| Marking Period | Unit Title | Recommended Instructional Days |
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| **MP 4** | **Design Thinking** | Approximately 10-12 days **(Meet Twice Per Week)** |

| Disciplinary Concept: | Practice: | |
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| CS ED NT ETW | Fostering an Inclusive Computing and Design Culture<br><br>Collaborating Around Computing and Design<br><br>Developing and Using Abstractions<br><br>Testing and Refining Computational Artifacts<br><br>Communicating About Computing and Design | **Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-CSDT within Unit** |
| **Core Idea:** | **Performance Expectation/s:** | |
| The study of human–computer interaction can improve the design of devices and extend the abilities of humans.<br>Engineering design is a systematic, creative, and iterative process used to address local and global problems. Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.<br>Improvements in technology are intended to make the completion of tasks easier, safer, and/or more | 8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.<br>8.2.8.ED.4: Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team.<br>8.2.8.ED.5: Explain the need for optimization in a design process | **Essential Question/s:**<br>What are the steps in the design thinking process?<br><br>How has technology impacted our world?<br><br>What is upcycling and why is it important?<br><br>Why is it important to review and modify existing technologies?<br><br>Why is learning to program important ?<br><br>What can I program a robot to do? |

efficient.
Technology advances through the processes of innovation and invention which relies upon the imaginative and inventive nature of people. Sometimes a technology developed for one purpose is adapted to serve other purposes. Engineers use a systematic process of creating or modifying technologies that is fueled and constrained by physical laws, cultural norms, and economic resources. Scientists use systematic investigation to understand the natural world.
Resources need to be utilized wisely to have positive effects on the environment and society. Some technological decisions involve tradeoffs between environmental and economic needs, while others have positive effects for both the economy and environment.
Programs use procedures to organize code and hide implementation details. Procedures can be repurposed in new programs. Defining parameters for procedures can generalize behavior and increase reusability.
Individuals design and test solutions to identify problems taking into consideration the diverse needs of the users and the community.

8.2.8.ED.7: Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system.
8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.
8.2.8.NT.2: Analyze an existing technological product that has been repurposed for a different function.
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.NT.4: Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.
8.2.8.ETW.1: Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.
8.1.8.AP.5: Create procedures with parameters to organize code and make it easier to reuse.
8.1.8.AP.8: Systematically test and refine programs using a range of test cases and users

**Activity Description**:
Students will learn about the design thinking process and complete a sample provided by the teacher.

Students will learn and research how technology has made both positive and negative impacts in our world. Students will be asked to make a list of technology they can not live without and justify its importance. They will also create a list of technologies that have been harmful to our society.

Students will learn and research what the team "upcycle" means in reference to technology and technological equipment. They will identify both positive and negative impacts that many common technology tools have on our environment (batteries, processor chips, cell phones, etc).

Students will use their list of technologies they can not live without, and come up with multiple ways they can improve those technologies. Students will use the design thinking process to improve a piece of existing technology. They will create a presentation that identifies the technology, its current strengths and weaknesses, ways to improve the technology and a final prototype of their new invention.

Students will use Sphero Robots to complete multiple challenges within their online platform: Mini Golf, Jungle Roll, Sphero Olympics!, and Chariot Challenge

**Interdisciplinary Connections:**
**ELA**
W7, W.8.7., W.8.2, RI.8.., NJSLSA.SL2., NJSLSA.SL5., SL.8.2., SL.8.5, NJSLSA.R7, NJSLSA.SL2, SL.8.2., NJSLSA.SL4., NJSLSA.SL5., NJSLSA.SL6., SL.8.5.

| **Social and Emotional Learning:** *Competencies* | **Social and Emotional Learning:** *Sub-Competencies* | |
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| Self Awareness<br><br>Self-Management<br><br>Social Awareness<br><br>Responsible-Decision Making<br><br>Relationship Skills | • Recognize the importance of self-confidence in handling daily tasks and challenges.<br>• Recognize one's personal traits, strengths, and limitations<br>• Recognize the skills needed to establish and achieve personal and educational goals<br>• Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals.<br>• Demonstrate an awareness of differences among individuals, groups, and others' cultural backgrounds<br>• Develop implement, aand model effective problem-solving and critical thinking skills<br>• utiliz positive communication and social skills to interact effectively with others | |
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| **Assessments (Formative)**<br>*To show evidence of meeting the standard/s, students will successfully engage within:* | | **Assessments (Summative)**<br>*To show evidence of meeting the standard/s, students will successfully complete:* |
| **Formative Assessments:**<br>• Exit Tickets<br>• Test / Quizzes<br>• Worksheets<br>• Presentations / videos | | **Benchmark:**<br>• Performance Assessment<br>• Unit Assessments<br>• Projects<br>**Summative Assessments:**<br>• District/Department Assessments |

| Differentiated Student Access to Content: Teaching and Learning *Resources/Materials* | | | |
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| **Core Resources** | **Alternate Core Resources** *IEP/504/At-Risk/ESL* | **ELL Core Resources** | **Gifted & Talented Core Resources** |
| ● Online Research (google.com)<br>● Sphero.com | ● Reteaching worksheets<br>● Spanish version of lesson activities | ● Dictionary for native language<br>● Google Translate<br>● Translation by classroom Paraprofessional | ● Enrichment/Extension activities |

| Supplemental Resources |
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**Technology:**
- Chromebooks, MacBook
- Projector
- Smartboard
- Google.com

**Other:**
- Schoology
- Google Meet Conferencing Tool
- GAFE (Docs, Sheets, Slides, Drawings, Sites)
- YouTube
- Sphero Robot
- Pens, Pencils, Paper, Markers, Crayons, chart paper, envelopes

| Differentiated Student Access to Content: Recommended *Strategies & Techniques* | | | |
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| **Core Resources** | **Alternate Core Resources** *IEP/504/At-Risk/ESL* | **ELL Core Resources** | **Gifted & Talented Core** |
| Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual | Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of | Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, | Provide extension activities related to the topic being discussed. Create an enhanced set of introductory |

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| instruction as needed, modify assessments and/or rubrics, repeat instructions as needed. | skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test 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. | oral/visual directions/prompts when necessary, supplemental materials including use of online or paper bilingual dictionaries, and modified assessment and/or rubric. | 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:** | |
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| | *Core Ideas:* | <ul><li>An individual's strengths, lifestyle goals, choices, and interests affect employment and income</li><li>There are a variety of resources available to help navigate the career planning process.</li><li>Communication skills and responsible behavior in addition to education, experience, certifications, and skills are all factors that affect employment and income.</li><li>Communication skills and responsible behavior in addition to education, experience, certifications, and skills are all factors that affect employment and income.</li></ul> |
| | *Performance Expectation/s:* | 9.1.8.PB.5, 9.2.8.CAP.2, 9.2.8.CAP.4:, 9.2.8.CAP.11:, 9.2.8.CAP.16:, 9.2.8.CAP.18, |
| | **Career Readiness, Life Literacies, & Key Skills Practices** | |
| | <ul><li>Consider the environmental, social, and economic impacts of decisions</li><li>Demonstrate creativity and innovation</li><li>Utilize critical thinking to make sense of problems and persevere in solving them</li><li>Use technology to enhance productivity, increase collaboration and communicate effectively</li></ul> | |

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|  | ● Work productively in team while using cultural/global competence |

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