Grade 5

Unit 1: Engineering and Technology

New Jersey Student Learning Standards
2022 - 2023

Established 2016-2017
Revised 2018-2019
Revised 2019-2020
Revised 2020-2021
Revised 2022-2023

Marking Period	Unit Title	Recommended Instructional Days
1	Engineering and Technology	21

NJSLS - Science: *TItle*	NJSLS - Science: *Performance Expectations*	**Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-S within Unit**
3-5-ETS1 Engineering Design	**5-ESS3-1** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. **3-5-ETS1-1** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3-5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. **3-5-ETS1-3** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	
FOUNDATION Disciplinary: *Core Idea*	**FOUNDATION Disciplinary: *Statement***	
ETS1.A: Defining and Delimiting Engineering Problems	● Possible solutions to a problem are limited by available materials and resources (constraints). The success	**Essential Questions:** ● How are science and math used in engineering? ● What is the design process? ● How does technology affect society?

ETS1.B: Developing Possible Solutions **ETS1.C:** Optimizing the Design Solution	of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) ● Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) ● At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) ● Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) ● Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)	**Enduring Understanding:** ● Understand, evaluate and practice safe procedures for conducting science investigations. ● Discover how science and math are used in engineering. ● Investigate a design process. ● Explore how technology decisions affect society. ● Use the engineering design process to find a good solution to this problem. ● Understand how and why technology changes over time. **Activity Description**: **Science Safety Activities** - Discuss Science Safety in Lab, Safety in the Field and Safety Symbols. (pgs: xvii-xix) (SCI) **Lab Activities** - Using the LEGO Tool Kits, create a model of a solution to a problem in your community (home, school, etc.) (MA, SCI, ART) **Performance Task** - Create or enhance a device that will help society in a positive way. Use evidence statements to describe how mathematics was necessary for the design. (MA, ELA, SCI, SS, ART) **Research Task** - How has Apple iPhone changed over time? In what ways is Math necessary for these changes? How has the iPhone become more efficient over time? (TECH, MA, SS) **Career Education** Computer Science - Students learn about the work of software engineers, who design and write software for computers. Students conduct research online about a software model of their choice, and complete an online lesson on how to code software. (page 21 - 22) Research Katherine Johnson. You may know of Katherine Johnson from the film *Hidden Figures*. Her work as a mathematician and "human computer" was critical to the success of the NASA US Space Programme in the 1950s and 60s. **(Amistad Law / Diversity & Inclusion)**
FOUNDATION **Science and Engineering Practices:**	**FOUNDATION** **Science and Engineering**	

Core Idea	**Practices:** ***Statement***	People in Science & Engineering: Dr. Wangari Maathai- Students learn about the work of Dr. Maathai. She had two intertwined problems to solve: the issue of how to control deforestation and how to control the erosion that followed. The First problem was a human-made problem, and the second problem is a result of earth processes that are always working. (page 41 - 42) **(Amistad Law / Diversity & Inclusion)** Safety Engineer - Engineers are always looking for ways to improve their design by identifying where the problems are. Safety and automobile engineers work together, even though their roles are different. Both types of engineers have the same goal: to make cars that are functional and safe. Early in the design process, prototypes are made. Point students to the tool shown on the page that cares a miniature prototype. (page 63 - 64) **Interdisciplinary Connections: Content: ;NJSLS#:** ***ELA / Literacy*** **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2) **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5- ETS1-2) **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2) **W.5.7** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1),(3-5-ETS1-3) **W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1),(3-5-ETS1-3) **W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1),(3-5-ETS1-3)
Asking Questions and Defining Problems **Planning and Carrying Out Investigations** **Constructing Explanations and Designing Solutions**	• Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) • Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)	

	• Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	***Mathematics*** **MP.2** Reason abstractly and quantitatively. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3) **MP.4** Model with mathematics. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3) **MP.5** Use appropriate tools strategically. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3) **3-5.OA** Operations and Algebraic Thinking (3-5-ETS1-1),(3-5-ETS1-2)
FOUNDATION **Crosscutting Concepts:** ***Core Idea***	**FOUNDATION** **Crosscutting Concepts:** ***Statement***	
Influence of Engineering, Technology, and Science on Society and the Natural World	• People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)	
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	

Self-Awareness **Self-Management** **Social Awareness** **Responsible** **Decision-Making** **Relationship Skills**	● 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 ● 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. ● Recognize and identify the thoughts, feelings, and perspectives of others. ● Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
<u>Formative Assessments:</u>	**<u>Benchmarks:</u>** ● District Assessments

• Diagnostic tests used to modify teaching and learning activities to improve student attainment (Unit Pretest, Lesson Check, Lesson Roundup, Unit Review, Lesson quiz, Safety Quiz)	**Summative Assessments:** • End of Unit/Chapter Test

Differentiated Student Access to Content:
Teaching and Learning *Resources/Materials*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
• Lesson 1: pp. 9, 19 • Lesson 2: pp. 31, 36 • Lesson 3: pp. 51, 66 • Leveled Readers - On-Level	• Lesson 1: pp. 7, 13, 17 • Lesson 2: pp. 28, 33, 36 • Lesson 3: pp. 48, 52, 60 • Leveled Readers - Extra Support	• Lesson 1: pp. 11 • Lesson 2: pp. 31, 39, 41 • Lesson 3: pp. 64 • Leveled Readers - Extra Support	• Lesson 1: pp. 9, 19 • Lesson 2: pp. 31, 36 • Lesson 3: pp. 51, 66 • Leveled readers - Enrichment

Supplemental Resources

Technology:
- Schoology
- HMH EBook
- Google Classroom
- Kahoot!
- MobyMax
- Quizlet / Quizlet Live
- Quizizz
- Mystery Science
- Newsela
- ReadWorks
- Crash Course Kids
- Legends of Learning
- You Solve It Simulation (Cat Tree)

Other:
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Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	Alternate Core Resources *IEP/504/At-Risk/ESL*	ELL Core Resources	Gifted & Talented Core
• Model how to identify vocabulary terms within text. Discuss how to locate definition within the text, noting that some definitions will need to be inferred based on images as well as text.	• Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake tests for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.	• Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.	• Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect students to related talent development opportunities.

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept:** Critical Thinking & Problem-Solving	
	Core Ideas:	The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.
	Performance Expectation/s:	• 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2). • 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1). • 9.4.5.CT.3: Describe how digital tools and technology may be used to

		solve problems. • 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
	Career Readiness, Life Literacies, & Key Skills Practices	
	Students work in cooperative groups and will use research strategies to complete labs	

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
X	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*		LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	X	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*