Crest Memorial School Curriculum and Pacing Guide	
Grades: K, 1 & 2	Subject Area: STEM - Computer Science & Design Thinking
Adoption Date:	Revision Date: February 16, 2024

Mission and Vision Statements

Mission: Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education

Vision: All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- develop and apply computational and design thinking to address real-world problems and design creative solutions;
- engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Integration of Technology

- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools.

21st Century Skills
• 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem. • 9.4.2.CT.2: Identify possible approaches and resources to execute a plan. • 9.4.2.CT.3: Use a variety of types of thinking to solve problems. • 9.4.2.DC.1: Explain differences between ownership and sharing of information. • 9.4.2.DC.2: Explain the importance of respecting digital content of others. • 9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet • 9.4.2.DC.4: Compare information that should be kept private to information that might be made public. • 9.4.2.DC.7: Describe actions peers can take to positively impact climate change

Career Education
• 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job. • 9.1.2.CAP.2: Explain why employers are willing to pay individuals to work.

Interdisciplinary Connection
Science - NJSLS • K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area • K-ESS3-3 Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. K-2-ETS1: Engineering Design • K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. • K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. • K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Accommodations and Modifications	
Special Education	● Follow 504/IEP accommodations ● Ask yes/no questions ● Simplify task directions ● Provide oral and written directions ● Small group instruction ● Use of graphic organizers
English Language Learners	● Create visual word wall with labels ● Highlight and define important vocabulary ● Ask yes/no questions ● Assign a buddy ● Use of visual aids ● Group projects ● Use of translation dictionaries ● Provide a Word Bank ● Reduce amount of work required ● Provide hands-on activities and explanations ● Provide picture labels with both English and other language ● Allow extended time for project and test/quiz completion. ● Reduce multiple choices to two. ● Offer book choices written in native language
Students At-Risk of Failure	● Adjust time for completion ● Allow verbalization before writing ● Use audio materials when necessary ● Restate, reword, clarify directions ● Re-teach concepts using small groups ● Provide educational “breaks” as necessary ● Chunking content into “digestible bites” ● Shorten assignments to focus on mastery concept ● Consistent use of behavior management techniques. ● Assignment, Project, and Assessment Modification Based on Individual Student Needs
Gifted and Talented	● Student Choice ● Provide independent learning activities ● Mentor/teach other students ● Ask students higher level questions ● Provide opportunities for open-ended, self-directed activities, or offer higher-level learning opportunities ● Offer students opportunities to present their understanding of a topic in different ways ● Assignment, Project, and Assessment Modification Based on Individual Student Needs

Students with 504 Plans	● Allow verbalization before writing ● Restate, reword, clarify directions ● Re-teach concepts using small groups ● Provide educational “breaks” as necessary ● Chunking content into “digestible bites” ● Shorten assignments to focus on mastery concept ● Reduced amount of work ● Preferential seating

Assessments	
Formative	● Planning/Design Page ● Lesson quick checks (Exit tickets) ● Teacher Observation & Questioning ● KWL Chart
Summative	● Oral Presentation ● End of unit test/reflection ● Google Classroom Slides ● Project Presentation
Benchmark	● End of project presentation ● Project Rubric
Alternative	● Performance Tasks ● Projects ● Choice Board

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Impacts of Technology on Ethics & Culture

Unit Learning Goals
Impacts of Technology on Ethics & Culture Computing technology has positively and negatively changed the way individuals live and work. The availability of technology for essential tasks varies in different parts of the world. 8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology. 8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

Core Instructional Materials	Supplemental Materials
● Crafting Materials	● Google Slides ● Teacher made planning paper

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will be able to talk about how technology has changed our lives and how different places use technology in different ways.	8.1.2.IC.1: 8.2.2.EC.1:	- Activate prior knowledge and set the stage for exploring how technology impacts our lives. Discuss everyday objects that use technology and help people in their daily lives(phones, tablets, or computers). - Class discussion: Compare life before and after technology (writing letters vs. sending emails). Guiding students to make a list and think about both positive and negative impacts. - Hands-On Craft: Students create a "Technology Timeline." Students paste images of different technologies in chronological order. Discuss how each item changed the way people live and work, emphasizing global differences in technology access. *(Each grade level has a different set of technology items)*
Day 2	8.1.2.IC.1: 8.2.2.EC.1:	- Warm Up: Ask students to think about one piece of technology they use at home and how it helps them.

Students will be able to express how technology has evolved with pros and cons.		Students share their ideas with the class. Encourage them to highlight any differences in technology use and access between their homes. - Create a visual display of the different technologies mentioned and their uses. - Facilitate a class discussion connecting the shared ideas to the broader concept of how technology impacts lives differently in various communities and regions. - Students color, cut out and sort various technology images into two categories: "Old Technology" and "New Technology" (e.g., landline phone, smartphone, typewriter, computer). - Students draw a line connecting each old technology to its new counterpart, illustrating the evolution. *(Each grade level has a different set of technology items)* - Reflection: What is one way technology has changed how we do things at home? Can you name a technology that is used differently in another part of the world?

Inclusive concepts
● Students will work in groups or pairs to foster a sense of belonging, respect for others and responsibility. ● This teaches accountability for ensuring everyone feels included, helping students become thoughtful and inclusive community members. ● Encouraging responsibility for personal actions, promoting teamwork and collaboration, and respecting each person's viewpoint. **Differentiation Guide** - Advanced learners: Encourage deeper exploration by asking them to research and present on a technology not covered in class. Challenge them to consider global impacts and variations in technology use. - Striving learners: Provide additional visual aids and simplified language. Pair them with peers for support during activities. Use concrete examples and hands-on materials to reinforce concepts.

Engineering Design

Unit Learning Goals	
Engineering Design Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions. Limitations (constraints) must be considered when engineering designs.	
8.2.2.ED.1: Communicate the function of a product or device. 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. 8.2.2.ED.4: Identify constraints and their role in the engineering design process. K-2-ETS1: Engineering Design • K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. • K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. • K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Hoop Glider** Students will design and test a hoop glider, identifying and explaining the functions of its system and subsystems. They will collaborate to evaluate and improve their designs based on performance data. **Coconut Tree** Students will apply the engineering design process to design & construct a tree that can hold the maximum number of items, then evaluate the stability and capacity of their designs through testing. **House for The Three Pigs** Students will design and construct a house using given materials that successfully hide the three pigs. They will evaluate the house's effectiveness, considering constraints and trade-offs in the engineering design process. **Build a Pumpkin** Students will design and build a 3D model that solves a real-world problem (Spookley's shape being different). **Ghost House** Students will design and construct a house using given materials that successfully hold all ten ghosts. They will evaluate the house's effectiveness, considering constraints and trade-offs in the engineering design process. **Pumpkin Fence** Students will design and construct a gate using popsicle sticks and clothespins, ensuring it meets specified height and load requirements. They will evaluate the gate's performance, considering constraints and trade-offs in the engineering design process.

	Turkey Trap Students will design and construct a model of a trap to catch a turkey, using knowledge of system functions and material properties. They will evaluate their designs based on criteria such as effectiveness, resource use, and adherence to constraints. **Elf Shelf** Students will design and construct a shelf using given materials that successfully holds the Elf. They will evaluate the shelf's effectiveness, considering constraints and trade-offs in the engineering design process. **Shady Structure** (Climate Change) Students will design and construct a model of a shady structure to keep a toy penguin cool, using knowledge of system functions and material properties. They will evaluate their designs based on criteria such as effectiveness, resource use, and adherence to constraints. **Penguin Sled** Students will design and build a sled using given materials that successfully keeps the penguin safe. They will evaluate the sled's effectiveness by measuring how far it travels, considering constraints and trade-offs in the engineering design process. **Leprechaun Trap** Students will design and construct a model of a trap to catch a Leprechaun, using knowledge of system functions and material properties. They will evaluate their designs based on criteria such as effectiveness, resource use, and adherence to constraints. **Basket for Eggs** Students will design and construct a basket that holds the most plastic eggs. They will evaluate and refine their designs based on constraints and trade-offs.

Core Instructional Materials	Supplemental Materials
● Building Materials	● Teacher Made Planning Page ● Google Slides

Hoop Glider Design Lab

By the end of this lesson, students will be able to build a hoop glider, explain how it works, and make it fly farther by improving the design.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Define the Engineering Design Process. Students will design and test a hoop glider, identifying and explaining the functions of its system and subsystems. They will collaborate to evaluate and improve their designs based on performance data.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Ask students to brainstorm what they notice about a simple paper airplane Systems and Subsystems: - Describe how the glider consists of a straw (body) and two paper hoops (wings). Discuss how each part contributes to the glider's flight. Engineering Design Process Overview: - Introduce the engineering design process: Ask, Imagine, Plan, Create, Test, and Improve. - Students follow the design process to build, test & improve hoop gliders Closing Reflection Questions: 1. What is one change you made to your hoop glider to improve its flight? 2. How did the subsystems of your hoop glider work together to help it fly?

Coconut Tree

Students will apply the engineering design process to design & construct a tree that can hold the maximum number of items, then evaluate the stability and capacity of their designs through testing.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 - Identify the problem and brainstorm potential	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3	- Read the story “Chicka Chicka Boom Boom” - Students follow the design process to plan, build, test & reflect

solutions for building a coconut tree to hold the letters - Develop a plan and begin constructing the tree - Conduct tests to evaluate the effectiveness of the bucket tower holding the most letters - Analyze the results and refine the design to enhance performance	8.2.2.ED.4	on their coconut trees. - *Build:* Students use tubes & stickers to start constructing a coconut tree. Help students focus on what specific parts of their design are working or not working. - *Test:* Students count how many letters their tree can hold. - *Redesign or Improve:* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it taller, stronger, etc. - If students are successful, ask them to critically assess which aspects of their solution could be improved.

House for the Three Pigs

Students will design and construct a house using given materials that successfully hide the three pigs. They will evaluate the house's effectiveness, considering constraints and trade-offs in the engineering design process.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will be able to utilize the design process to plan, design and build a new house for the three pigs.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Quickly retell the story of the three little pigs, highlighting the different materials they used. Ask which materials worked better than others, and why? - *Plan:* Students draw a quick sketch of their new house explaining what materials they plan on using. - *Build:* Students build houses following their plans. Remind them to ensure the house can hold the pigs and protect them from the big bad wolf. - *Reflection:* Ask students to evaluate the house they build. Encourage them to consider what worked well and what could be improved.

Build a Pumpkin

By the end of this lesson, Students will design and build a 3D model that solves a real-world problem (Spookley's shape being different).

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and build a 3D model that solves a real-world problem (Spookley's shape being different).	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Quickly retell the story of Spookley the pumpkin, highlighting the facts; What made Spookley different? How did this help him save the other pumpkins? - *Plan:* Students draw a quick sketch of their pumpkin explaining the shape, size and colors they plan on using. - *Build:* Instruct students to construct their pumpkins using Legos. Remind them to follow their plans and ensure the pumpkin will not roll away. - *Test:* Have students test their pumpkins by placing them in front of the fan. Observe if the pumpkin rolls away or not. - *Redesign or Improve* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it longer, wider, etc. If students are successful, ask them to critically assess which aspects of their solution could be improved. - *Reflection:* Ask students to evaluate their pumpkin's performance. Encourage them to consider what worked well and what could be improved.

Ghost House

Students will design and construct a house using given materials that successfully hold all ten ghosts. They will evaluate the house's effectiveness, considering constraints and trade-offs in the engineering design process.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will be able to utilize the design process to plan, design and build a haunted house for the ten ghosts.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Read the story "Ten Timid Ghosts" - *Plan:* Students draw a quick sketch of their haunted house, explaining what materials they plan on using. - *Build:* Students build houses following their plans. Remind them to ensure the house can hold all ten ghosts. - *Reflection:* Ask students to evaluate the house they build. Encourage them to consider what worked well and what could be improved.

Pumpkin Fence

Students will design and construct a gate using popsicle sticks and clothespins, to hold the five little pumpkins.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and construct a gate using popsicle sticks and clothespins, ensuring it meets specified height and load requirements. They will evaluate the gate's performance, considering constraints and trade-offs in the engineering design process.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Listen to the story "Five Little Pumpkins" - *Plan:* Students draw a quick sketch of their gate, explaining how they are going to use the sticks and clothespins to hold all the pumpkins. - *Build:* Instruct students to construct their gate/fence using popsicle sticks and clothespins. Remind them to follow their revised designs and ensure the gate will hold the pumpkins. - *Test:* Have students test their gates by placing pumpkins on

		top. Observe & record how many pumpkins the gate holds without collapsing. - *Redesign or Improve* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it longer, wider, etc. If students are successful, ask them to critically assess which aspects of their solution could be improved. - *Reflection:* Ask students to evaluate their bridge's performance. Encourage them to consider what worked well and what could be improved.

Turkey Trap

By the end of this lesson, students will design and construct a model of a trap to catch a turkey.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and construct a model of a trap to catch a turkey, using knowledge of system functions and material properties. They will evaluate their designs based on criteria such as effectiveness, and resource use.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Read the story "Run Turkey Run." Ask students how they could build a trap to help the farmer catch the Turkey? Systems and Subsystems: - Explain the concept of systems and subsystems using a real-world example. Relate this to the trap project, identifying the trap as a system with subsystems like the lever, door, and box. - *Plan:* Students draw a quick sketch of their trap, explaining what materials they plan on using. - *Build:* Instruct students to construct their traps. Remind them to follow their designs and ensure the trap will catch the turkey and not hurt them. - *Test:* Have students "test" their traps with the decoy turkeys to show how the subsystems work within the system of the trap. - *Reflection:* Ask students to evaluate their trap's performance. Encourage them to consider what worked well and what could be improved. 1. How did the subsystems of your trap contribute to its overall function?

Elf Shelf

By the end of this lesson, students will design and construct a shelf using given materials that successfully holds the Elf.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and construct a shelf using given materials that successfully holds the Elf. They will evaluate the shelf's effectiveness, considering constraints and trade-offs in the engineering design process.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Ask students to explain the details of the Elf on the shelf. Highlighting how the Elf must not be touched, and usually sits way up high to see everyone better. - *Plan:* Students draw a quick sketch of their shelf, explaining how they are going to use the sticks and Play Doh to hold the Elf. - *Build:* Instruct students to construct their shelf using popsicle sticks and Play Doh. Remind them to follow their designs and ensure the shelf is tall and sturdy. - *Test:* Have students test their shelfs by placing a block "Elf" on top. Observe if the shelf holds the block without collapsing. - *Redesign or Improve* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it stronger, wider, etc. If students are successful, ask them to critically assess which aspects of their solution could be improved. - *Reflection:* Ask students to evaluate their shelf's performance. Encourage them to consider what worked well and what could be improved.

Shady Structure Design Lab

By the end of this lesson, students will be able to create a model of a shady structure to keep a toy penguin cool and explain why the design works well.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and construct a model of a shady structure to keep a toy penguin cool, using knowledge of system functions and material properties. They will evaluate their designs based on criteria such as effectiveness, resource use, and adherence to constraints.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Ask students to brainstorm what they notice about a toy penguin in direct sunlight versus another penguin under a shady structure. - Discuss the properties of translucent and opaque materials. Use examples like sunglasses (translucent) and umbrellas (opaque) to illustrate how these materials affect light and temperature. - Students follow the design process to plan, build, test & reflect on their shady structures. - *Build:* Instruct students to construct their shady structure using available materials. - *Test:* Have students test their structures by placing them under the lamp and adding the toy penguin under the shade. - Reflect: Ask students to evaluate their designs based on effectiveness, resource use, and adherence to constraints. Prompt them to consider what worked well and what could be improved. How did the materials you chose affect the shade/light under your shady structure?

Penguin Sled

By the end of this lesson, students will design and build a sled that travels the fathers while successfully keeps the penguin safe.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will design and build a sled using the given materials that successfully keeps the penguin safe. They will evaluate the sled's effectiveness by measuring how far it travels, considering constraints and trade-offs in the engineering design process.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Explain to students they will be building a Sled out of Legos. Highlighting ideas of how to keep the Penguin safe and what the bottom of the sled should look like to slide best? - *Plan:* Students draw a quick sketch of their sled, explaining how they are going to use the Legos to slide and hold the Penguin. - *Build:* Instruct students to construct their sleds. Remind them to follow their designs and ensure the sled is sturdy and has something to hold the Penguin in place.. - *Test:* Have students test their sleds by sliding them down the ramp. Observe & record how far the sled slides and if the penguin landed safely. - *Redesign or Improve* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it stronger, wider, etc. If students are successful, ask them to critically assess which aspects of their solution could be improved. - *Reflection:* Ask students to evaluate their shelf's performance. Encourage them to consider what worked well and what could be improved.

Leprechaun Trap

By the end of this lesson, students will design and construct a model of a trap to catch a Leprechaun.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Identify the problem and brainstorm potential solutions for building a Leprechaun trap. Develop a plan and begin constructing the trap.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- Warm-up: Read the story “How to Catch a Leprechaun.” Ask students how they could build a trap to catch the Leprechaun? Highlighting ideas of what to use for bait and how Leprechauns can be tricky/sneaky. - *Plan:* Students draw a quick sketch of their trap, explaining what materials they plan on using. - *Build:* Students gather their materials and start constructing traps. Help students focus on what specific parts of their design are working or not working.
Day 2 Conduct tests to evaluate the effectiveness of the trap. Analyze the results and refine the design to enhance performance.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- *Build:* Instruct students to finish constructing their traps. Remind them to follow their designs and ensure the trap will catch the Leprechaun and not hurt them. - *Test:* Have students “test” their traps with the decoy Leprechauns to show how the subsystems work within the system of the trap. - *Reflection:* Ask students to evaluate their designs based on effectiveness, resource use, and adherence to constraints. Prompt them to consider what worked well and what could be improved. Questions to ask could include: What went well? What didn’t work? What would you do differently next time?

Basket for Eggs

Students will design and construct a basket that holds the most plastic eggs.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 Students will utilize the design process to plan, design and construct a basket that holds the most plastic eggs. They will evaluate and refine their designs based on constraints and trade-offs.	8.2.2.ED.1 8.2.2.ED.2 8.2.2.ED.3 8.2.2.ED.4	- *Plan:* Students draw a quick sketch of their basket, explaining how they are going to use the two pieces of paper to hold the most eggs. - *Build:* Instruct students to construct their basket using two pieces of construction paper. Remind them to follow their designs and ensure the basket has a handle. - *Test:* Have students test their baskets by holding the handle and placing eggs inside. Observe & record how many eggs the basket holds without collapsing. - *Redesign or Improve* If their design did not work, they get a chance to improve their project. Ask, what didn't work, how could they make it longer, wider, etc. If students are successful, ask them to critically assess which aspects of their solution could be improved. - *Reflection:* Ask students to evaluate their basket's performance. Encourage them to consider what worked well and what could be improved.

Inclusive concepts
● Students will work in groups or pairs to foster a sense of belonging, respect for others and responsibility. ● This teaches accountability for ensuring everyone feels included, helping students become thoughtful and inclusive community members. ● Encouraging responsibility for personal actions, promoting teamwork and collaboration, and respecting each person's viewpoint.

Biomimicry

Biomimicry Unit Learning Goals
Students will analyze how biomimicry can address societal needs by evaluating a biomimetic product's effectiveness and identifying its environmental impact. They will also describe how biomimicry has led to new technologies that improve daily life. By the end of this lesson, students will be able to explain how nature-inspired designs solve real-world problems and make life better.

Effects of Technology on the Natural World	Nature of Technology	Interaction of Technology and Humans
The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.	Innovation and the improvement of existing technology involves creative thinking.	Human needs and desires determine which new tools are developed. Technology has changed the way people live and work. Various tools can improve daily tasks and quality of life.
8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ETW.3: Describe or model the system used for recycling technology. 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.	8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together. 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value. 8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

Core Instructional Materials	Supplemental Materials
● Building Materials	● Google Slides

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: What is Biomimicry? Students will be able to tell which things are made by nature and which are made by people, and think of ways to make them better for our planet.	8.2.2.ETW.1 8.2.2.ETW.2 8.2.2.ETW.3 8.2.2.ETW.4 8.2.2.NT.1 8.2.2.NT.2 8.2.2.ITH.1 8.2.2.ITH.2 8.2.2.ITH.3 8.2.2.ITH.4 8.2.2.ITH.5	- Warm up: Show students a picture of a bird and an airplane. Ask, "What do you notice about these two pictures?" Ask, "Which one is made by nature? Which one is made by people?" - Introduce Biomimicry: Explain that biomimicry is when people create things by copying ideas from nature. Show a picture of a gecko and a sticky tape. Emphasize the connection between nature and human-made products. - Show students examples and decide if it was made by nature or people: a spider web and a fishing net, a honeycomb and a beehive, a tree and a wooden chair. Discuss how the human-made items are inspired by nature. - Show a picture of a plastic bottle and a reusable water bottle. Ask, "What happens to these when we throw them away?" Discuss how plastic can harm the environment and how reusing items can help. Encourage students to think of ways to improve products to be more like nature, which often recycles and reuses materials. - Ask students to think about a product they use daily, like a backpack. Consider how nature might inspire a better design. Think about how a natural element, like a turtle shell, could inspire a new backpack design. Encourage them to discuss how the turtle shell's features could improve the backpack. - Build: Students use building materials to design a new and improved backpack, mimicking the turtle shell. Students present their new backpacks at the end of class. *(Each grade level has a different set of building materials based on grade.)* - Reflection: As a class, classify the backpack as a human-made product and discuss how the turtle shell is a natural inspiration. Discuss how using natural designs can lead to more sustainable products, emphasizing recycling and reusing materials.

Day 2: Students will be able to tell which things are made by nature and which are made by people, and think of ways to make them better for our planet.	8.2.2.ETW.1 8.2.2.ETW.2 8.2.2.ETW.3 8.2.2.ETW.4 8.2.2.NT.1 8.2.2.NT.2 8.2.2.ITH.1 8.2.2.ITH.2 8.2.2.ITH.3 8.2.2.ITH.4 8.2.2.ITH.5	- Warm Up: Ask students to remember one thing we learned last class that is made by nature and one thing made by people? How can we make a product better for the environment by using ideas from nature? - Product Classification: Hand out images of various products, both natural and human-made. Have students classify them into two groups: "Nature-Made" and "Human-Made." - Environmental Impact Reflection: Ask students to choose one human-made product from their classification and draw a picture of how it could be improved to be more environmentally friendly, inspired by nature. Encourage them to think about recycling and reusing materials. - Nature-Inspired Drawing: Ask students to think of more human made projects they use daily, like a shoe or a lunchbox, Then think about how an animal or plant could inspire a new design. Students will draw a plan of their new design, including labels and details. - Reflection: Students present plans to the class explaining how it has been improved to be more environmentally friendly.
Days 3 & 4: Earth Day Students will know what natural resources are in things we use every day and how recycling helps our planet.	8.2.2.ETW.1 8.2.2.ETW.2 8.2.2.ETW.3 8.2.2.ETW.4	- Warm-up: Ask students, "What do you see when you go outside?" Then, introduce the concept of natural resources by explaining that these are things from nature that we use every day. Prompt them to think about items in the classroom made from natural resources, like paper (trees) or pencils (wood). - Discuss recycling, ask students to describe how a plastic bottle can be reused to make a new bottle. Use a real bottle as a prop. Discuss how recycling helps save natural resources like oil and reduces waste in landfills. - Recycling Process: Students cut and glue the diagram to describe the recycling process. Explain each step: collection, sorting, cleaning, and remanufacturing. Highlight how recycling helps the environment by reducing waste and conserving resources. - Ask students to think about one item they use daily that can be recycled. Give them a moment to consider what natural resource it

		comes from and how recycling it helps the environment. - Recycling Game: Set up a simple sorting game based on grade level. Provide bins labeled "Paper," "Plastic," and "Trash." Give students various items (e.g., paper scraps, plastic bottles, non-recyclable items) to sort into the correct bins. Encourage them to think about the natural resources each item comes from and why recycling is important. - Craft Activity: Provide materials like used paper, cardboard, and plastic lids. Instruct students to create a simple craft, such as a paper hat or a cardboard animal. Emphasize the importance of reusing materials and discuss how this helps conserve resources. - Reflection: Ask students to draw a picture of their favorite recycled item and write a sentence about how recycling helps the Earth. Circulate to support and encourage creativity. Ask students how they felt about reusing materials and what they learned about recycling's impact on the environment.

Inclusive concepts
- Advanced learners: Encourage them to explore additional examples of biomimicry, such as Velcro inspired by burrs or bullet trains inspired by kingfisher birds. Challenge them to think of new products that could be designed using nature as a model. Allow them to present their ideas to the class, explaining the natural inspiration and potential environmental benefits. Encourage them to explore additional natural resources and their uses. Challenge them to think of innovative ways to recycle or reuse items. Allow them to lead a small group discussion on the environmental impact of recycling. - Striving learners: Provide visual aids and simplified explanations to reinforce the concept of biomimicry. Use tangible examples, like showing a piece of Velcro and a burr, to make connections clearer. Pair them with peers for collaborative activities to support understanding. Offer additional guidance during classification tasks and environmental impact discussions. Provide visual aids and hands-on examples to reinforce concepts. Pair them with a peer for support during activities. Simplify instructions and offer step-by-step guidance during the recycling game and craft activity.

Algorithms & Programming

Unit Learning Goals	
Algorithms & Programming Individuals develop and follow directions as part of daily life. A sequence of steps can be expressed as an algorithm that a computer can process. Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images). Computers follow precise sequences of steps that automate tasks. Complex tasks can be broken down into simpler instructions, some of which can be broken down even further. People work together to develop programs for a purpose, such as expressing ideas or addressing problems. The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors. 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks. 8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information. 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks. 8.1.2.AP.4: Break down a task into a sequence of steps. 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes. 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.	**Data & Analysis** Individuals collect, use, and display data about individuals and the world around them. Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved. Data can be used to make predictions about the world. 8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats. 8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete data using a computing device. 8.1.2.DA.3: Identify and describe patterns in data visualizations. 8.1.2.DA.4: Make predictions based on data using charts or graphs.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet Kodable Field Guide Kodable Scope & Sequence	● Websites: Kodable https://www.kodable.com/ ● Google Slides

Kodable

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Beginner Levels		
Day 1: Kodable Basics ● Introduce foundational coding concepts & game mechanics ● 2 Lessons & 11 Activities	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Model and practice logging in to Kodable - Intro to mechanics (Drag and drop) - Sequence (Put the arrows in the correct order) - De-Bugging (Identify & fix the problem) - Game progression (Students earn chest and coins to unlock new features)
Day 2: Cloudhaven ● Students will master the concept of sequence, putting code in the correct order ● Create & Solve programming problems, sequence mastery, test & debug code ● 1 Video, 8 Lessons & 12 Activities	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Review and practice logging in to Kodable. - Watch the intro video as a class, then model the first lesson together. - Review Vocabulary “Sequence” & “DeBugging” - Students practice the lessons on their own.
Day 3: Smeeborg ● Students use arrow commands to write the correct code to move their character ● Create and solve programming problems ● Explain programming processes ● Test and debug code ● 2 Videos, 6 Lessons & 10 Activities	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Review and have students log in to Kodable independently. - Watch the intro video as a class, then model the first lesson together. Review “Sequence” and introduce “Conditions.” - Students practice the lessons on their own.
Intermediate Levels		
Day 4: Beach Cleanup ● Students are presented as a series of challenges, each with a different layout of litter. ● Create and solve programming problems ● Visually represent programming problems ● Explain programming processes ● Test and debug code	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Have students log in to Kodable independently. - Review “Sequence” and “Conditions.” Then model the first lesson together. - Discuss the Environmental Science connections (taking care of environment and keeping it clean) - Students practice the lessons on their own.

• 1 Lessons & 6 Activities		
Day 5: Fuzz Builder • Students create and use their own custom Fuzzes by applying concepts learned throughout the Kodable Courses. • Create a Fuzz inspired by a hero and write a story about them. • Design a Fuzz that resembles themselves. • Spin the wheel to collect 5 new Fuzz items.	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Students log in to Kodable independently. - Introduce “Coding Languages:” Students use the Kode Editor to access languages Javascript, Swift or C#. - Introduce “Function” & “Properties” vocabulary. - Students customize a fuzzes' body color, eyes, mouth and accessories using “Functions” and “Properties”.
Day 6: Maze Maker • Students apply their knowledge of basic coding concepts learned previously. • Students code, decorate, solve and share their own maze levels.	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Students log in to Kodable independently. - Review vocabulary from the previous lessons - Highlight that there needs to be a starting & ending point on the maze - Make sure there is at least one path from start to finish - Based on progress, students unlock skill appropriate mazes that they can code and interact with. Challenge students to: - Create a maze that contains 5 turns and 15 decorations. - Design a maze in that is in two different shapes. - Play and "react" to 3 classmates' mazes.
Day 7: Aquatopia • Students will be able to identify and use patterns and repeats in code, called Loops. • Create and solve programming problems • Visually represent programming problems • Patterns and repeats • Test and debug code • 1 Video, 6 Lessons & 10 Activities	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Students log in to Kodable independently. - Watch the intro video as a class. - Introduce new vocabulary “Pattern Recognition” & “Loops” - Model the first lesson together. - Students practice the lessons on their own.
Day 8: Asteroid Belt • Students learn about variables. • Students put code in the correct order, unlocking secret tunnels to allow them access to additional mazes and collect parts to build their own video games in Game Designer. • Differentiate between variable types	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	Students log in to Kodable independently. - Watch the intro video as a class. - Introduce new vocabulary “Booleans” “Array Variables” “Characters” & “Equality Operator” - Model the first lesson together. - Students practice the lessons on their own.

• Understand the role of variables in programming • 3 Videos, 9 Lessons & 7 Activities		
Day 9: Pets • Students program robots, called Carebots, to automate everyday pet chores such as feeding, grooming and walking. •	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6: 8.1.2.DA.1: 8.1.2.DA.2: 8.1.2.DA.3: 8.1.2.DA.4:	- Students log in to Kodable independently. - Review previous vocabulary “Conditions & Functions” & “Loops” - Introduce new vocabulary “Automation” - Model how to use the KODE editor together. - Students practice the lessons on their own. Challenge students to: - Keep all of their pets happy - Charge a CareBot - Decorate their Pet's home with at least five items
Advanced Levels		
Day 10: Moon Garden • Students learn about functions in code. • Students will apply introductory concepts to complete these tricky levels. • Create and solve programming problems • Functions and Pattern decomposition • Application of sequence, conditions, loops and functions • Test and debug code • 1 Video, 6 Lessons &10 Activities	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6:	- Students log in to Kodable independently. - Review previous vocabulary “Functions” - Watch the intro video as a class. - Model the first lesson together. - Students practice the lessons on their own.
Day 11: Game Designer • Customize a unique blaster game by modifying variables such as name, background and difficulty level. • To unlock Game Designer, students need to reach Kode rank 4.	8.1.2.AP.1: 8.1.2.AP.2: 8.1.2.AP.3: 8.1.2.AP.4: 8.1.2.AP.5: 8.1.2.AP.6: 8.1.2.DA.1: 8.1.2.DA.2: 8.1.2.DA.3: 8.1.2.DA.4:	- Students log in to Kodable independently. - Review previous vocabulary “Properties” & “Variables” - Watch the intro video as a class. - Model and example together. - Students practice the lessons on their own. Challenge students to: - Unlock more custom game options by playing levels in Asteroid Belt. - Change 3 different variables in their game. What is the result of their code change? - Play and beat two classmates' games.

Inclusive concepts
● Students will work in groups or pairs to foster a sense of belonging, respect for others and responsibility. ● This teaches accountability for ensuring everyone feels included, helping students become thoughtful and inclusive community members. ● Encouraging responsibility for personal actions, promoting teamwork and collaboration, and respecting each person's viewpoint.

Networks and the Internet

Unit Learning Goals	
Networks and the Internet Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide. Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access. 8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network. 8.1.2.NI.2: Describe how the Internet enables individuals to connect with others worldwide. 8.1.2.NI.3: Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others. 8.1.2.NI.4: Explain why access to devices need to be secured.	**Computing Systems** Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally. A computing system is composed of software and hardware. Describing a problem is the first step toward finding a solution when computing systems do not work as expected. 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences. 8.1.2.CS.2: Explain the functions of common software and hardware components of computing systems. 8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology.

Core Instructional Materials	Supplemental Materials
● Crafting Materials	● Google Slides

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: Students will know how computers help us connect with others and why it's important to keep our devices safe with strong passwords.	8.1.2.NI.1: 8.1.2.NI.2: 8.1.2.CS.1:	- Warm Up: Show a picture of a computer with various icons representing communication (e.g., email, video call, chat). Ask students, "What do you wonder about how these icons help us connect with others?" Record their responses on the board to highlight the different ways computers connect us to people and information. - Read-Aloud Story: (The character uses a computer to connect with a friend in another country). Emphasize how the computer helps them share ideas and learn about each other's cultures. - Demonstrate Network Connection: Show a simple diagram of a computer network. Explain how computers connect to each other and the internet. Use a real-world example, like video calling a family member. - Connection Activity: Each student picks a device (computer, tablet, phone, etc.) then “connects” their device to another location using colored string. For example: Connect a computer to the library to get a book. Connect a tablet to a faraway friend to send a picture. Connect a phone to a park to find directions. When a connection is made, give the student a token or sticker to show they’ve successfully shared or received information. - Reflection: Ask students: “What did your computer do?” “Who did you connect with?” “How did it help you?”
Day 2: Students will be able to discuss the importance of passwords in keeping devices secure and ways to create a strong password.	8.1.2.NI.3: 8.1.2.NI.4:	- Introduce Passwords: Discuss the importance of passwords in keeping devices secure. Use a lock-and-key analogy. Demonstrate creating a strong password using a mix of letters, numbers, and symbols. Ask students to think of a simple password and then make it stronger. Discuss why sharing passwords is not safe. - Guide students to practice creating strong passwords. Ask students to think of a simple password they might use, like

		their name or "1234". Give them a moment to consider why this might not be secure. - Have students pair up and discuss how they could make their passwords stronger. Encourage them to use a mix of letters, numbers, and symbols. Discuss why these are stronger and safer. - Ask students why it's important to keep passwords private and secure. Reinforce the concept of security in connecting devices to networks. - Craft Activity: Provide students with materials to create a "Password Shield." Design a shield that represents a strong password. Encourage them to use symbols, numbers, and letters creatively. Remind them that the shield symbolizes protection for their devices.
Day 3: Students will be able to tell what different computer parts do and talk about simple problems they might have.	8.1.2.CS.1: 8.1.2.CS.2: 8.1.2.CS.3:	- Warm Up: Ask students: How do computers help us talk to people far away? Why is it important to have a strong password for your computer? - Introduce “Hardware” and “Software”: Explain that a computer system is made up of two main parts: hardware and software. Use real-world examples. - Explore Functions: Discuss the basic functions of each component. For hardware, explain how a monitor displays images, a keyboard inputs text, and a mouse helps navigate. For software, describe how an app can be used to draw pictures or play music. Use simple, relatable analogies, like comparing a keyboard to a pencil for writing. - Build a Computer: Give each student a paper cutout of a computer system, including separate pieces for hardware (monitor, keyboard, mouse) and software (icons, apps). - Game: Students play a matching game to match pictures of hardware and software components with their functions. - Reflection: What is one piece of hardware you learned

		about today? Can you name a software problem we talked about?

Inclusive concepts
● Students will work in groups or pairs to foster a sense of belonging, respect for others and responsibility. ● This teaches accountability for ensuring everyone feels included, helping students become thoughtful and inclusive community members. ● Encouraging responsibility for personal actions, promoting teamwork and collaboration, and respecting each person's viewpoint. **Differentiation guide** - Advanced learners: Encourage them to explore how different devices connect to networks. Challenge them to explain the role of routers and modems in simple terms. Allow them to create a short presentation or drawing to share with the class. - Striving learners: Provide additional support with visual aids, such as diagrams showing how devices connect to the internet. Use simple language and repeat key concepts. Pair them with a peer for collaborative activities to reinforce understanding.