular respiration is a chemical reaction in which atoms are rearranged to form new molecules.
- Explain how energy released from cellular respiration supports cell growth and repair.
- Analyze how conditions that affect energy release can impact growth and repair in the body.
- Explain how increased oxygen availability can increase cellular respiration, especially during exercise.
- Describe how blood doping and high-altitude training affect oxygen delivery in the body.
- Use evidence to compare claims about blood doping and high-altitude training.
- Evaluate the quality of evidence by considering how much data was collected and how it supports a claim.
- Construct a scientific argument related to metabolism or body systems using claims, evidence, and reasoning.
- Explain how medical diagnoses function as scientific arguments based on evidence.
- Discuss how scientists determine certainty and uncertainty in their claims.
- Explain why scientists may revise their explanations when presented with new evidence.
- Collaborate with peers to discuss evidence and refine understanding of scientific ideas.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Inside the cell, the atoms that make up glucose and oxygen can be rearranged to make different molecules. This chemical reaction is called cellular respiration and releases energy.
- Cells can grow and repair themselves by combining amino acid molecules to form larger protein molecules. This growth and repair requires energy release from cellular respiration.
- Conditions that affect energy release in the cells, like diabetes, can also affect the body's ability to grow and repair cells.
- Increased cellular respiration can occur when more oxygen is available to the cells of the body.
- Some athletes increase the amount of oxygen that can be carried by their circulatory systems through a process called blood doping.
- Training at high altitude can also increase the amount of oxygen that can be carried by the circulatory system.
- Increased cellular respiration can occur when more oxygen is available to the cells of the body, especially during exercise.
- Scientists try to use the highest-quality evidence available when considering and comparing different claims.
- Evidence for blood doping can include age of red blood cells and levels of hemoglobin.
- High-altitude training can have a similar effect as blood doping, by increasing the number of red blood cells in the body.
- Scientists must carefully consider all available evidence before making arguments about a phenomenon.
- Scientists can be more or less certain of their claims depending on the evidence they have.
- Discussing evidence and ideas with others helps build new understanding.
- Scientists can change their minds when presented with convincing evidence.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- Articles in This Unit
 - "Molecules Cells Need"
 - Patient Stories: Problems with Body Systems article set
 - "Meet a Scientist Who Grows New Cells"

Supplemental Materials

- Digital Resources included in each unit
 - Metabolism Simulation
- Multi-language glossary
- Hands-On Flexextension:
 - Investigating the Nervous System
- [Marie Maynard Daly](#)

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Systems of the Human Body article set
- “Cellular Respiration”
- “Growth & Repair”
- “The Big Climb: A Story in Large and Small Scale”
- “Blood Doping: Messing with Metabolism to Win Races”
- Odd Organisms and How They Get the Molecules They Need article set

Suggested Accommodations

English Language Learners:

- Multi-sensory instruction
- Flexible grouping
- Small group instruction
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 3: Metabolism Engineering Internship

Duration: 11 days

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

New Jersey Student Learning Standards	
MS-ETS1-1	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.
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.
MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Students consider multiple criteria and constraints in defining their design problem. They also have opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read scientific texts, such as the Futura Food Engineer’s Dossier. <p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students use the Futura RecipeTest Design Tool, a digital simulation, to test their designed solutions. 	<p>ETS1.A: Defining and Delimiting Engineering Problems:</p> <ul style="list-style-type: none"> 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. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) <p>ETS1.B: Developing Possible Solutions:</p> <ul style="list-style-type: none"> A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) There are systematic processes for evaluating 	<p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ETS1-1) The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Practice 3: Planning and Carrying Out Investigations.</p> <ul style="list-style-type: none"> Students work through the phases of the design cycle—Plan, Build, Test, Analyze—in developing optimal solutions to their design problem. They plan and carry out iterative tests in the Futura RecipeTest Design Tool and collect data that help inform their subsequent designs. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> Students analyze the data recorded in the RecipeTracker to determine needed revisions to their designs. <p>Practice 5: Using Mathematics and Computational Thinking.</p> <ul style="list-style-type: none"> Students calculate differences between the results of two tests as well as evaluate graphs and tables as they look for trends, with the ultimate goal of optimizing their designs. Students break down this problem into smaller parts by isolating design variables to understand their impacts on the final results. <p>Practice 6: Constructing Explanations and Designing Solutions.</p> <ul style="list-style-type: none"> Students use an iterative process to optimize a design solution. <p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students evaluate competing design solutions, based on agreed-upon design criteria, to choose the best recipe. <p>Practice 8: Obtaining, Evaluating,</p>	<p>solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)</p> <ul style="list-style-type: none"> Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) Models of all kinds are important for testing solutions. (MS-ETS1-4) <p>ETS1.C: Optimizing the Design Solution:</p> <ul style="list-style-type: none"> Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4) <p>LS1.C: Organization for Matter and Energy Flow in Organisms:</p> <ul style="list-style-type: none"> Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) 	<p>conditions. (MS-ETS1-1)</p> <p>Energy and Matter</p> <ul style="list-style-type: none"> Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)
---	---	---

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>and Communicating Information.</p> <ul style="list-style-type: none"> Students read and research in the Futura Food Engineer’s Dossier; analyze different design iterations, using their data tables; and write final proposals describing their optimal recipe designs. 		
---	--	--

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> Develop, implement, and model effective problem-solving and critical thinking skills. Identify the consequences associated with one’s actions in order to make constructive choices. Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> Establish and maintain healthy relationships. Utilize positive communication and social skills to interact effectively with others. Identify ways to resist inappropriate social pressure. Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. Identify who, when, where, or how to seek help for oneself or others when needed.

[Interdisciplinary Connections](#)

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
6.RP.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
6.SP.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
6.SP.5a	Summarize numerical data sets in relation to their context, by reporting the number of observations.
6.SP.5a	Summarize numerical data sets in relation to their context, by reporting the number of observations.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

6.SP.5c	Summarize numerical data sets in relation to their context, by giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.
----------------	---

<u>Computer Science & Design Thinking</u>
--

8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

<u>Career Readiness, Life Literacies & Key Skills</u>
--

9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one's goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
--------------------	--

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Design a health bar to meet the metabolic needs of populations affected by natural disasters. ● Define a new engineering problem related to food scarcity, food packaging, or meeting specific metabolic needs. ● Engineers use scientific knowledge about metabolism to design solutions that meet human needs. ● Metabolic needs for energy, growth, and repair depend on the types and amounts of nutrients consumed. ● Different foods provide carbohydrates and proteins that are broken down into molecules cells can use. ● Glycemic index influences how quickly energy becomes available to the body. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How do engineers use knowledge of metabolism to solve real-world problems? ● How do carbohydrates and proteins support the body's energy, growth, and repair needs? ● How does glycemic index affect how the body uses food for energy? ● How can food be engineered to meet the metabolic needs of different people? ● Why do different users require different design solutions? ● How do criteria shape the design of an engineering solution? ● Why are trade-offs necessary when designing solutions? ● How does testing and iteration improve an engineering design? ● How can evidence be used to justify why one design solution is better than another?

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Engineering problems are defined by criteria, and solutions must be evaluated against those criteria. ● Trade-offs are unavoidable in engineering design, and not all criteria can be met equally well. ● Iteration improves design quality through testing, feedback, and revision. ● Evidence and reasoning are essential for explaining why a design solution is effective. ● People have varied metabolic needs, so effective solutions must consider user differences. ● Clear, professional communication strengthens the impact and credibility of engineering solutions. 	<ul style="list-style-type: none"> ● Why is professional scientific and engineering communication important when sharing solutions?
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Engineers design physical objects and processes that try to solve real-world problems. ● Criteria define the engineering problem. ● Background research is necessary when solving an engineering problem. ● Metabolic needs for survival are energy and cellular growth and repair. ● Food provides carbohydrates and proteins necessary to meet metabolic needs. ● Glycemic index measures how fast carbohydrates break down into glucose. ● Professionals need to be organized and have systems in place that help them deliver their work on time. ● Protein is broken down into amino acids in the body, which are used in the cells for growth and repair. ● Carbohydrates are broken down into glucose, which is used in the cells for energy. ● Different foods have different glycemic indices, which is the rate of carbohydrates breaking down. ● Specific ingredients meet various metabolic needs. ● People's needs vary, and one solution will not necessarily work for every user. ● People's metabolic needs determine the amount of proteins and carbohydrates they need to consume. ● Scientific communication is the process of sharing scientific arguments, explanations, ideas, or data with an audience. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Explain how engineers design physical objects and processes to solve real-world problems. ● Define an engineering problem by identifying criteria that describe a successful solution. ● Conduct background research to understand metabolic needs and inform design decisions. ● Explain that energy and cellular growth and repair are essential metabolic needs for survival. ● Identify carbohydrates and proteins as key nutrients that support metabolic needs. ● Explain how carbohydrates are broken down into glucose and used by cells for energy. ● Explain how proteins are broken down into amino acids and used by cells for growth and repair. ● Describe glycemic index as a measure of how quickly carbohydrates are converted into glucose. ● Compare foods based on glycemic index and explain how different rates of glucose release affect metabolic needs. ● Analyze how specific ingredients meet different metabolic needs. ● Explain why people have different metabolic needs and why a single solution may not work for all users. ● Design a food-based solution that meets defined metabolic criteria for a specific user. ● Apply organizational strategies to manage time, materials, and tasks during an engineering project. ● Follow a methodical engineering design process to develop and test solutions. ● Evaluate design results based on how well they meet the established criteria.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Engineers conduct their work in a methodical way.
- Engineers consider trade-offs by weighing the impact of each criterion against the others
- The results of each design test are evaluated based on how the design addresses the criteria.
- Modifications are made to a design based on evaluated results. Designs are modified in order to be tested again. This is called an iteration.
- Engineers take feedback into consideration during the iterative process (modifying the design at each iteration).
- For optimal designs, engineers complete several iterations, often combining the best parts of previous designs.
- Engineers consider trade-offs by weighing the impact of each criterion against the others.
- Results are evaluated based on how they address the criteria.
- Trade-offs may make it difficult or impossible to meet all the criteria for a design project.
- Strong engineering proposals use evidence to describe why the design is optimal, including a discussion of trade-offs and comparisons to earlier iterations.
- An engineer's written proposal explains to others how and why a design solution works.
- Strong proposals are written for a professional audience and use topic-specific vocabulary words.
- Reasoning is a process that scientists use to connect evidence to their claims.
- Engineers improve the use of evidence in and the professionalism of their writing when they revise their written proposals.
- Solutions to a problem will differ based on the defined criteria.
- Food engineers design solutions related to food shortage, food packing, and meeting metabolic needs of consumers.
- Important steps in the design process include identifying a problem in need of a solution, and defining criteria for a successful solution.
- Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity.
- Analyze trade-offs by weighing how well a design meets some criteria at the expense of others.
- Revise and modify a design based on test results and feedback.
- Explain iteration as a process of improving a design through repeated testing and modification.
- Compare multiple design iterations to identify improvements and optimal features.
- Use evidence to justify why a design solution is optimal, including discussion of trade-offs.
- Write a professional engineering proposal that explains how and why a design solution works.
- Use topic-specific scientific and engineering vocabulary appropriate for a professional audience.
- Use reasoning to clearly connect evidence to claims in written and oral explanations.
- Revise written proposals to improve clarity, use of evidence, and professionalism.
- Explain how solutions can differ based on criteria and user needs.
- Describe how food engineers address problems related to food supply, packaging, and metabolic needs.
- Communicate scientific and engineering ideas effectively to an audience using evidence and clear explanations.
- Demonstrate persistence, precision, logic, creativity, and imagination throughout the engineering design process.

Core Instructional & Supplemental Materials

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Suggested Activities/Resources:

- Articles in This Unit
 - “Request for Proposals”
 - “Meeting Your Metabolic Needs”
 - “Ingredient Information”
 - “Target Populations”
 - “Proposal Resources”

Supplemental Materials

- Digital Resources included in each unit
 - Futura Workspace
- Multi-language glossary
- Hands-On Flexextension:
 - Taste-Testing Ingredients
- [Calling All Minds: How To Think and Create Like an Inventor by Temple Grandin](#)

Suggested Accommodations

English Language Learners:

- Multi-sensory instruction
- Flexible grouping
- Small group instruction
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 4: Traits and Reproduction

Duration: 23 days

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

New Jersey Student Learning Standards	
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-LS1-3	Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-4:	Use arguments 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.
MS-LS3-1	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
MS-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions.</p> <ul style="list-style-type: none"> As students investigate a puzzling case of variation in a spider family, their inquiry is guided by a series of strategic questions. They also have many opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read science articles. 	<p>LS1.A Structure and Function:</p> <ul style="list-style-type: none"> Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) <p>LS1.B Growth and Development of Organisms:</p> <ul style="list-style-type: none"> Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4) Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students complete visual representations to demonstrate their understanding of key concepts throughout the unit. Physical models are used to compare the structures of protein molecules and how this influences their functions. Students also use physical models to represent the role of genes in the production of proteins and how mutations change the instructions and, therefore, the protein being produced. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> Students have several opportunities to analyze and interpret data, particularly in data tables, as they investigate the trait of silk flexibility in Darwin's bark spiders and the traits of running ability in a family. <p>Practice 6: Constructing Explanations.</p> <ul style="list-style-type: none"> In each chapter, students deepen their understanding of trait variation to create increasingly robust explanations about the differences in silk flexibility in Darwin's bark spiders. Students first explain that trait variation is caused by differences in proteins. They then account for differences in proteins by explaining that organisms have different genes that instruct for proteins. The final component of students' explanations is that organisms can inherit multiple possible combinations of genes. 	<p>features for reproduction. (MS-LS1-4)</p> <ul style="list-style-type: none"> Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5) Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2) <p>LS3.A Inheritance of Traits:</p> <ul style="list-style-type: none"> Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1) Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2) <p>LS3.B Variation in Traits:</p> <ul style="list-style-type: none"> In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and 	<ul style="list-style-type: none"> Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-5) <p>Connections to Engineering, Technology, and Applications of Science</p> <ul style="list-style-type: none"> Interdependence of Science, Engineering, and Technology Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5) <p>Structure and Function</p> <ul style="list-style-type: none"> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1) <p>Systems and System Models</p> <ul style="list-style-type: none"> Systems may interact with other systems; they may have subsystems and be a part of larger complex systems. (MS-LS1-3) <p>Structure and Function</p> <ul style="list-style-type: none"> Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their
---	--	---

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students evaluate claims regarding the possible reasons why the trait for silk flexibility varies among the members of the Darwin’s bark spider family. Students engage in scientific reasoning and produce written arguments. In the Science Seminar, students practice both oral and written argumentation to debate alternate claims about why members of a family have different traits for running ability. <p>Practice 8: Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none"> Students have multiple opportunities to engage in Active Reading, an approach to obtaining information from science texts. They also have frequent opportunities to communicate orally and in writing. 	<p>hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)</p> <ul style="list-style-type: none"> In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1) <p>LS4.B Natural Selection:</p> <ul style="list-style-type: none"> In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5) 	<p>function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)</p> <p>Connections to Nature of Science</p> <p>Science is a Human Endeavor</p> <ul style="list-style-type: none"> Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3) <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5)
---	---	---

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> ● Develop, implement, and model effective problem-solving and critical thinking skills. ● Identify the consequences associated with one's actions in order to make constructive choices. ● Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> ● Establish and maintain healthy relationships. ● Utilize positive communication and social skills to interact effectively with others. ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP7	Look for and make use of structure.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Computer Science & Design Thinking	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Career Readiness, Life Literacies & Key Skills	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one's goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning	
Formative Tasks: <ul style="list-style-type: none"> ● Teacher observations 	Alternative Assessments: <ul style="list-style-type: none"> ● Oral assessments

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● The function of a protein molecule depends on its structure and how it interacts with other protein molecules. (1.3) ● Differences in the structure of protein molecules affect how they connect to other protein molecules. This can result in different traits. (1.4) ● The structure of molecules determines how they function at a molecular scale, which determines the properties of the object they make up. (1.4) ● Organisms can have different proteins in their cells for a particular feature. (1.5) ● Genes are instructions for proteins. (2.2) ● Each gene version provides a unique instruction to make a specific protein molecule in an organism's cells. (2.2) ● An organism has two copies of a gene for each feature. (2.3) ● The two copies of a gene for each feature can be the same version (homozygous) and provide instructions for only one type of protein. (2.3) ● The two copies of a gene for each feature can be different versions (heterozygous) and provide instructions for two types of proteins. (2.3) 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● Why do traits for silk flexibility vary within this family of Darwin's bark spiders? ● What determines an organism's traits at the molecular scale? ● Why do Darwin's bark spiders make different proteins for silk flexibility? ● How can organisms make different protein molecules for a particular feature? ● Why do some organisms make one type of protein for a feature and other organisms make two? ● Why do the Darwin's bark spider offspring have different gene combinations even though they have the same parents? ● How do organisms get their genes? ● How does sexual reproduction result in variation among offspring? ● Why is Jackie an elite distance runner when no one else in her family has that trait?
--	--

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Organisms inherit their genes through sexual reproduction. (3.2) ● Each parent randomly passes on one of its two copies of each gene to its offspring. Each offspring, therefore, receives two copies of each gene, one from each parent. (3.2) ● Through sexual reproduction, each offspring can inherit a different combination of gene versions. Therefore, siblings can have different traits from each other and even from their parents. (3.3) 	
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Traits vary between parents and offspring and among siblings. ● Differences among features (such as eye color) are called traits. ● People from different social, cultural, and ethnic backgrounds work as scientists and engineers. ● Spiders can make many different kinds of silk. ● The function of a protein molecule depends on its structure and how it interacts with other protein molecules. ● The flexibility of spider silk is determined by the structure of its protein molecules. ● Differences in the structure of protein molecules affect how they connect to other protein molecules. This can result in different traits. ● The structure of molecules determines how they function at a molecular scale, which determines the properties of the object they make up. ● Organisms can have different proteins in their cells for a particular feature. ● Even a behavioral trait such as one's running ability may be affected by variation in protein molecules. ● Runners who have more ACTN3 protein in their cells tend to be faster sprinters. ● Reading actively means thinking about one's own understanding as one reads. ● A person with hemophilia has genes that do not provide the right instructions for making the clotting factor proteins needed to form scabs. ● Genes are instructions for proteins. ● Each gene version provides a unique instruction to make a specific protein molecule in an organism's cells. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Define traits as differences in features among organisms. ● Explain how traits can vary between parents and offspring and among siblings. ● Recognize that scientists and engineers come from diverse social, cultural, and ethnic backgrounds. ● Describe how different organisms can produce different proteins that affect traits. ● Explain how the structure of a protein affects its function. ● Use examples to explain how differences in protein structure can lead to different traits. ● Explain how molecular structure determines function at a molecular scale and influences observable properties. ● Describe how variation in protein molecules can affect physical and behavioral traits. ● Explain how ACTN3 protein affects muscle function and sprinting ability. ● Use active reading strategies to monitor understanding while reading science texts. ● Explain that genes provide instructions for making proteins. ● Describe how genetic instructions are used by the cell to produce proteins. ● Explain how mutations are changes in gene versions that can alter proteins and traits. ● Describe that organisms have two copies of each gene for a feature. ● Differentiate between homozygous and heterozygous gene combinations. ● Explain how different gene versions can lead to different proteins in cells. ● Predict possible gene versions based on information about proteins or traits. ● Explain how reproductive cells contain only one copy of each gene.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Genes do not make proteins; instead, they send instructions to another part of the cell where the protein is made.
- Mutations are changes to a gene version, which can result in changes to proteins.
- An organism has two copies of a gene for each feature.
- The two copies of a gene for each feature can be the same version (homozygous) and provide instructions for only one type of protein.
- The two copies of a gene for each feature can be different versions (heterozygous) and provide instructions for two types of proteins.
- The ACTN3 protein is produced with instructions from a particular gene.
- It is possible to make predictions about an organism's genes based on information about its proteins.
- Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.
- Each reproductive cell only has one copy of each gene.
- Identical twins have identical genes.
- Organisms inherit their genes through sexual reproduction.
- Each parent randomly passes on one of its two copies of each gene to its offspring. Each offspring, therefore, receives two copies of each gene, one from each parent.
- Through sexual reproduction, each offspring can inherit a different combination of gene versions. Therefore, siblings can have different traits from each other and even from their parents.
- The offspring of Darwin's bark spiders inherited traits that vary because both parents had heterozygous gene combinations. As a result, multiple combinations of genes could be passed down to the spiders' offspring.
- Different gene combinations can result in different traits. Therefore, an offspring can have a trait that neither of its parents have.
- Selective breeding can be used to produce offspring with desired traits.
- Science depends on evaluating proposed explanations.
- Reasoning is a process that scientists use to connect evidence to their claims.
- Explain how genes are inherited through sexual reproduction.
 - Describe how random inheritance results in variation among offspring.
 - Explain why siblings can have different traits from each other and from their parents.
 - Use models or examples to explain how offspring can inherit traits that neither parent shows.
 - Explain how selective breeding can be used to produce desired traits.
 - Evaluate scientific explanations by examining evidence and reasoning.
 - Use reasoning to connect evidence to claims about inheritance and traits.
 - Explain why some traits change due to rare mutations.
 - Analyze situations in which evidence may support more than one claim.
 - Engage in scientific discussions to refine understanding and evaluate ideas.
 - Explain how scientists revise explanations when presented with convincing evidence.
 - Construct a written scientific argument that includes a claim, evidence, and reasoning.
 - Integrate multiple pieces of evidence to support a scientific claim about traits and reproduction.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Mutations that result in a change to a trait are rare. ● ACTN3 protein connects muscle fibers which helps them contract more rapidly. ● Sometimes evidence can support more than one claim. ● Scientists and engineers are guided by habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. ● Discussing evidence and ideas with others helps build new understanding. ● Scientists can change their minds when presented with convincing evidence. ● To convince its reader, a written scientific argument needs to include a claim, describe specific evidence, and explain how the evidence supports the claim. ● Sometimes different pieces of evidence need to be considered together to best support a claim. 	
--	--

Core Instructional & Supplemental Materials

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ “Surprising Spider Silk” ○ “Hemophilia, Proteins, and Genes” ○ “Exploring the Human Genome” ○ “Why Are Identical Twins Rare?” ○ “Invasion of the Periodical Cicada” ○ “Why the Corpse Flower Smells So Bad” ○ “Sea Anemones: Two Ways to Reproduce” ○ “Cloning Mammoths: A Mammoth Task” ○ “Can Genes Affect Running Ability?” ○ “Growing Giant Pumpkins” 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Traits and Reproduction Simulation ● Multi-language glossary ● Hands-On Flexextension: <ul style="list-style-type: none"> ○ Plant Structures for Reproduction ● Races: Are we so different? ● Science misuse to genetics and reproduction
---	---

Suggested Accommodations

<p>English Language Learners:</p> <ul style="list-style-type: none"> ● Multi-sensory instruction ● Flexible grouping ● Small group instruction ● Provide peer tutoring ● Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
--

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 5: Thermal Energy	Duration: 21 days
-------------------------------	--------------------------

New Jersey Student Learning Standards	
MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
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-PS2-1	Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.
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.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

MS-PS3-5	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
----------	--

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions.</p> <ul style="list-style-type: none"> As students investigate which heating system will work better to warm the school, their inquiry is guided by a series of strategic questions. They also have many opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read science articles. <p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students complete visual representations to demonstrate their understanding of key concepts throughout the unit. They also use physical and kinesthetic models to demonstrate energy transfer between objects with the same and varying numbers of molecules. <p>Practice 3: Planning and Carrying Out Investigations.</p> <ul style="list-style-type: none"> Students plan and conduct investigations to figure out what determines how much the temperature of something will change. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> The use of the Thermal Energy Simulation leads students to collect data about the molecular nature of 	<p>PS3.A: Definitions of Energy:</p> <ul style="list-style-type: none"> Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3), (MS-PS3-4) <p>PS3.B: Conservation of Energy and Energy Transfer:</p> <ul style="list-style-type: none"> When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5) The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4) Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3) <p>PS2.A: Forces and Motion:</p> <ul style="list-style-type: none"> For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1) 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4) <p>Scale, Proportion, and Quantity</p> <ul style="list-style-type: none"> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1) Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (MS-PS3-4) <p>Systems and System Models</p> <ul style="list-style-type: none"> Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy and matter flows within systems. (MS-PS2-1) <p>Energy and Matter</p> <ul style="list-style-type: none"> Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). (MS-PS3-5) <p>Connections to Nature of Science</p>

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>temperature and its relationship to kinetic energy. Students analyze, interpret, and then use this data as evidence when they make their recommendation about the heating systems.</p> <ul style="list-style-type: none"> ● Practice 5: Using Mathematics and Computational Thinking. Students learn what a mathematical average is and how to calculate it. Throughout the unit, students practice calculating the average speed of molecules in order to determine the temperature of a sample. Additionally, they calculate the total energy of a sample and explore the difference between a total and an average. By the end of the unit, students can use these values to predict what the equilibrium temperature of a system of samples in contact will be. <p>Practice 6: Constructing Explanations.</p> <ul style="list-style-type: none"> ● In each chapter, students deepen their understanding of temperature in order to create increasingly robust explanations about the differences in the heating systems. Students first explain that the air molecules in the school move faster when the air temperature increases. They then explain that the transfer of kinetic energy via molecular collisions is how one material can increase the temperature of another material. The final component of their explanations is that the number of molecules in a sample affects the amount of 	<p>PS3.A: Definitions of Energy:</p> <ul style="list-style-type: none"> ● The term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MS- PS1-4) ● The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system’s material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system’s total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary to MS-PS1-4) <p>PS3.C: Relationship Between Energy and Forces:</p> <ul style="list-style-type: none"> ● When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2) 	<p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> ● Science knowledge is based upon logical and conceptual connections between evidence and explanations (MS-PS3-4), (MS-PS3-5)
--	---	---

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>total kinetic energy that sample has, and this can mean that a larger sample at a lower temperature can transfer more energy than a smaller sample with a higher temperature.</p> <p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students evaluate claims about the heating systems and about principles of thermal energy transfer. In the Science Seminar, students practice both oral and written argumentation to debate alternate claims about whether the pasteurization kits can raise the temperature of water to above 65oC. <p>Practice 8: Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none"> Students have multiple opportunities to engage in Active Reading, an approach to obtaining information from science texts. They also have frequent opportunities to communicate orally and in writing. 		
--	--	--

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> Develop, implement, and model effective problem-solving and critical thinking skills. Identify the consequences associated with one's actions in order to make constructive choices. Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> Establish and maintain healthy relationships. Utilize positive communication and social skills to interact effectively with others. Identify ways to resist inappropriate social pressure. Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

MP7	Look for and make use of structure.
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship.
6.RP.3a	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.EE.2a	Write expressions that record operations with numbers and with letters standing for numbers.
6.EE.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.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.
6.SP.5	Summarize numerical data sets in relation to their context.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
6.SP.5c	Summarize numerical data sets in relation to their context, by giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.

Computer Science & Design Thinking

8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
--------------------	--

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Career Readiness, Life Literacies & Key Skills

9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one's goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning

Formative Tasks:

- Teacher observations
- Class discussions
- Whiteboard/Communicators
- On-the-Fly Assessments
- Daily classwork
- Checks for understanding

Alternative Assessments:

- Oral assessments
- Teacher-Created Projects
- <https://www.khanacademy.org/>
- Completion of webquests

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<ul style="list-style-type: none"> ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Things are made of molecules (or other types of atom groups). (1.3) ● When a thing gets hotter, its molecules are moving faster. (1.3) ● When a thing gets colder, its molecules are moving slower. (1.3) ● Temperature is a measure of the average speed of the molecules of a thing. (1.4) ● When a thing gets hotter, its molecules are moving faster and have more kinetic energy. (2.1) ● When a thing gets colder, its molecules are moving slower and have less kinetic energy. (2.1) ● Temperature is a measure of the average kinetic energy of the molecules of a thing. (2.1) ● When two things are in contact, their molecules collide, and kinetic energy transfers from the faster-moving molecules to the slower-moving molecules. (2.3) ● Energy isn't created or destroyed. Therefore, as energy transfers, it increases in one part of the system as it decreases in another part of the system. (2.3) ● The molecules of a system will transfer energy until the system reaches a stable state known as equilibrium, in which all of the molecules are moving at about the same speed. (2.5) 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● Why do things change temperature? ● What is happening when the air in the school gets warmer? ● How is something different when it is warmer or cooler? ● What causes the air molecules inside the school to speed up? ● Why do molecules change speed? ● Why does the transfer of energy between two things stop? ● Which heating system will warm the air in the school more? ● What determines how much total kinetic energy something has? ● What determines how much something will change temperature? ● Why wasn't the water pasteurized?

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● For things at the same temperature, the thing with more molecules has more total kinetic energy (thermal energy) than the thing with fewer molecules. (3.2) ● At equilibrium, the average kinetic energy (temperature) of the molecules in the system is the total kinetic energy (thermal energy) evenly divided by the number of molecules in the system. (3.2) ● When a thing gains or loses energy, the energy gained or lost is divided among all the molecules of the thing. (3.2) ● Revised: Energy isn't created or destroyed. Therefore, as energy transfers, it increases in one part of the system as it decreases in another part of the system. The total energy of a system doesn't change. (3.3) ● 	
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● There is more movement within warmer liquid than colder liquid. ● Things are made of molecules (or other types of atom groups). ● When a thing gets hotter, its molecules are moving faster. ● When a thing gets colder, its molecules are moving slower. ● Scientists use digital simulations to represent things that are too small to see with the naked eye. ● There is a limit to how cold something can be. Scientists call this temperature absolute zero because at this temperature there is zero molecular motion. ● Temperature is a measure of the average speed of the molecules of a thing. ● Averages are useful because they make it easier to compare two sets of data. ● To find an average you add the values and divide by how many numbers are in the data set. ● Models are representations of systems; they help us understand something by making it simpler or easier to see. ● When a thing gets hotter, its molecules are moving faster and have more kinetic energy. ● When a thing gets colder, its molecules are moving slower and have less kinetic energy. ● Temperature is a measure of the average kinetic energy of the molecules of a thing. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Explain that all matter is made of molecules (or other groups of atoms). ● Describe how molecular motion changes when a substance is heated or cooled. ● Explain that warmer substances have faster-moving molecules and colder substances have slower-moving molecules. ● Use particle motion to explain why warmer liquids have more movement than colder liquids. ● Explain that temperature is a measure of the average kinetic energy of molecules in a substance. ● Distinguish between temperature and total kinetic energy (thermal energy). ● Explain why colder objects can have more total thermal energy than warmer objects if they contain more molecules. ● Explain that for objects at the same temperature, the object with more molecules has more total thermal energy. ● Use models and digital simulations to represent molecular motion that cannot be observed directly. ● Explain why scientists use models to simplify and understand complex systems. <p>Explain the concept of absolute zero as the lowest possible temperature with no molecular motion.</p> <ul style="list-style-type: none"> ● Calculate averages and explain why averages are useful for comparing temperature data. ● Explain how energy is transferred when objects are in contact through molecular collisions. ● Explain that thermal energy transfers from faster-moving molecules to slower-moving molecules.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Reading actively means thinking about one's own understanding as one reads.
- When scientists read, they make connections between the text and science ideas they have learned or investigated.
- Energy transfer can cool things down.
- When two things are in contact, their molecules collide, and kinetic energy transfers from the faster-moving molecules to the slower-moving molecules.
- Energy isn't created or destroyed. Therefore, as energy transfers, it increases in one part of the system as it decreases in another part of the system.
- Energy between two objects transfers until their temperatures are equal and they reach a stable state.
- The molecules of a system will transfer energy until the system reaches a stable state known as equilibrium, in which all of the molecules are moving at about the same speed.
- Colder things can have more total kinetic energy (thermal energy) than warmer things if they are made up of more molecules.
- For things at the same temperature, the thing with more molecules has more total kinetic energy (thermal energy) than the thing with fewer molecules.
- At equilibrium, the average kinetic energy (temperature) of the molecules in the system is the total kinetic energy (thermal energy) evenly divided by the number of molecules in the system.
- When a thing gains or loses energy, the energy gained or lost is divided among all the molecules of the thing.
- The greater the total kinetic energy (thermal energy) something has, the more energy it has to transfer to other parts of a system.
- Energy isn't created or destroyed. Therefore, as energy transfers, it increases in one part of the system as it decreases in another part of the system. The total energy of a system doesn't change.
- Reasoning is a process that scientists use to connect evidence to their claims.
- Natural disasters can result in restricted access to clean drinking water.
- Untreated water may contain harmful bacteria that can cause illnesses if consumed by humans.
- Explain that energy is conserved and is not created or destroyed during energy transfer.
 - Describe how energy transfers within a system until equilibrium is reached.
 - Explain equilibrium as a stable state where molecules move at about the same average speed.
 - Explain how energy gained or lost by an object is distributed among all of its molecules.Analyze how the amount of thermal energy in a system affects its ability to transfer energy.
 - Use evidence from investigations or simulations to support claims about thermal energy transfer.
 - Apply active reading strategies to make connections between text and scientific ideas.Explain how thermal energy transfer can be used to solve real-world problems.

Describe how natural disasters can limit access to clean drinking water.

 - Explain why untreated water may contain harmful bacteria that can cause illness.
 - Explain how pasteurization uses thermal energy to reduce harmful bacteria in water.Construct a scientific argument that includes a claim,
 - evidence, and reasoning related to thermal energy.
 - Use multiple pieces of evidence to more effectively support a scientific claim.
 - Engage in scientific discussions to refine ideas and build understanding.
 - Explain why scientists must remain open to new ideas and revise claims based on evidence.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Pasteurization is a method of treating water that involves heating it to a high enough temperature that almost all of the harmful bacteria are destroyed. ● Using evidence helps scientists support their claims. ● Discussing evidence and ideas with others helps build new understanding. ● Scientists need to stay open to new ideas so they can change their minds when presented with convincing evidence. ● Scientists clearly communicate how their claims and evidence are supported with reasoning in a convincing scientific argument. ● A written scientific argument needs to state a claim, describe specific evidence, and explain how the evidence supports the claim to convince its reader. ● A claim can sometimes be supported more effectively if you consider the combination of several different pieces of evidence. 	
--	--

Core Instructional & Supplemental Materials

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ “Absolute Zero” ○ “How Air Conditioners Make Cities Hotter” ○ “How Air Conditioners Make Cities Hotter” ○ “Thermal Energy Is NOT Temperature” ○ “Dumpling Dilemma: Oil or Water?” 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Thermal Energy Simulation ● Multi-language glossary ● Hands-On Flexextension: <ul style="list-style-type: none"> ○ Designing Hot and Cold Packs
--	---

Suggested Accommodations

<p>English Language Learners:</p> <ul style="list-style-type: none"> ● Multi-sensory instruction ● Flexible grouping ● Small group instruction ● Provide peer tutoring ● Use a strong student as a “buddy” (does not necessarily have to speak the primary language) ● Chunking information ● Scaffolded questioning ● Academic language support ● Vocabulary support ● Co-Constructed Word Banks ● Anchor charts

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 6: Ocean, Atmosphere, and Climate

Duration: 21 days

New Jersey Student Learning Standards

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-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-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
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.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions.</p> <ul style="list-style-type: none"> Through considering the puzzling climate variation in Christchurch, New Zealand, students have the opportunity to ask questions that will drive their investigation of energy and climate. <p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students spend ample time exploring and investigating a digital simulation that models how sun, air, and water interact to determine climate patterns. They also use a digital modeling tool to create models that show their ideas about energy and climate. <p>Practice 3: Planning and Carrying Out Investigations.</p> <ul style="list-style-type: none"> Students conduct investigations using physical models and the digital simulation to develop an understanding of the relationships between ocean currents, air temperature, energy, and wind. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> Students analyze and interpret data about solar energy as well as air and water temperature, both from the Ocean, Atmosphere, and Climate Simulation and from historical records. <p>Practice 6: Constructing Explanations.</p> <ul style="list-style-type: none"> Students learn about scientific explanations and have 	<p>ESS2.D: Weather and Climate:</p> <ul style="list-style-type: none"> 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 oceanic and atmospheric flow patterns. (MS-ESS2-6) The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6) <p>ESS2.C: The Roles of Water in Earth's Surface Processes:</p> <ul style="list-style-type: none"> Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions:</p> <ul style="list-style-type: none"> Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) <p>ESS2.C: The Roles of Water in Earth's Surface Processes:</p> <ul style="list-style-type: none"> The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. 	<p>Patterns</p> <ul style="list-style-type: none"> Patterns in rates of change and other numerical relationships can provide information about natural systems. (MS-ESS2-3) Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2) <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4) <p>Energy and Matter</p> <ul style="list-style-type: none"> The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3) <p>Systems and System Models</p> <ul style="list-style-type: none"> Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6) <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Open to</p>

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>multiple opportunities to make increasingly complex explanations (and defend them through argumentation) over the course of the unit as they explain what happened to the air temperature in Christchurch.</p> <p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students receive instruction about the structure of a scientific argument and are supported in evaluating evidence, engaging in scientific reasoning, and producing both oral and written arguments. <p>Practice 8: Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none"> Students have multiple opportunities to engage in Active Reading, an approach to obtaining information from science texts. 	<p>(MS-ESS2-5)</p> <p>ESS3.B: Natural Hazards:</p> <ul style="list-style-type: none"> Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2) <p>PS3.A: Definitions of Energy:</p> <ul style="list-style-type: none"> The term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MS-PS1-4) <p>PS3.B: Conservation of Energy and Energy Transfer:</p> <ul style="list-style-type: none"> Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3) 	<p>Revision in Light of New Evidence</p> <ul style="list-style-type: none"> Science findings are frequently revised and/or reinterpreted based on new evidence. (MS-ESS2-3) <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time. (MS-ESS3-2)
---	---	---

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	<ul style="list-style-type: none"> Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals.
Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds. Demonstrate an understanding of the need for mutual respect when viewpoints differ. Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> Develop, implement, and model effective problem-solving and critical thinking skills. Identify the consequences associated with one's actions in order to make constructive choices. Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> Establish and maintain healthy relationships. Utilize positive communication and social skills to interact effectively with others. Identify ways to resist inappropriate social pressure. Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. Identify who, when, where, or how to seek help for oneself or others when needed.

Interdisciplinary Connections	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.NS.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself.
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.EE.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.SP.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.5	Summarize numerical data sets in relation to their context.

Computer Science & Design Thinking	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.
-------------------	---

<u>Career Readiness, Life Literacies & Key Skills</u>	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one's goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment
---	---

Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Energy from the sun is transferred to Earth's surface. Some of that energy is then transferred to the air above the surface. (1.3) ● The closer a location is to the equator, the more energy it receives from the sun. Therefore, a location's air temperature is affected by its distance from the equator. (1.4) ● An effect may have more than one cause; these may be linked into a chain of causes and effects. (2.1) ● When an ocean current comes from the equator, it brings warmer-than-expected water to the places it passes. When an ocean current comes from a pole, it brings colder-than-expected water to the places it passes. (2.2) ● Energy transfers from warmer substances to colder substances. Warmer currents transfer energy to cooler air and warmer air transfers energy to cooler currents. (2.3) ● When an ocean current comes from the equator, it brings warmer-than-expected water to the places it passes, and that water is warmer than the nearby air. When an ocean current comes from a pole, it brings colder-than-expected water to the places it passes, and that water is colder than the nearby air. (2.3) ● Prevailing winds and the position of continents determine the direction of ocean currents. (3.2) ● Changes to prevailing winds affect ocean currents. Changes to ocean currents affect how much energy is brought to (or taken away from) a location. (3.3) 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● What determines the air temperature of a location on Earth? ● What determines the air temperature of Christchurch, New Zealand? ● How does air get energy? ● Why do different locations have different air temperatures? ● Other than latitude, what else affects the air temperature of Christchurch? ● Other than latitude, what else affects ocean surface temperature? ● How do ocean currents affect the air temperatures of the locations they pass? ● What determines how the ocean currents near Christchurch move? ● What determines the direction of ocean currents? ● How can changes to prevailing winds affect the air temperature of a location? ● In South China during the late Carboniferous period, was the air temperature warmer or cooler than the air temperature in that location today?
---	--

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Content

Students will know...

- Temperature is a measure of how hot or cold something is; the higher the temperature, the more energy it has.
- A location's air temperature is determined by the amount of energy in the air.
- Most of Earth's energy comes from the sun.
- Science investigations use a variety of methods and tools to make measurements and observations.
- Scientists carefully consider and evaluate anomalies in data and evidence.
- Energy from the sun is transferred to Earth's surface. Some of that energy is then transferred to the air above the surface.
- The closer a location is to the equator, the more energy it receives from the sun. Therefore, a location's air temperature is affected by its distance from the equator.
- El Niño changes are not caused by variations in solar energy.
- An effect may have more than one cause; these may be linked into a chain of causes and effects.
- Ocean water is always moving. Currents are fairly consistent patterns in the direction the water moves in different places in the ocean.
- Ocean currents move objects, organisms, and energy around Earth.
- Reading actively means thinking about one's own understanding as one reads.
- Expert readers build understanding by asking more focused, deeper questions as they read.
- When an ocean current comes from the equator, it brings warmer-than-expected water to the places it passes. When an ocean current comes from a pole, it brings colder-than-expected water to the places it passes.
- Energy transfers from warmer substances to colder substances. Warmer currents transfer energy to cooler air and warmer air transfers energy to cooler currents.
- When an ocean current comes from the equator, it brings warmer-than-expected water to the places it passes, and that water is warmer than the nearby air. When an ocean current comes from a pole, it brings colder-than-expected water to the places it passes, and that water is colder than the nearby air.

Skills

Students will be able to ...

- Explain temperature as a measure of how hot or cold something is based on the amount of energy it has.
- Describe how the amount of energy in the air determines a location's air temperature.
- Explain that most of Earth's energy comes from the sun.
- Use scientific tools and methods to make observations and measurements related to air temperature and energy transfer.
- Identify and analyze anomalies in data and explain why scientists must evaluate them carefully.
- Explain how energy from the sun is transferred to Earth's surface and then to the air above it.
- Explain how a location's distance from the equator affects the amount of solar energy it receives and its air temperature.
- Explain that El Niño changes are not caused by variations in solar energy.
- Analyze cause-and-effect relationships, including chains of causes and effects, in Earth systems.
- Describe ocean currents as consistent patterns of moving ocean water.
- Explain how ocean currents move organisms, objects, and energy around Earth.
- Use active reading strategies to monitor understanding and ask deeper questions when reading scientific texts.
- Explain how ocean currents from the equator bring warmer-than-expected water and currents from the poles bring colder-than-expected water to different locations.
- Explain how thermal energy transfers between ocean water and the air above it.
- Explain how differences between ocean temperature and air temperature affect local climates.
- Explain how ocean currents affect air temperature through a causal chain involving sunlight, latitude, ocean movement, and energy transfer.
- Describe prevailing winds and explain how they influence ocean currents.
- Explain how prevailing winds push ocean currents and help determine their direction.
- Describe the role of continents in shaping the direction of ocean currents.
- Explain how changes in prevailing winds can change ocean currents and affect how much energy reaches a location.
- Identify the Gulf Stream as a major ocean current that carries warm water northward along the east coast of North America.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Ocean currents affect air temperature through a causal chain that involves latitude-dependent effects of sunlight on ocean temperature, ocean movement, and differences between ocean and air temperature. ● Prevailing winds are winds that move in one direction and are strong enough to push ocean currents. ● The Gulf Stream current carries warm water from the equator northward, along the east coast of North America. ● Ocean currents are pushed by prevailing winds. ● Prevailing winds and the position of continents determine the direction of ocean currents. ● Changes to prevailing winds affect ocean currents. Changes to ocean currents affect how much energy is brought to (or taken away from) a location. ● Scientists revise claims as new evidence becomes available. ● Scientists communicate their ideas through written arguments. ● Reasoning is a process that scientists use to connect evidence to their claims. ● The arrangement of continents was different in the late Carboniferous period than it is today. ● Scientists build arguments based on evidence about the natural world. ● Scientists evaluate evidence in relation to claims. ● Discussing evidence and ideas with others helps build new understanding. ● Scientists can change their minds when presented with convincing evidence. ● To convince a reader, a written scientific argument needs to include a claim, describe specific evidence, and explain how the evidence supports the claim. ● Sometimes different pieces of evidence need to be considered together to best support a claim. 	<ul style="list-style-type: none"> ● Explain how ocean currents influence regional climate patterns. ● Explain that the arrangement of continents has changed over Earth’s history and can affect ocean and climate systems. ● Use evidence to build scientific explanations about ocean, atmosphere, and climate interactions. ● Evaluate evidence in relation to scientific claims about Earth systems. ● Construct written scientific arguments that include a claim, relevant evidence, and clear reasoning. ● Use multiple pieces of evidence together to strengthen a scientific argument. ● Engage in scientific discussions to refine ideas and build shared understanding. ● Explain why scientists revise claims and change their thinking when presented with convincing new evidence.
---	---

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ Effects of El Niño Around the World ○ “The Ocean in Motion” 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Ocean, Atmosphere, and Climate Simulation

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- | | |
|--|--|
| <ul style="list-style-type: none">○ “How the Ocean Keeps Climates Stable”○ The Climates of Peru○ “The Gulf Stream: A Current That Helped Win a War”○ “What Causes Prevailing Winds?”○ “The Coriolis Effect”○ “Deep Ocean Currents: Driven by Density” | <ul style="list-style-type: none">● Multi-language glossary● Hands-On Flextension:<ul style="list-style-type: none">○ Investigating Deep Ocean Currents |
|--|--|

Suggested Accommodations

English Language Learners:

- Multi-sensory instruction
- Flexible grouping
- Small group instruction
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 7: Weather Patterns

Duration: 19 days

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

New Jersey Student Learning Standards	
MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
MS-ESS2-4	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-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
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.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions.</p> <ul style="list-style-type: none"> As students investigate weather patterns, their inquiry is guided by a series of strategic questions. They also have many opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read science articles. <p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students complete visual representations to demonstrate their understanding of key concepts throughout the unit. 	<p>ESS2.C: The Roles of Water in Earth's Surface Processes:</p> <ul style="list-style-type: none"> Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) Global movements of water and its changes in form are 	<p>Patterns</p> <ul style="list-style-type: none"> Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2) <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4) <p>Systems and System Models</p> <ul style="list-style-type: none"> Models can be used to represent systems and

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Physical models are used to investigate how temperature affects condensation in an air parcel, and a large syringe is used by students as a model to explore wind. Models are also used as students develop understanding of how water vapor, temperature, and wind affect the amount of rain in a warm weather storm.

Practice 3: Planning and Carrying Out Investigations.

- Students use the Weather Patterns Simulation and hands-on activities to investigate the relationships between temperature, energy transfer, height of an air parcel in the troposphere, and rainfall to determine what can cause a severe rainstorm.

Practice 4: Analyzing and Interpreting Data.

- Students use the Weather Patterns Simulation to investigate factors that lead to severe storms. In the process, they are called on to analyze and interpret multiple types of graphs that represent changes to the multiple variables that are found within the system.

Practice 5: Using Mathematics and Computational Thinking.

- As students investigate using the Weather Patterns Simulation, they apply ratios, rates, and proportional reasoning to model various weather phenomena.

Practice 6: Constructing Explanations.

- Students learn about scientific explanations and have multiple opportunities to construct increasingly

propelled by sunlight and gravity. (MS-ESS2-4)

ESS2.D: Weather and Climate:

- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)

ESS2.A: Earth’s Materials and Systems:

- All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms. (MS-ESS2-1)

ESS2.D: Weather and Climate:

- 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 oceanic and atmospheric flow patterns. (MS-ESS2-6)

ESS3.B: Natural Hazards:

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)

PS3.A: Definitions of Energy:

- The term “heat” as used in

their interactions— such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6)

Energy and Matter

- Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)
- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)

Stability and Change

- Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

- The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time. (MS-ESS3-2)

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>complex explanations (and defend them through argumentation) over the course of the unit as they explain the factors that influence various weather phenomena.</p> <p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students receive instruction about the structure of a scientific argument and are supported in evaluating evidence, engaging in scientific reasoning, and producing both oral and written arguments. <p>Practice 8: Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none"> Students review Active Reading—an approach to obtaining information from science texts—and have multiple opportunities to engage in this practice. Students evaluate and compare data about severe rainstorms and communicate the factors that are contributing to the storms through a series of writing activities. 	<p>everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MS-PS1-4)</p> <p>PS3.B: Conservation of Energy and Energy Transfer:</p> <ul style="list-style-type: none"> Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3) 	
--	---	--

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

Social Awareness	<ul style="list-style-type: none"> ● Recognize and identify the thoughts, feelings, and perspectives of others. ● Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds. ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> ● Develop, implement, and model effective problem-solving and critical thinking skills. ● Identify the consequences associated with one's actions in order to make constructive choices. ● Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> ● Establish and maintain healthy relationships. ● Utilize positive communication and social skills to interact effectively with others. ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

MP7	Look for and make use of structure.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems.
6.RP.3a	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
6.RP.3b	Solve unit rate problems including those involving unit pricing and constant speed.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.EE.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.
6.SP.5	Summarize numerical data sets in relation to their context.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Computer Science & Design Thinking	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<u>Career Readiness, Life Literacies & Key Skills</u>	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one’s goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment
---	---

Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● When liquid water becomes warmer it can evaporate and become water vapor in the air. All air contains water. (1.3) ● When water vapor in an air parcel cools, it can condense into liquid water which can form a cloud and fall as rain. (1.3) ● Energy transfers from warm air to cold air until their temperatures become equal. (1.5) ● The more an air parcel loses energy and cools, the more rainfall can happen. (1.5) ● The troposphere is warmest at the surface and coldest at its highest point. (2.1) ● If an air parcel is warmer than the surrounding air it will rise. (2.1) ● As an air parcel rises, energy transfers from the warm air parcel to the cold surrounding air until their temperatures become equal. (2.3) ● When an air parcel starts with a higher temperature, it will rise higher and lose more energy, causing more rainfall. (2.3) ● Systems go through periods of stability and periods of change. (2.4) ● Air moving from areas of high pressure to areas of low pressure is wind. (3.1) ● Air parcels can be pushed up into the troposphere by wind (moving air). (3.1) 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● Why do some rainstorms have more rain than others? ● What causes the rainfall in Galetown? ● What makes rain happen? ● What causes an air parcel to cool? ● Why is the amount of rain in Galetown different from storm to storm? ● What determines how much an air parcel will cool? ● Why did the most recent storm in Galetown have the greatest amount of rain? ● How can wind affect the cooling of an air parcel? ● How was the Carson Wilderness Education Center damaged?
---	---

<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Many factors contribute to rain formation. ● Water cycles among locations on Earth, including ocean and other surface water, water vapor in the atmosphere, and clouds. ● This cycling of water is an important part of weather on Earth. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Explain that weather results from interactions among multiple factors, including energy, water, air temperature, and wind. ● Describe how water cycles among Earth's surface, the atmosphere, and clouds. ● Explain how evaporation changes liquid water into water vapor when water is warmed.
--	--

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- When liquid water becomes warmer it can evaporate and become water vapor in the air. All air contains water.
- When water vapor in an air parcel cools, it can condense into liquid water which can form a cloud and fall as rain.
- Asking deeper questions is an important reading strategy.
- Every cloud, no matter its shape or size, is condensed water that was once gas.
- Energy transfer is an important part of cloud formation.
- Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination, and creativity.
- Energy transfers from warm air to cold air until their temperatures become equal.
- The more an air parcel loses energy and cools, the more rainfall can happen.
- If there is more water vapor in the air parcel when it loses energy, more water will condense, resulting in more rain.
- Energy is transferred from the sun to the surface to the air.
- The troposphere is warmest at the surface and coldest at its highest point.
- If an air parcel is warmer than the surrounding air it will rise.
- Careful readers try to make connections when they read.
- Major flooding disasters can happen when conditions for severe storms are present.
- As an air parcel rises, energy transfers from the warm air parcel to the cold surrounding air until their temperatures become equal.
- When an air parcel starts with a higher temperature, it will rise higher and lose more energy, causing more rainfall.
- Systems go through periods of stability and periods of change.
- Air temperature can be a factor in the severity of rainstorms.
- Air moving from areas of high pressure to areas of low pressure is wind.
- Air parcels can be pushed up into the troposphere by wind (moving air).
- Wind can push an air parcel even higher in the troposphere, causing the parcel to cool and lose more energy, which will lead to more rainfall.
- Evidence is higher quality if it comes from a reliable source.
- Explain how condensation occurs when water vapor cools and forms liquid water droplets.
 - Explain that all clouds are made of condensed water that was once water vapor.
 - Describe how energy transfer plays a role in cloud formation and rainfall.
 - Explain how energy transfers from warmer air to cooler air until temperatures equalize.
 - Explain how cooling of an air parcel can lead to condensation and rainfall.
 - Analyze how the amount of water vapor in an air parcel affects the amount of rainfall produced.
 - Explain how energy from the sun transfers to Earth's surface and then to the air.
 - Describe the temperature pattern of the troposphere, including why it is warmer near Earth's surface and cooler at higher altitudes.
 - Explain why warmer air parcels rise and cooler air parcels sink.
 - Explain how rising air loses energy as it moves through cooler surrounding air.
 - Analyze how higher starting temperatures allow air parcels to rise higher, lose more energy, and produce more rainfall.
 - Explain how wind forms as air moves from areas of high pressure to areas of low pressure.
 - Describe how wind can push air parcels upward into the troposphere.
 - Explain how wind can increase rainfall by lifting air parcels higher, causing additional cooling and condensation.
 - Analyze how temperature, water vapor, and wind together influence the severity of rainstorms.
 - Explain how severe rainstorms can lead to major flooding events.
 - Describe weather systems as systems that experience periods of stability and change.
 - Use active reading strategies to ask deeper questions and make connections while reading scientific texts.
 - Evaluate evidence by considering the reliability of sources.
 - Explain why higher-quality evidence leads to stronger scientific conclusions.
 - Use multiple pieces of evidence to support explanations of weather phenomena.
 - Construct scientific arguments that include a claim, relevant evidence, and clear reasoning.
 - Explain how scientific knowledge is limited by available technology, materials, and human capacity.
 - Engage in scientific discussions to refine ideas and build shared understanding.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Scientific knowledge is constrained by human capacity, technology, and materials.
- Severe rainstorms can be caused by many factors (water vapor, temperature, and wind).
- Using evidence sources that are more reliable will result in stronger conclusions.
- Scientists must carefully consider all available evidence before making arguments about a phenomenon.
- Discussing evidence and ideas with others helps build new understanding.
- You can change your mind about a claim or an argument when presented with convincing evidence.

- Revise claims or explanations when presented with convincing new evidence.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- Articles in This Unit
 - “What Makes Water Move?”
 - “What Are Clouds?”
 - “Why Don’t All Clouds Produce Rain?”
 - “Disaster in California!”
 - “Types of Rain”
 - “How We Predict the Weather”
 - “Hail, Snow, and Sleet”

Supplemental Materials

- Digital Resources included in each unit
 - Weather Patterns Simulation
- Multi-language glossary
- Hands-On Flexextension:
 - Why Warm Air Rises
 - Modeling Rain Formation

Suggested Accommodations

English Language Learners:

- Multi-sensory instruction
- Flexible grouping
- Small group instruction
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

- Sentence starters
 - Prompting and cueing
 - Activate schema
 - Build background knowledge
- Culturally Diverse:**
- Create an emotionally positive classroom climate.
 - Create effective communication
 - Model and teach cultural respect
 - Build relationships with students by interviewing students to understand their background

Unit 8: Earth’s Changing Climate	Duration: 23 days
---	--------------------------

New Jersey Student Learning Standards	
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-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
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.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions.</p> <ul style="list-style-type: none"> ● As students investigate the surprising launch results, their inquiry is guided by a series of strategic questions. They also have many opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on 	<p>ESS3.C: Human Impacts on Earth Systems:</p> <ul style="list-style-type: none"> ● Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. 	<p>Patterns</p> <ul style="list-style-type: none"> ● Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2) <p>Cause and Effect</p> <ul style="list-style-type: none"> ● Relationships can be classified as causal or correlational, and

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>curiosity and inquiry, supports students in asking thoughtful questions as they read science articles.</p> <p>Practice 2: Developing and Using Models.</p> <ul style="list-style-type: none"> Students create and use simple physical models of energy and the Earth system and spend extensive time exploring and investigating with the Earth’s Changing Climate Simulation that models climate, energy, the atmosphere, and human activities. They also use a digital modeling tool to create models that show their ideas about climate change. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> Students analyze data about temperature, surface ice, gases in the atmosphere, amount of energy from the sun, population, combustion per person, livestock per person, and forest cover. They learn to distinguish long-term trends from short-term fluctuations and to evaluate the strength of evidence based on the length of time shown in the data. <p>Practice 5: Using Mathematics and Computational Thinking.</p> <ul style="list-style-type: none"> Students identify patterns in large datasets, both from the Earth’s Changing Climate Simulation and from historical climate and atmospheric data. They use mathematical concepts, such as trends in data, to support explanations and arguments. <p>Practice 6: Constructing Explanations.</p> <ul style="list-style-type: none"> Students learn about scientific 	<p>(MSESS3-3),(MS-ESS3-4)</p> <p>ESS3.D: Global Climate Change:</p> <ul style="list-style-type: none"> 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). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5) <p>ESS2.A: Earth’s Materials and Systems:</p> <ul style="list-style-type: none"> All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms. (MS-ESS2-1) <p>ESS2.D: Weather and Climate:</p> <ul style="list-style-type: none"> 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 oceanic and atmospheric flow patterns. (MS-ESS2-6) 	<p>correlation does not necessarily imply causation. (MS-ESS3-3)</p> <ul style="list-style-type: none"> Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-4) Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1) <p>Stability and Change</p> <ul style="list-style-type: none"> Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5) Small changes in one part of a system might cause large changes in another part. (MS-LS2-4) <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-4) The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus,
--	---	--

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>explanations and have multiple opportunities to make increasingly complex explanations (and defend them through argumentation) over the course of the unit as they explain what can cause changes to Earth’s climate.</p> <p>Practice 7: Engaging in Argument from Evidence.</p> <ul style="list-style-type: none"> Students receive instruction about the structure of a scientific argument and are supported in evaluating evidence, engaging in scientific reasoning, and producing both oral and written arguments. <p>Practice 8: Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none"> Students have multiple opportunities to engage in Active Reading, an approach to obtaining information from science texts. Students also evaluate evidence to determine its relevance to a particular claim. 	<p>ESS3.B: Natural Hazards:</p> <ul style="list-style-type: none"> Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2) <p>LS2.A: Interdependent Relationships in Ecosystems:</p> <ul style="list-style-type: none"> Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) <p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience:</p> <ul style="list-style-type: none"> Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) 	<p>technology use varies from region to region and over time. (MS-ESS3-2), (MS-ESS3-3)</p> <p>Connections to Nature of Science</p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4) <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)
--	---	---

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s feelings and thoughts. Recognize the impact of one’s feelings and thoughts on one’s own behavior. Recognize one’s personal traits, strengths, and limitations. Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. Recognize the skills needed to establish and achieve personal and educational goals. Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> Recognize and identify the thoughts, feelings, and perspectives of others. Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> ● Develop, implement, and model effective problem-solving and critical thinking skills. ● Identify the consequences associated with one's actions in order to make constructive choices. ● Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> ● Establish and maintain healthy relationships. ● Utilize positive communication and social skills to interact effectively with others. ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self- correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

MP7	Look for and make use of structure.
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems.
6.RP.3a	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
6.RP.3b	Solve unit rate problems including those involving unit pricing and constant speed.
6.EE.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.
6.SP.5	Summarize numerical data sets in relation to their context.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
6.SP.5c	Summarize numerical data sets in relation to their context, by giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.

Computer Science & Design Thinking	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Career Readiness, Life Literacies & Key Skills

9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one's goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning

<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding ● Clipboard Assessment Tool 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities
--	--

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<ul style="list-style-type: none"> ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Although there are many fluctuations, there has been a trend toward increasing temperatures and decreasing ice on Earth since about 1880. (1.2) ● Global average temperature increases when energy absorbed by the surface increases. (1.3) ● When the amount of carbon dioxide or methane in the atmosphere changes, the amount of energy absorbed by the surface also changes. (1.4) ● When the amount of carbon dioxide or methane increases, energy absorbed by the surface increases. (1.4) ● When the amount of carbon dioxide or methane decreases, energy absorbed by the surface decreases. (1.4) ● A system can be stable, even as something flows into and out of the system. If this balanced flow is disrupted, there may be changes to the system. (2.1) ● A change to either the amount of energy entering or exiting the Earth system affects how much energy is absorbed by the surface. (2.1) ● Temperature increases if more energy enters than exits. (2.1) ● Temperature decreases if less energy enters than exits. (2.1) ● If there is an increase in the amount of carbon dioxide or methane, the amount of energy 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● What causes climate change? ● Why is the ice on Earth's surface melting? ● What could be causing ice to melt and temperatures to increase on Earth? ● What kinds of changes to the atmosphere could affect how much energy is absorbed by Earth's surface? ● Why do temperatures on Earth increase when the amount of carbon dioxide or methane in the Earth system increases? ● How can the amount of energy absorbed by Earth's surface change? ● How do carbon dioxide and methane affect energy entering or exiting the Earth system? ● Why does an increase in carbon dioxide or methane result in more energy entering than exiting the Earth system? ● What can be done to stop the carbon dioxide and methane in Earth's atmosphere from increasing? ● Why are carbon dioxide and methane increasing in the atmosphere? ● How is Earth's climate affected in the five to ten years after a large volcanic eruption?

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<p>leaving the Earth system decreases, so more energy enters than exits. (2.3)</p> <ul style="list-style-type: none"> ● If there is a decrease in the amount of carbon dioxide or methane, the amount of energy leaving the Earth system increases, so less energy enters than exits. (2.3) ● Carbon dioxide and methane stop energy from leaving by redirecting energy that would have exited the system. (2.6) ● Carbon dioxide and methane in the atmosphere increase as a result of human activities, such as combustion. (3.1) ● Some ways to stop the increase of carbon dioxide and methane include decreasing combustion and removing these gases from the atmosphere. (3.3) ● Humans can take actions in their daily lives that will reduce the amount of carbon dioxide and methane in the atmosphere. (3.3) ● While human activities are causing the current long-term trend of increasing temperatures, other factors can have smaller effects on the climate in the short term.(4.1) 	
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Ice on Earth has decreased, and global average temperature has increased since about 1880. ● Data over a long enough time period to show a trend offers stronger, more convincing evidence than data from a short time period that only shows fluctuations. ● Although there are many fluctuations, there is a trend toward increasing temperatures and decreasing ice on Earth since about 1880. ● Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers. ● Sources of energy other than sunlight are too small to affect global average temperature. ● Every model is accurate in some ways and inaccurate in other ways. ● Global average temperature increases when energy absorbed by the surface increases. ● The atmosphere is a mixture of many kinds of gases. ● When the amount of carbon dioxide or methane in the atmosphere changes, the amount of energy absorbed by the surface also changes. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Describe long-term trends showing increasing global average temperature and decreasing ice on Earth since about 1880. ● Distinguish between short-term fluctuations and long-term trends in climate data. ● Explain why data collected over long time periods provides stronger evidence for climate trends than short-term data. ● Recognize that scientists and engineers come from diverse social, cultural, and ethnic backgrounds. ● Explain why sources of energy other than sunlight are too small to significantly affect global average temperature. ● Explain that models are useful representations that are accurate in some ways and inaccurate in others. ● Use models and diagrams to explain how energy enters, moves through, and exits the Earth system. ● Explain how increases in energy absorbed by Earth’s surface lead to increases in global average temperature. ● Describe the atmosphere as a mixture of different gases. ● Explain how changes in carbon dioxide and methane levels affect the amount of energy absorbed by Earth’s surface.

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- When the amount of carbon dioxide or methane increases, energy absorbed by the surface increases.
- When the amount of carbon dioxide or methane decreases, energy absorbed by the surface decreases.
- Scientists gather evidence from several sources in order to be more sure of their claims.
- Scientists create models, including diagrams, in order to clarify and communicate their ideas.
- The amounts of carbon dioxide and methane in the atmosphere have been increasing at the same time as temperature has been increasing.
- A system can be stable, even as something is flowing into and out of the system. If this balanced flow is disrupted, there may be changes to the system.
- A change to either the amount of energy entering or exiting the Earth system affects how much energy is absorbed by the surface.
- Temperature increases if more energy enters than exits.
- Temperature decreases if less energy enters than exits.
- Climate change has happened on Earth many times during its 4.6 billion year history.
- All climate changes happen because of an imbalance of energy entering and exiting the Earth system.
- When more sunlight is reflected, more energy leaves Earth's system, and therefore, temperatures get cooler.
- Carbon dioxide and methane stop energy from leaving by redirecting energy that would have exited the system.
- Incoming energy passes through carbon dioxide and methane.
- It is important to use scientific vocabulary when communicating an explanation.
- Scientists use both visuals and writing when they present information.
- Human activities refers to things people do that affect the Earth system.
- Combustion is the process of burning fuels that produces heat and, for many fuels, carbon dioxide, which is released into the atmosphere.
- Livestock are animals such as cows, horses, and pigs that are raised and used by people. They produce methane through burps and
 - Explain how increasing carbon dioxide and methane levels increase energy absorbed by the surface.
 - Explain how decreasing carbon dioxide and methane levels decrease energy absorbed by the surface.
 - Analyze evidence showing that carbon dioxide and methane levels have increased alongside global temperatures.
 - Explain why scientists use evidence from multiple sources to strengthen their claims.
 - Describe how systems can remain stable with balanced inputs and outputs and change when that balance is disrupted.
 - Explain how changes to energy entering or leaving the Earth system affect surface temperature.
 - Explain how temperature increases when more energy enters the system than exits and decreases when less energy enters than exits.
 - Explain that climate change has occurred many times throughout Earth's history.
 - Explain that all climate changes result from imbalances in energy entering and exiting the Earth system.
 - Explain how reflecting more sunlight causes cooling by increasing energy leaving the Earth system.
 - Explain how carbon dioxide and methane reduce energy leaving the Earth system by redirecting outgoing energy.
 - Explain that incoming solar energy can pass through carbon dioxide and methane in the atmosphere.
 - Use appropriate scientific vocabulary when explaining climate processes.
 - Communicate scientific explanations using both visuals and written descriptions.
 - Define human activities and describe how they affect the Earth system.
 - Explain how combustion produces heat and releases carbon dioxide into the atmosphere.
 - Explain how livestock contribute methane to the atmosphere.
 - Explain how human activities increase atmospheric carbon dioxide and methane levels.
 - Explain that science can describe consequences of actions but does not determine societal decisions.
 - Describe examples of solutions being developed to reduce climate change.
 - Identify actions individuals can take to reduce carbon dioxide and methane emissions.
 - Explain how reducing combustion and removing gases from the atmosphere can slow climate change.
 - Explain how volcanic eruptions affect the atmosphere by releasing gases and particles.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<p>flatulence, and the methane is released into the atmosphere.</p> <ul style="list-style-type: none"> ● Carbon dioxide and methane in the atmosphere increase as a result of human activities, such as combustion. ● Science knowledge can describe consequences of actions but is not responsible for society’s decisions. ● Scientists (and others) are creating and implementing solutions to combat climate change. ● Humans can take actions in their daily lives to reduce the amount of carbon dioxide and methane in the atmosphere. ● Some ways to stop the increase of carbon dioxide and methane include decreasing combustion and removing these gases from the atmosphere. ● Humans can take actions in their daily lives that will reduce the amount of carbon dioxide and methane in the atmosphere. ● Volcanic eruptions add ash, dust, carbon dioxide, and sulfur dioxide to the atmosphere. ● Sulfur dioxide redirects some incoming energy from sunlight back to outer space. ● An increase in sulfur dioxide results in cooling because sulfur dioxide causes more energy to leave, and that means less energy enters than exits the Earth system for a period of time. ● While human activities are causing the current long-term trend of increasing temperatures, in the short term, other factors can have smaller effects on the climate. ● Scientists must carefully consider all available evidence before making arguments about a phenomenon. ● Discussing evidence and ideas with others helps build new understanding. ● Scientists can change their minds when presented with convincing evidence. 	<ul style="list-style-type: none"> ● Explain how sulfur dioxide can cause short-term cooling by redirecting energy back into space. ● Distinguish between long-term human-caused climate trends and short-term natural influences. ● Evaluate evidence related to climate change before making scientific claims. ● Construct scientific arguments that include claims, evidence, and reasoning about Earth’s changing climate. ● Engage in scientific discussions to deepen understanding and refine explanations. ● Explain why scientists revise explanations when presented with convincing new evidence.
--	---

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ “The Effects of Climate Change” ○ “A Hole in Earth’s Ozone Layer” ○ “Past Climate Changes on Earth” ○ "Climate Change Solutions" 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Earth’s Changing Climate Simulation ● Multi-language glossary ● Hands-On Flexextension: <ul style="list-style-type: none"> ○ Measuring Trees for Carbon Content

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- “Global Warming: A History of a Hot Debate”
- “What Are We Doing About Sea Level Rise?”

Suggested Accommodations

English Language Learners:

- Multi-sensory instruction
- Flexible grouping
- Small group instruction
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames
- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 9: Earth’s Changing Climate Engineering

Duration: 11 days

New Jersey Student Learning Standards

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

MS-ETS1-1	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.
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.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Practice 1: Asking Questions and Defining Problems.</p> <ul style="list-style-type: none"> Students consider multiple criteria and constraints in defining their design problem. They also have opportunities to pose their own questions. In particular, the Active Reading approach, an approach to reading based on curiosity and inquiry, supports students in asking thoughtful questions as they read scientific texts, such as the Futura Civil Engineer’s Dossier. <p>Practice 2: Developing and Using Models.</p>	<p>ETS1.A: Defining and Delimiting Engineering Problems:</p> <ul style="list-style-type: none"> 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. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) <p>ETS1.B: Developing Possible Solutions:</p> <ul style="list-style-type: none"> A solution needs to be 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3) <p>Structure and Function</p> <ul style="list-style-type: none"> Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2) <p>Stability and Change</p> <ul style="list-style-type: none"> Stability might be disturbed either by sudden events or gradual

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
----------	-----------------------

<ul style="list-style-type: none"> Students use the Futura RoofMod Design Tool, a digital simulation, to test their designed solutions. <p>Practice 3: Planning and Carrying Out Investigations.</p> <ul style="list-style-type: none"> Students work through the phases of the design cycle—Plan, Build, Test, Analyze—as they develop optimal solutions to their design problem. They plan and carry out iterative tests in the Futura RoofMod Design Tool and collect data that help inform their subsequent designs. <p>Practice 4: Analyzing and Interpreting Data.</p> <ul style="list-style-type: none"> Students analyze the data recorded on their data sheets to determine needed revisions to their designs. <p>Practice 5: Using Mathematics and Computational Thinking.</p> <ul style="list-style-type: none"> Students calculate differences between the results of two tests as well as evaluate graphs and tables as they look for trends, with the ultimate goal of optimizing their designs. Students break down this problem into smaller parts by isolating design variables to understand how specific design features impact the final results. <p>Practice 6: Constructing Explanations and Designing Solutions.</p>	<p>tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)</p> <ul style="list-style-type: none"> There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3) Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) Models of all kinds are important for testing solutions. (MS-ETS1-4) <p>ETS1.C: Optimizing the Design Solution:</p> <ul style="list-style-type: none"> Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4) <p>ESS3.C: Human Impacts on Earth Systems:</p>	<p>changes that accumulate over time. (MS-ESS3-5)</p> <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time. (MS-ESS3-3) <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ETS1-1) The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. (MS-ETS1-1)
---	---	--

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Students use an iterative process to optimize a design solution.

Practice 7: Engaging in Argument from Evidence.

- Students evaluate competing design solutions, based on agreed-upon design criteria, to choose the best design for roof modification.

Practice 8: Obtaining, Evaluating, and Communicating Information.

- Students read and research in the Futura Civil Engineer’s Dossier; analyze different design iterations, using their data tables; and write final proposals describing their optimal designs for roof modification.

- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)

ESS3.D: Global Climate Change:

- 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). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)

PS4.B: Electromagnetic Radiation:

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object’s material and the frequency (color) of the light. (MS-PS4-2)

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

New Jersey Social and Emotional Competencies and Sub-Competencies	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s feelings and thoughts. ● Recognize the impact of one’s feelings and thoughts on one’s own behavior. ● Recognize one’s personal traits, strengths, and limitations. ● Recognize the importance of self-confidence in handling daily tasks and challenges.
Self-Management	<ul style="list-style-type: none"> ● Understand and practice strategies for managing one’s own emotions, thoughts, and behaviors. ● Recognize the skills needed to establish and achieve personal and educational goals. ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals.
Social Awareness	<ul style="list-style-type: none"> ● Recognize and identify the thoughts, feelings, and perspectives of others. ● Demonstrate an awareness of the differences among individuals, groups, and others’ cultural backgrounds. ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of settings.
Responsible Decision Making	<ul style="list-style-type: none"> ● Develop, implement, and model effective problem-solving and critical thinking skills. ● Identify the consequences associated with one’s actions in order to make constructive choices. ● Evaluate personal, ethical, safety, and civic impact of decisions.
Relationship Skills	<ul style="list-style-type: none"> ● Establish and maintain healthy relationships. ● Utilize positive communication and social skills to interact effectively with others. ● Identify ways to resist inappropriate social pressure. ● Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways. ● Identify who, when, where, or how to seek help for oneself or others when needed.

<u>Interdisciplinary Connections</u>	
ELA Standards	
RL.CR.6.1	Cite textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
RI.CI.6.2.	Determine the central idea of an informational text and explain how it is

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

	supported by key details; provide a summary of the text distinct from personal opinions or judgments..
RI.CT.6.8	Compare and contrast informational texts in different forms, by different authors, or from different genres (e.g., a memoir written by and a biography on the same person, historical novels and primary source documents, infographics and scientific journals) in terms of their approaches to similar themes and topics.
RI.MF.6.6	Integrate information when presented in different media or formats (e.g., visually, quantitatively) to develop a coherent understanding of a topic or issue.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
RL.CT.6.8	Compare and contrast literary texts in different forms, by different authors, or from different genres (e.g., stories and poems; historical novels and primary source documents, scientific journals and fantasy stories) in terms of their approaches to similar themes and topics.
RI.AA.6.7	Trace the development of and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
W.AW.6.1	Write arguments on discipline-specific content (e.g., social studies, science, math, technical subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
W.AW.6.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence, that demonstrate an understanding of the topic or text, using credible sources.
W.IW.6.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.IW.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.WR.6.5	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
W.SE.6.6	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

W.RW.6.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mathematics Standards	
MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
6.RP.3c	Find a percent of a quantity as a rate per 100; solve problems involving finding the whole given a part and the percent.
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.NS.7c	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.SP.5	Summarize numerical data sets in relation to their context.
6.SP.5b	Summarize numerical data sets in relation to their context, by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

<u>Computer Science & Design Thinking</u>	
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Career Readiness, Life Literacies & Key Skills	
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.PB.5	Identify factors that affect one’s goals, including peers, culture, location, and past experiences.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Evidence of Student Learning	
<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher observations ● Class discussions ● Whiteboard/Communicators ● On-the-Fly Assessments ● Daily classwork ● Checks for understanding 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● Oral assessments ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● Clipboard Assessment Tool ● Critical Juncture Assessment ● Crosscutting Concept Tracker 	<ul style="list-style-type: none"> ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam ● Chapter/Unit Test ● Writing Assignments ● Presentations ● Laboratory Reports/Practical ● Unit Projects 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Midterm Assessment ● Unit Common Assessment

Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Engineers use scientific knowledge about energy and climate to design solutions to human problems. ● Understanding a problem and clearly defining criteria are essential for effective engineering design. ● Albedo affects how much solar energy is absorbed or reflected, influencing temperature and climate impacts. ● Different engineering solutions can address the same problem in different ways and with different trade-offs. ● Engineering design is an iterative process that improves solutions through testing, feedback, and revision. ● Models help engineers test ideas and make predictions before building full-scale solutions. ● Trade-offs are unavoidable in engineering, and no solution can perfectly meet all criteria. ● Evidence and reasoning are necessary to justify why one design solution is more effective than another. ● Engineering solutions are shaped by constraints such as materials, technology, and human capacity. ● Clear, professional communication strengthens the impact and credibility of engineering proposals. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How can engineering solutions reduce the impacts of climate change? ● How does albedo influence how much energy a surface absorbs or reflects? ● How do solar roofs and white roofs reduce building temperatures in different ways? ● Why is it important to clearly define criteria before designing a solution? ● How do engineers decide which design solution is the best when trade-offs exist? ● Why must engineering designs be tested, evaluated, and revised multiple times? ● How do models help engineers understand and improve their designs? ● How does isolating variables improve the reliability of design tests? ● How can evidence be used to justify that a design solution is optimized? ● Why is professional communication important when engineers present their solutions to others?
--	---

<p>Content <i>Students will know...</i></p>	<p>Skills <i>Students will be able to ...</i></p>
--	--

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Engineers plan designs, physical objects, and processes that try to solve human problems.
 - Engineers need to understand the problem they are trying to solve so they can design an effective solution.
 - Albedo refers to how much sunlight (light energy) is reflected away from a surface. When the albedo of a surface is high, less energy is absorbed and more energy is reflected.
 - Criteria define the engineering problem.
 - Results are evaluated based on how they address the criteria.
 - Scientific knowledge is constrained by human capacity, technology, and materials.
 - Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.
 - Engineers read with purpose so they can understand relevant background information that impacts their work.
 - While solar roofs and white roofs both reduce climate impact by decreasing the amount of carbon dioxide being released into the atmosphere, they do this in very different ways.
 - Solar roofs absorb energy from sunlight and convert it to electrical energy. This electrical energy can be used to cool the building.
 - White roofs reflect more energy from sunlight, causing the building to stay cool and reducing the need to burn fuels for electrical energy to cool the building.
 - Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers.
 - Engineers sometimes use models to test their designs.
 - Isolating variables is a key strategy for experimental design in which one selects and tests for the effect of one variable at a time.
 - The results of each design test are evaluated based on how they address the criteria.
 - Engineering designs need to be tested—and retested.
 - Modifications are made to the design based on the evaluated results, and the design is modified in order to be tested again; this is called an iteration.
 - Engineers take feedback into consideration during the iterative process (modifying the design at each iteration).
- Explain how engineers design physical objects, systems, and processes to solve human problems.
 - Define an engineering problem by identifying criteria that describe a successful solution.
 - Explain why understanding the problem is essential before designing an effective solution.
 - Explain albedo as a measure of how much sunlight is reflected by a surface.
 - Explain how higher albedo leads to less energy absorption and lower surface temperatures.
 - Apply the concept of albedo to explain how engineering designs can reduce climate impacts.
 - Compare how solar roofs and white roofs reduce climate impact through different mechanisms.
 - Explain how solar roofs convert sunlight into electrical energy that can be used to cool buildings.
 - Explain how white roofs reflect sunlight, reducing building temperatures and energy use.
 - Explain how reducing energy use can decrease the need to burn fuels and lower carbon dioxide emissions.
 - Recognize that scientists and engineers come from diverse social, cultural, and ethnic backgrounds.
 - Explain how scientific knowledge and engineering design are limited by human capacity, technology, and available materials.
 - Use background research to inform engineering design decisions.
 - Use models to test and evaluate engineering designs.
 - Design and conduct tests that isolate variables to determine the effect of one factor at a time.
 - Evaluate test results based on how well a design meets the established criteria.
 - Explain why engineering designs must be tested and retested.
 - Describe and apply iteration as a process of modifying and improving a design through repeated testing.
 - Incorporate feedback to improve designs during the iterative process.
 - Compare multiple design iterations to identify features that improve performance.
 - Analyze trade-offs by weighing how well a design meets some criteria compared to others.
 - Explain why trade-offs can make it difficult to meet all criteria in a design project.
 - Use evidence to justify why a design solution is optimized, including comparisons to earlier iterations.
 - Write a professional engineering proposal that explains how and why a design solution works.

Lakewood Public School District Curriculum Guide

Grade: 6	Content Area: Science
-----------------	------------------------------

<ul style="list-style-type: none"> ● For an optimal design, engineers complete several iterations, often combining the best parts of previous designs. ● Strong proposals use evidence to describe how the design is optimized, including a discussion of trade-offs and comparisons to earlier iterations. ● Engineers consider trade-offs by weighing the impact of each criterion against the others. ● Trade-offs may make it difficult or impossible to meet all the criteria for a design project. ● Strong engineering proposals use evidence to describe why the design is optimal, including a discussion of trade-offs and comparisons to earlier iterations. ● An engineer's written proposal explains to others how and why a design solution works. ● Strong proposals are written for a professional audience and use topic-specific vocabulary words. ● Reasoning is a process that scientists use to connect evidence to their claims. ● Engineers improve the use of evidence in and the professionalism of their writing when they revise their written proposals. ● Civil engineers focus on developing and improving the roads, bridges, and buildings that the public uses. ● Criteria define the engineering problem. 	<ul style="list-style-type: none"> ● Use topic-specific scientific and engineering vocabulary appropriate for a professional audience. ● Use reasoning to clearly connect evidence to claims in engineering explanations. ● Revise written proposals to improve clarity, use of evidence, and professionalism. ● Explain the role of civil engineers in designing and improving buildings and infrastructure used by the public.
--	--

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Articles in This Unit <ul style="list-style-type: none"> ○ “Request for Proposals” ○ “Futura Engineering’s Work on Rooftops” ○ “Roof Modification Technical Notes” ○ “Meet an Engineer Who Designs City Streets” ○ “Proposal Resources” ○ “Additional Resources” 	<p>Supplemental Materials</p> <ul style="list-style-type: none"> ● Digital Resources included in each unit <ul style="list-style-type: none"> ○ Futura Workspace ● Multi-language glossary

Suggested Accommodations
<p>English Language Learners:</p> <ul style="list-style-type: none"> ● Multi-sensory instruction ● Flexible grouping ● Small group instruction

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Chunking information
- Scaffolded questioning
- Academic language support
- Vocabulary support
- Co-Constructed Word Banks
- Anchor charts
- Gradual release model
- Visual models
- Native language support when possible (Multi-language glossary)
- Sheltered English Instruction Strategies
- Sentence starters

Special Education/Students with Disabilities:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Follow all IEP modifications
- Calculators
- Manipulatives/concrete models
- Directions repeated, clarified, and reworded
- Breakdown task into manageable parts

504 Plans:

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Calculators
- Manipulatives/concrete models
- Follow all 504 modifications

Gifted and Talented:

- Higher level questioning
- Enriched assignments
- Tiered assignments
- Choice board to extend learning

Students at Risk of Failure:

- Provide peer tutoring
- Use a strong student as a “buddy”
- Allow extra time to complete assignments or tests
- Work in a small group
- One on one instruction
- Provide immediate praise and feedback
- Create a nurturing environment
- Provide visuals
- Be flexible with assignments and time frames

Lakewood Public School District Curriculum Guide

Grade: 6

Content Area: Science

- Provide needed academic resources
- Chunking information
- Scaffolded questioning
- Tiered activities
- Manipulatives/concrete models
- Modified assignments
- Brain breaks

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create an emotionally positive classroom climate.
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background