Crest Memorial School Curriculum and Pacing Guide	
Grade: 6, 7 & 8	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

- 9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
- 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.
- 9.4.8.TL.4: Synthesize and publish information about a local or global issue or event.
- 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

21st Century Skills

• 9.4.8.CI.2: Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
• 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).
• 9.4.8.CI.4: Explore the role of creativity and innovation in career pathways and industries.
• 9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
• 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products
• 9.4.8.IML.1: Critically curate multiple resources to assess the credibility of sources when searching for information.

Career Education

• 9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest
• 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.
• 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
• 9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.
• 9.2.8.CAP.6: Compare the costs of postsecondary education with the potential increase in income from a career of choice.
• 9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.
• 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.

Interdisciplinary Connection

Science - NJSLS (Engineering Design)
• 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.

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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Pacing Guide

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Impacts of Technology on Ethics & Culture

Unit Learning Goals
Impacts of Technology on Ethics & Culture Explore how advancements in computing technology can change individuals' behaviors. Describe how society is faced with trade-offs due to the increasing globalization and automation that computing brings Examine the technological disparities have consequences for public health and prosperity. 8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options. 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. 8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies. 8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Google Slides ● Teacher made planning paper

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1 How does old vs. new technology affect our life (Good & Bad)?	8.1.8.IC.1: 8.1.8.IC.2: 8.2.8.EC.1: 8.2.8.EC.2:	- Sort cards to match the invention to its corresponding innovation (record player - ipod) - Class discussion: think about a technology invention or innovation that has most impacted your life (good or bad) - Independently, use the planning paper to research the technology invention focusing on the past, present and future
Day 2 How has technology advanced?	8.1.8.IC.1: 8.1.8.IC.2: 8.2.8.EC.1: 8.2.8.EC.2:	- Independently, use the planning paper to continue researching a technology invention - Create a presentation with information from research focusing on the evolution of the technology choice

Day 3 How do advancements in technology change our behaviors (Good & Bad)?	8.1.8.IC.1: 8.1.8.IC.2: 8.2.8.EC.1: 8.2.8.EC.2:	- Present research projects - Class discussion focusing on the positive and negative effects various technologies have on society
Day 4 What compromises have we made for advances in technology? What are the consequences for technological inconsistencies?	8.1.8.IC.1: 8.1.8.IC.2: 8.2.8.EC.1: 8.2.8.EC.2:	- End of unit assessment - Student reflection questions: Compare the trade-offs associated with technologies that affect our lives everyday Describe issues of bias and accessibility in the design of existing technologies. Explain issues that may arise from the use of new technologies and product development

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.

Engineering Design

Unit Learning Goals

Engineering Design
Engineering design is a systematic, creative, and iterative process used to address local and global problems. The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes. Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.

8.2.8.ED.1: Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer. 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem. 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 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. 8.2.8.ED.5: Explain the need for optimization in a design process. 8.2.8.ED.6: Analyze how trade-offs can impact the design of a product. 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).	**Apple Wrecking Ball** Students will design and construct a wrecking ball mechanism using the Engineering Design process, and evaluate its effectiveness by measuring the number of markers knocked down in a controlled test. **Bucket Tower** Students will apply the engineering design process to construct a bucket tower that can hold the maximum number of items, and evaluate the stability and capacity of their designs through testing. **Pulley** Students will be able to build a pulley system that can pull up as many (pumpkins/cubes) as possible and figure out ways to improve it after testing is complete. **Boat Float** Students will design and construct a boat using given materials that successfully floats and supports an increasing number of pennies without sinking. **Egg Drop** By the end of this lesson, students will be able to build a “Lunar Lander” that holds and protects an egg from a drop. Then students will figure out what design works best by testing the lander.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Building Supplies ● Google Slides

Apple Wrecking Ball Design Lab

[Apple Annihilator Slides]

By the end of this lesson, students will be able to build a wrecking ball that can knock down as many markers as possible and figure out ways to make it even better after testing it.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Apple Annihilator Day 1 Identify the problem and brainstorm potential solutions for building a wrecking ball.	8.2.8.ED.1 8.2.8.ED.2 8.2.8.ED.3	*1. Ask (Activate prior knowledge and gathering information)* Before engineers can plan and design a solution to a problem, they first need to totally understand the problem and know what all of the constraints are. Define the word constraint and review the list of constraints for this activity. Each grade level has a different budget for supplies and level of constraints for the project. Look at some examples and examine what students think would work well and what they would improve on. *2. Plan* Students write and sketch their ideas and solutions. Drawings should be detailed and labeled. Once each student has their ideas sketched out, they can take turns sharing their ideas with their group. This helps ensure that each student has ideas to contribute and no one student's ideas are immediately chosen. This is a good time to emphasize that often the best solution is a blending of ideas.
Apple Annihilator Days 2-3 Develop a plan and begin constructing the wrecking ball	8.2.8.ED.4 8.2.8.ED.7	*3. Create* Students gather their materials and start constructing wrecking ball towers. As the students create, circulate among them to evaluate how they are progressing. Help students focus on what specific parts of their design are working or not working.
Apple Annihilator Days 4-5 Conduct tests to evaluate the effectiveness of the wrecking ball in knocking down markers. Analyze the results and refine the design to	8.2.8.ED.4 8.2.8.ED.5 8.2.8.ED.6	*4. Test* Students set up markers on the designated spots in front of their designed wrecking balls. They get one swing to see how many markers they can knock down. *5. Redesign or Improve* If their design did not work, they get a chance to improve their

enhance performance.		project to see if it will knock down more markers. 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. *6. Reflection* It is helpful for the students to reflect on their experience once the activity is over. Questions to ask could include: What went well? What didn't work? What would you do differently next time? Students answer reflection questions online, then we review as a class.

Bucket Tower Design Lab

Bucket Tower Slides
By the end of this project, students be able to design and build a tower with buckets that can hold as many items as possible and test to see how well my tower works.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Bucket Tower Day 1 Identify the problem and brainstorm potential solutions for building a bucket tower	8.2.8.ED.1 8.2.8.ED.2 8.2.8.ED.3	*1. Ask (Activate prior knowledge and gathering information)* Before engineers can plan and design a solution to a problem, they first need to totally understand the problem and know what all of the constraints are. Define the word constraint and review the list of constraints for this activity. Each grade level has a different budget for supplies and level of constraints for the project. Look at some examples and examine what students think would work well and what they would improve on. *2. Plan* Students write and sketch their ideas and solutions. Drawings should be detailed and labeled. Once each student has their ideas sketched out, they can take turns sharing their ideas with their group. This helps ensure that each student has ideas to contribute and no one student's ideas are immediately chosen. This is a good time to emphasize that often the best solution is a blending of ideas.

Bucket Tower Days 2-3 Develop a plan and begin constructing the bucket tower	8.2.8.ED.4 8.2.8.ED.7	*3. Create* Students gather their materials and start constructing a bucket tower. As the students create, circulate among them to evaluate how they are progressing. Help students focus on what specific parts of their design are working or not working.
Bucket Tower Days 4-5 Conduct tests to evaluate the effectiveness of the bucket tower holding the most items. Analyze the results and refine the design to enhance performance.	8.2.8.ED.4 8.2.8.ED.5 8.2.8.ED.6	*4. Test* Students measure how far off the table their tower is, then count how many objects their bucket can hold. *5. 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. *6. Reflection* It is helpful for the students to reflect on their experience once the activity is over. Questions to ask could include: What went well? What didn't work? What would you do differently next time? Students answer reflection questions online, then we review as a class.

Pulley System Design Lab

Pulley Simple Machine Slides

By the end of this lesson, students will be able to build a pulley system that can pull up as many (pumpkins/cubes) as possible and figure out ways to improve it after testing is complete.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Pulley Day 1 Identify the problem and brainstorm potential solutions for building a wrecking ball.	8.2.8.ED.1 8.2.8.ED.2 8.2.8.ED.3	*1. Ask (Activate prior knowledge and gathering information)* Before engineers can plan and design a solution to a problem, they first need to totally understand the problem and know what all of the constraints are. Research and review simple machines, how they make work easier for us. Each grade level has a different budget for supplies and level of

		constraints for the project. Look at some examples and examine what students think would work well and what they would improve on. *2. Plan* Students write and sketch their ideas and solutions. Drawings should be detailed and labeled. Once each student has their ideas sketched out, they can take turns sharing their ideas with their group. This helps ensure that each student has ideas to contribute and no one student's ideas are immediately chosen. This is a good time to emphasize that often the best solution is a blending of ideas.
Pulley Days 2-3 Develop a plan and begin constructing the Pulley	8.2.8.ED.4 8.2.8.ED.7	*3. Create* Students gather their materials and start constructing Pulley towers. As the students create, circulate among them to evaluate how they are progressing. Help students focus on what specific parts of their design are working or not working.
Pulley Days 4-5 Conduct tests to evaluate the effectiveness of the pulley system. Analyze the results and refine the design to enhance performance.	8.2.8.ED.4 8.2.8.ED.5 8.2.8.ED.6	*4. Test* Students set up the pulley on the designated spots on the tables. They get one chance to see how many objects they can pull up with their design. *5. Redesign or Improve* 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. *6. Reflection* It is helpful for the students to reflect on their experience once the activity is over. Questions to ask could include: What went well? What didn't work? What would you do differently next time? Students answer reflection questions online, then we review as a class.

Boat Float Design Lab

Build a Boat Slides

By the end of this lesson, students will be able to build a boat that not only floats but can also carry as many pennies as possible, and students will figure out what design works best by testing and improving the boat.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Boat Float Day 1 Identify the problem and brainstorm potential solutions for building a boat that floats.	8.2.8.ED.1 8.2.8.ED.2 8.2.8.ED.3	*1. Ask (Activate prior knowledge and gathering information)* Before engineers can plan and design a solution to a problem, they first need to totally understand the problem and know what all of the constraints are. Define the word constraint and review the list of constraints for this activity. Each grade level has a different budget for supplies and level of constraints for the project. Look at some examples and examine what students think would work well and what they would improve on. *2. Plan* Students write and sketch their ideas and solutions. Drawings should be detailed and labeled. Once each student has their ideas sketched out, they can take turns sharing their ideas with their group. This helps ensure that each student has ideas to contribute and no one student's ideas are immediately chosen. This is a good time to emphasize that often the best solution is a blending of ideas.
Boat Float Days 2-3 Develop a plan and begin constructing the boat.	8.2.8.ED.4 8.2.8.ED.7	*3. Create* Students gather their materials and start constructing boats. As the students create, circulate among them to evaluate how they are progressing. Help students focus on what specific parts of their design are working or not working.
Boat Float Days 4-5 Conduct tests to evaluate the effectiveness of the boat holding the most pennies. Analyze the results and refine the design to enhance performance.	8.2.8.ED.4 8.2.8.ED.5 8.2.8.ED.6	*4. Test* Students place boats into tubs of water to see if their boat floats. Then add pennies to see how many pennies their boat can hold. *5. Redesign or Improve* If students are successful, ask them to critically assess which aspects of their solution could be improved.

		6. Reflection It is helpful for the students to reflect on their experience once the activity is over. Questions to ask could include: What went well? What didn't work? What would you do differently next time? Students answer reflection questions online, then we review as a class.

Egg Drop Design Lab

Egg Drop Slides - Egg Drop Slides 2
By the end of this lesson, students will be able to build a "Lunar Lander" that holds and protects an egg from a drop. Then students will figure out what design works best by testing the lander.

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Egg Drop Day 1 Identify the problem and brainstorm potential solutions for building a lander that protects the egg.	8.2.8.ED.1 8.2.8.ED.2 8.2.8.ED.3	*1. Ask (Activate prior knowledge and gathering information)* Before engineers can plan and design a solution to a problem, they first need to totally understand the problem and know what all of the constraints are. Research and discuss the shape and structure of the equipment that has landed on the moon. How can we use these designs to help us project the egg and land safely? Each grade level has a different budget for supplies and level of constraints for the project. Look at some examples and examine what students think would work well and what they would improve on. *2. Plan* Students write and sketch their ideas and solutions. Drawings should be detailed and labeled. Once each student has their ideas sketched out, they can take turns sharing their ideas with their group. This helps ensure that each student has ideas to contribute and no one student's ideas are immediately chosen. This is a good time to emphasize that often the best solution is a blending of ideas.

Egg Drop Days 2-3 Develop a plan and begin constructing the boat.	8.2.8.ED.4 8.2.8.ED.7	*3. Create* Students gather their materials and start constructing lunar landers. As the students create, circulate among them to evaluate how they are progressing. Help students focus on what specific parts of their design are working or not working.
Egg Drop Days 4-5 Conduct tests to evaluate the effectiveness of the lander. Analyze the results and refine the design to enhance performance.	8.2.8.ED.4 8.2.8.ED.5 8.2.8.ED.6	*4. Test* - 6th Grade: Teacher drops landers from a ladder - 7th & 8th Grade: Teacher drops landers from the roof of the school. *5. Redesign or Improve* If students are successful, ask them to critically assess which aspects of their solution could be improved. *6. Reflection* It is helpful for the students to reflect on their experience once the activity is over. Questions to ask could include: What went well? What didn't work? What would you do differently next time? Students answer reflection questions online, then we review as a class.

Inclusive concepts
● Explain any character education effort where you are encouraging inclusivity and culture competency.

Biomimicry

Biomimicry Unit Learning Goals		
Effects of Technology on the Natural World	**Nature of Technology**	**Interaction of Technology and Humans**
How can we better utilize resources wisely to have positive effects on the environment and society? Why do some technological decisions involve trade- offs between environmental and economic needs, while others have positive effects for both the economy and environment?	Sometimes a technology developed for one purpose is adapted to serve other purposes. How have engineers used a systematic process of creating or modifying technologies that is fueled and constrained by physical laws and economic resources? Scientists use systematic investigation to understand the natural world. How can we use nature to help improve designs?	How has the interaction of new technology changed society, leading to the creation of new needs and wants? What consequences have the new needs and wants created? Using Biomimicry examples, what improvements in technology have been created to make the completion of tasks easier, safer, and/or more efficient?
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. 8.2.8.ETW.2: Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital). 8.2.8.ETW.3: Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact. 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.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.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues. 8.2.8.ITH.2: Compare how technologies have influenced society over time. 8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system. 8.2.8.ITH.4: Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact. 8.2.8.ITH.5: Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Google Slides Nest & Shady Structure Slides Wind Turbine

Daily Targets	NJSLS Performance Expectations	Instructional Activities

Day 1: Investigate Biomimicry and be able to answer the questions: 1. What is Biomimicry? 2. What are some examples, specifically technological products? 3. Why do we copy nature? 4. How have the mimicked designs impacted our lives?	8.2.8.ETW.3 8.2.8.NT.1 8.2.8.NT.2 8.2.8.NT.4	Explore the sources on the Google form to build your background knowledge about Biomimicry. Then, answer the questions using examples of how living things were copied in the designs. 6th: Google Form - Basic introduction and examples 7th: Google Form - Focus on industrial engineering ideas 8th: Google Form - Focus on insects and robotics Discuss answers to questions, highlighting the following topics: - Examine the design of a product that has negative impacts - Brainstorm ideas for a malfunctioning invention using biomimicry - Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.
Day 2: 6th & 7th: What specific details from living things have we utilized to either create or streamline the design of an invention? 8th: What are some environments that are too dangerous for humans? How can we use Biomimicry to design a robot to better travel on the terrain?	8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3	Warm up: Biomimicry memory matching online game 6th & 7th: Google Slides; match Biomimicry examples, pick two and research what was copied from nature. Discuss how these inventions have influenced society over time. 8th: Google Slides; brainstorm list of different types of terrain and living things. Pick a terrain and living thing to inspire a robot to travel in an environment unsafe for humans. Then, evaluate the impact of sustainability of the development of the design.
Day 3: Students will use Biomimicry to identify designs that reduce the negative impacts on Earth. Then, compare the inventions, explaining factors that make it appropriate and sustainable in one area but not in another.	8.2.8.ITH.4: 8.2.8.ITH.5	Present slides and discuss pros and cons to copying living things, highlighting the following topics: - Identify designs that reduce the negative impacts on Earth. - Compare the inventions, explaining factors that make it appropriate and sustainable in one area but not in another.
Days 4 & 5: Utilize Biomimicry to design a new product. Analyze the design of a structure/robot and develop solutions to upcycle it into a new product.	8.2.8.ETW.1 8.2.8.ETW.2 8.2.8.ETW.3	Students will use Biomimicry examples to design, build and test the following projects: Google Slides 6th: Shady Structure: Think about living things that naturally create shade. How can we mimic them to keep the most people shaded and cool in a hot climate?

Discuss the pros and cons that the impact of modifying resources in a product has on the system.		7th: Birds Nest: Research various bird nest designs. How do they keep the nest together and functional? How can you hold the most eggs? 8th: Create prototype for terrain robot, (Pick a terrain and living thing to inspire a robot to travel in an environment unsafe for humans. Then, evaluate the impact of sustainability of the development of the design.)
Days 6 - 8: Identify a list of human issues negatively impacting nature and civilization. Highlight climate change causes and create a list of technologies that have been designed to reduce the negative consequences 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.ITH.4 8.2.8.ITH.5 8.2.8.ETW.2 8.2.8.ETW.4	Day 6: 6th: Brainstorm list of human issues 7th: Climate change questions 8th: Robot Prototypes Day 7: Present Research Slides Day 8: Jeopardy Game, Gimkit, or Blooket with review questions
Day 9 & 10: Compare and contrast the original windmills to current wind turbines. Illustrate how they have been modified to meet our new demand for clean energy. Analyze the design of current wind turbines that negatively impacts the environment or society and use biomimicry to develop possible solutions to lessen its impact.	8.2.8.NT.1 8.2.8.NT.2 8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ETW.3 8.2.8.ETW.4	Wind Turbine Challenge Wind Turbine How can we copy the efficiency of nature to build better turbines? Think about living things that are naturally aerodynamic. How can we mimic them? Use the corresponding grade level slides to answer questions on the planning page. Pick at least two examples of Biomimicry to utilize in wind turbine design. Students work with parenter to design, build and present wind turbines.

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.

Algorithms & Programming

Unit Learning Goals
Algorithms & Programming "Individuals design algorithms that are reusable in many situations. Algorithms that are readable are easier to follow, test, and debug." Programmers create variables to store data values of different types and perform appropriate operations on their values. Control structures are selected and combined in programs to solve more complex problems. 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. 8.1.8.AP.1: Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode. 8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values. 8.1.8.AP.3: Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 8.1.8.AP.4: Decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs. 8.1.8.AP.5: Create procedures with parameters to organize code and make it easier to reuse. 8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users. 8.1.8.AP.7: Design programs, incorporating existing code, media, and libraries, and give attribution. 8.1.8.AP.8: Systematically test and refine programs using a range of test cases and users. 8.1.8.AP.9: Document programs in order to make them easier to follow, test, and debug. **Computing Systems** The study of human–computer interaction can improve the design of devices and extend the abilities of humans. Software and hardware determine a computing system's capability to store and process information. The design or selection of a computing system involves multiple considerations and potential trade-offs. Troubleshooting a problem is more effective when knowledge of the specific device along with a systematic process is used to identify the source of a problem. 8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices. 8.1.8.CS.2: Design a system that combines hardware and software components to process data. 8.1.8.CS.3: Justify design decisions and explain potential system trade-offs. 8.1.8.CS.4: Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.

Data & Analysis

"People use digital devices and tools to automate the collection, use, and transformation of data.
The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data."

Data is represented in many formats. Software tools translate the low-level representation of bits into a form understandable by individuals. Data is organized and accessible based on the application used to store it.

The purpose of cleaning data is to remove errors and make it easier for computers to process.
Computer models can be used to simulate events, examine theories and inferences, or make predictions.

8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.
8.1.8.DA.2: Explain the difference between how the computer stores data as bits and how the data is displayed.
8.1.8.DA.3: Identify the appropriate tool to access data based on its file format.
8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5: Test, analyze, and refine computational models.
8.1.8.DA.6: Analyze climate change computational models and propose refinements.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet Teacher Materials Ozaria Pacing Guide Ozaria Scope & Sequence Ozaria Slides	● Websites: Code Combat & Ozaria https://www.ozaria.com/ ● Google Slides

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: Model daily processes by creating and following algorithms to complete tasks. Individuals design algorithms that are reusable in many situations. Algorithms that are readable are easier to follow, test, and debug.	8.1.8.AP.1	- Ozaria Teacher Slides Chapter 1 - Model and discuss the steps to build a house, follow directions and bake a cake (slides 12-14) - Ozaria: logging in, navigating - Independent practice (first 8 levels) - Extension activity for early finishers
Day 2: Control structures are selected and combined in programs to solve more complex problems. Create programs with sequences and simple loops to accomplish tasks. Debug errors in an algorithm or program that includes sequences and simple loops. 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.	8.1.8.AP.1 8.1.8.AP.3 8.1.8.AP.4 8.1.8.AP.5	Ozaria Chapter 1; Module 1, Lessons 1-4 - Review algorithms and sequences - Introduce loops and loops syntax - Independent practice levels Understand how to use sequences and loops in programs Solve a problem using a sequence of code " Decompose a problem into subproblems" Use a troubleshooting guide to identify and fix problems Debug programs that contain loops Debug programs that contain syntax and logic errors Use a troubleshooting guide to identify and fix problems
Day 3: Capstone Project: Loops Individuals design and test solutions to identify problems taking into consideration the diverse needs of the users and the community.	8.1.8.AP.6 8.1.8.AP.7 8.1.8.AP.8 8.1.8.AP.9	Design a game that involves sequenced commands to build obstacles, revising a loop to program a boss's movement, and customizing art assets with methods and parameters. Develop programs using planning tools
Day 4: Explorations: Impacts of Computing	8.1.8.IC.1 8.1.8.IC.2 8.2.8.EC.1	Identify relevant problems and how they are solved using computer science/various computing devices.

	8.2.8.EC.2	
Day 5: Break down a task into a sequence of steps. Debug errors in an algorithm or program that includes sequences and simple loops. Sequences and Algorithms, Syntax	8.1.8.AP.3 8.1.8.AP.4	Ozaria Chapter 2; Module 1, Lesson 1 Modify sequences to complete a goal. Write algorithms using valid syntax to complete defined goals. Decompose a problem into subproblems Explain what syntax is and why it is important. Define the term algorithm.
Day 6: Debugging Explorations: Impacts of Computing	8.1.8.AP.1 8.1.8.AP.3 8.1.8.AP.4 8.1.8.IC.1 8.1.8.IC.2 8.2.8.EC.1 8.2.8.EC.2	Ozaria Chapter 2; Module 2, Lessons 1-2 Understand how and why to use sequences and loops in programs Solve a problem using a sequence of code Identify and fix code errors and logic problems. Define and differentiate between code errors and logic problems. Explain the importance of debugging and iteration in the programming process. Understand the impact computers have on the world
Day 7: Variables (Creation and Updating) Explorations: Networks and the Internet	8.1.8.AP.2 8.1.8.NI.1 8.1.8.NI.2 8.1.8.NI.3 8.1.8.NI.4	Ozaria Chapter 2; Module 3, Lessons 1-4 Explain what a variable is and why variables are useful in developing programs. Define and modify variables to help accomplish a goal. Use clear variable names. Students will describe how the internet works: types of networks, packets, protocols, internet privacy Understand how data is transmitted
Days 8 & 9: Describe a program's sequence of events, goals, and expected outcomes. Conditionals and Boolean Logic	8.1.8.AP.1 8.1.8.AP.3 8.1.8.AP.4 8.1.8.AP.5	Ozaria Chapter 2; Module 4, Lessons 1-3 Give examples of conditional logic in everyday life. Understand how and why to use sequences and loops in programs Solve a problem using a sequence of code

		Explain Boolean logic and evaluate simple Boolean expressions. Explain how conditions and decision points result in different algorithm execution. Use if and if/else statements to provide varied paths based on conditional logic. Use pseudocode as a tool to plan code and understand algorithms.
Day 10: Explorations: Computing Systems	8.1.8.CS.1 8.1.8.CS.2	Ozaria Chapter 2; Module 4, Lessons 4 Identify the parts of a computer and understand their purposes
Day 11: Capstone Methods Assessment/Capstone	8.1.8.AP.1 8.1.8.AP.2 8.1.8.AP.3 8.1.8.AP.4 8.1.8.AP.5 8.1.8.AP.6 8.1.8.AP.7 8.1.8.AP.8 8.1.8.AP.9	Ozaria Chapter 2; Module 5, Lessons 1 Use a defined set of methods to create simple narrative sequences. Define conditions and resulting program functionality using user input. Students demonstrate mastery of algorithms, debugging, variables, conditionals. Students create a storytelling project that provides an opportunity to showcase their creativity.
Day 12: Debug errors in an algorithm or program that includes sequences and simple loops. Debugging, Data Types, Objects, Variable Arithmetic Explorations: Computing Systems	8.1.8.AP.2 8.1.8.AP.4 8.1.8.AP.6 8.1.8.CS.2 8.1.8.CS.3 8.1.8.CS.4	Ozaria Chapter 3; Module 1, Lessons 1-3 Identify and fix code errors and logic problems. Differentiate between objects, methods, and arguments. Update the value of variables using arithmetic operations. Explain the difference between the basic data types. Understand how hardware and software work together and the results achieved
Day 13: For Loops	8.1.8.AP.1 8.1.8.AP.2 8.1.8.AP.3 8.1.8.AP.4	Ozaria Chapter 3; Module 2, Lesson 1 Simplify code using for loops and repeated actions. Update the values of variables within loops.

		Include loops in sequence with other types of code statements.
Days 14 & 15: Nesting, Nested Loops, Nested Structures Explorations: Cybersecurity	8.1.8.AP.1 8.1.8.AP.2 8.1.8.AP.3 8.1.8.AP.4 8.1.8.IC.1 8.1.8.IC.2 8.2.8.EC.1 8.2.8.EC.2	Ozaria Chapter 3; Module 3, Lessons 1-3 Create programs using complex conditionals and nested conditionals Nest conditionals within loops. Use nested structures to accomplish a given task. Understand and explain the pros and cons of information security and data privacy
Days 16 & 17: While Loops Model the way programs store and manipulate data by using numbers or other symbols to represent information.	8.1.8.AP.2 8.1.8.AP.4	Ozaria Chapter 3; Module 4, Lesson 1 Trace updating of a variable within a while loop. Determine whether it is best to use a for loop or a while loop for a given puzzle. Use while loops to condense code.
Days 18 & 19: Explorations: Networks & the Internet, Encryption Explorations: Data & Analysis	8.1.8.NI.1 8.1.8.NI.2 8.1.8.NI.3 8.1.8.NI.4 8.1.8.DA.2 8.1.8.DA.3	Ozaria Chapter 3; Module 4, Lessons 2-3 Encrypt data to secure information Apply data encryption methods to protect information
Day 20: Capstone Data & Analysis Impacts of Computing	8.1.8.AP.1 8.1.8.AP.2 8.1.8.AP.3 8.1.8.AP.4 8.1.8.AP.5 8.1.8.AP.6 8.1.8.AP.7 8.1.8.AP.8 8.1.8.AP.9 8.1.8.DA.1	Ozaria Chapter 3; Module 5, Lesson 1 Using defined methods and art assets, design a side scrolling game that incorporates loops. Use planning tools to create programs, use feedback from peers to improve program Collect and clean survey data. Visualize the data that's collected in various formats. Understand how information is gathered using technology Understand appropriate methods for crediting others' ideas and property

	8.1.8.DA.4 8.1.8.DA.5	Understand how to gather and apply feedback to improve and debug a program Give and receive constructive and relevant feedback to peers Be able to explain why certain choices are made using evidence Understand how to gather and apply feedback to improve and debug a program Use engineering design tools to plan and create programs
Days 21 & 22: Review, Else/If and Compound Conditionals, Testing and Debugging Explorations: Networks and the Internet, Physical & Digital Security	8.1.8.AP.1 8.1.8.AP.3 8.1.8.AP.4 8.1.8.NI.1 8.1.8.NI.2 8.1.8.NI.3 8.1.8.NI.4	Ozaria Chapter 4; Module 1, Lessons 1-3 Review previously learned concepts and apply in new contexts Use previously learned concepts in more complex programs Understand the purpose and benefits of securing information
Days 23 & 24: Introduction to Functions Data and Analysis Explorations: Computing Systems	8.1.8.AP.7 8.1.8.DA.1 8.1.8.DA.4 8.1.8.DA.5 8.1.8.CS.2 8.1.8.CS.3	Ozaria Chapter 4; Module 2, Lessons 1-3 Revise a computational model based on simulated data to reach specific objectives. - Students run a shop using functions - Rock paper scissors data analysis game
Day 25: Writing Functions	8.1.8.AP.4 8.1.8.AP.5	Ozaria Chapter 4; Module 3, Lesson 1 - Writing functions with pseudocode - Functions with a mouse
Days 30-34: Capstone Break up into days	8.1.8.AP.1 8.1.8.AP.2 8.1.8.AP.3 8.1.8.AP.4 8.1.8.AP.5 8.1.8.AP.6	Ozaria Chapter 4; Module 4, Lessons 1-5 Sandbox Game Design using Design Thinking Process

	8.1.8.AP.7 8.1.8.AP.8 8.1.8.AP.9	
Day 35: Explorations: Impacts of Computing, Accessibility	8.1.8.IC.1 8.1.8.IC.2 8.2.8.EC.1 8.2.8.EC.2	Ozaria Chapter 4; Module 4, Lesson 6 Topic: Accessibility
Day 36: Explorations: Impacts of Computing, Bias and Stereotypes	8.1.8.IC.1 8.1.8.IC.2 8.2.8.EC.1 8.2.8.EC.2	Ozaria Chapter 4; Module 4, Lesson 7 Topic: Bias and Stereotypes

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 Explore how protocols, packets, and addressing are the key components for reliable delivery of information across networks. Model how information is sent and received across networks can be protected from unauthorized access and modification in a variety of ways. Discuss how the evolution of malware leads to understanding the key security measures and best practices needed to proactively address the threat to digital data. 8.1.8.NI.1: Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination. 8.1.8.NI.2: Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication. 8.1.8.NI.3: Explain how network security depends on a combination of hardware, software, and practices that control access to data and systems. 8.1.8.NI.4: Explain how new security measures have been created in response to key malware events.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Websites :_____ ● Google Slides ● Code.org video explaining the internet

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: What is the internet and how does information travel across it?	8.1.8.NI.1: 8.1.8.NI.2:	- Grade level vocabulary matching challenge - Watch part of Code.org video __ answer corresponding questions - Each grade level has a different set
Day 2: Use the correct terminology to explain how data is transmitted across networks.	8.1.8.NI.1: 8.1.8.NI.2:	- Each student picks a different grade level network vocabulary word - Students make a slide or poster explaining their word - Present vocabulary

		- Each grade level has a different set
Day 3: Model how information is transmitted as addressed packets through multiple devices over networks and the Internet.	8.1.8.NI.1: 8.1.8.NI.2:	Manipulate pieces of local area network to show how information travels through devices over networks: - 6: Digital representation - 7: Cut/glue paper pieces - 8: Act out the movement of different components
Day 4: Examine network security processes. Consider digital security options.	8.1.8.NI.3: 8.1.8.NI.4:	- Complete “MS Network & Security Slides” - 6: LAN, WAN, WPAN & networks - 7: Network security goals, firewall, & malware. Answer scenario questions - 8: Encryption, Alan Turing research
Day 5: Investigate how network security depends on a combination of hardware, software, and practices that control access to data. Discuss how new security measures have been created in response to key malware events.	8.1.8.NI.3: 8.1.8.NI.4:	- Encryption & decryption challenges: students work in groups to decode the messages. Then use the same idea to create their own versions of the encryption code - Class discussion on cyber security examples and purposes - Each grade level has a different set

Inclusive concepts
● Explain any character education effort where you are encouraging inclusivity and culture competency.

Research Projects

6th Grade Landmark Project

Unit Learning Goals
Research Project Students will research and analyze the historical, economic, and cultural significance of a famous landmark. They will also evaluate the technological advancements that influenced its design and construction. Student-facing objective: By the end of this lesson, I'll be able to research a famous landmark, understand its history and purpose, and explain how technology influenced its design. **Standards** 8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options. 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. 8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues. 8.2.8.ITH.2: Compare how technologies have influenced society over time. 8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system. 8.2.8.ITH.4: Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact. 8.2.8.ITH.5: Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Websites :_____ ● Google Slides ● Code.org video explaining the internet

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: Introduction to Research Process Analyzing Technological Impact Evaluating Trade-offs and Impacts	8.1.8.IC.1 8.1.8.IC.2 8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3 8.2.8.ITH.4 8.2.8.ITH.5	**Introduction to Research Process** Explain the steps of a research project: selecting a topic, gathering information, organizing findings, and presenting results. Use the example of the Eiffel Tower. Discuss its historical context, purpose, and technological advancements. Highlight how economic, political, social, and cultural factors influenced its design and construction. **Analyzing Technological Impact** Present a brief history of technological advancements during the Eiffel Tower's construction period. Discuss how these advancements made the construction possible and efficient. Pose questions to the class: "How did technology influence the design of the Eiffel Tower?" "What economic and social impacts did the Eiffel Tower have on Paris?" **Evaluating Trade-offs and Impacts** Introduce the concept of trade-offs in technological decisions. Discuss the environmental and economic trade-offs involved in the Eiffel Tower's construction. Ask students to consider: "What were the positive and negative impacts of building the Eiffel Tower on the local economy and environment?" "How did the construction of the Eiffel Tower address new needs and wants in society?" **Transition to Guided Practice:** Summarize the key points discussed. Prepare students for the next activity where they will choose their own landmark to research.
Day 2: Students will begin researching landmarks	8.1.8.IC.1 8.1.8.IC.2 8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3	1. Think: • Ask students to choose a famous landmark they are interested in researching.

Think, Pair, Share Research Guidance	8.2.8.ITH.4 8.2.8.ITH.5	• Have them write down three key questions they want to answer about their chosen landmark, focusing on its history, purpose, and technological influences. 2. Pair: • Pair students up. • Instruct them to share their chosen landmark and the three questions they wrote. • Encourage them to discuss and refine their questions based on their partner's feedback. 3. Share: • Select a few pairs to share their landmarks and questions with the class. • Record these questions on the board to create a collective reference for the class. 4. Research Guidance: • Guide students on how to start their research using reliable sources. • Provide tips on organizing their findings and citing sources properly. 5. Initial Research: • Allow students to begin their research in class. • Circulate to provide support, answer questions, and ensure they are on the right track.
Day 3: Students finish research slides and begin building model of their landmark.	8.1.8.IC.1 8.1.8.IC.2 8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3 8.2.8.ITH.4 8.2.8.ITH.5	**Independent practice** • Direct students to continue their research on their chosen landmark. • Provide a list of reliable sources and databases for their research. • Instruct students to focus on answering their three key questions. • Encourage them to take notes on historical, economic, and cultural significance, as well as technological advancements. • Remind students to consider the trade-offs and impacts of the landmark's construction. • Circulate to observe and support students as needed. • Students build a model of their landmark.

Day 4: Students finish research slides and begin building a model of their landmark.	8.1.8.IC.1 8.1.8.IC.2 8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3 8.2.8.ITH.4 8.2.8.ITH.5	**Independent practice** • Direct students to finish their research and model of their chosen landmark.
Day 5: Students present slides and projects. Student reflections	8.1.8.IC.1 8.1.8.IC.2 8.2.8.ITH.1 8.2.8.ITH.2 8.2.8.ITH.3 8.2.8.ITH.4 8.2.8.ITH.5	**Student Presentations** Reflection: How did technology influence the design and construction of the landmark you chose? What are two positive and two negative impacts of the landmark on its local economy and environment? What's one question you still have from today's lesson?

Inclusive concepts

Differentiation guide

Advanced learners

- Encourage deeper analysis of the landmark's impact on global technology trends.
- Assign additional research on lesser-known technological advancements related to the landmark.
- Have students create a comparative analysis with another landmark from a different era or region.

Striving learners

- Provide a list of suggested landmarks with guided questions to help focus their research.
- Offer graphic organizers to help structure their findings.
- Pair with a peer mentor for additional support during research activities.

7th Grade Famous Inventor Project

Unit Learning Goals
Research Project Students will analyze the contributions of a famous inventor and explain how their invention has impacted society, including economic, political, social, and cultural aspects. They will also evaluate how the invention has been modified to meet new demands and led to new products. Student-facing objective: By the end of this lesson, I'll be able to describe how a famous inventor's work has changed our lives and how their invention has evolved over time. **Standards** 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.2: Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital). 8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues. 8.2.8.ITH.2: Compare how technologies have influenced society over time.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Websites :_____ ● Google Slides ● Code.org video explaining the internet

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1: Introduction to Research Process Analyzing Technological Impact	8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ITH.1 8.2.8.ITH.2	**Notice and wonder:** Display an image of a famous invention (e.g., the light bulb). Ask students to spend 2 minutes silently observing the image and thinking about what they notice and what they wonder. Then, have them share their observations and questions with a partner for 2 minutes. Finally, ask several students to share their thoughts with the class. Record their responses on the board. This will activate

Examine Modifications and Evolution		prior knowledge and set the stage for deeper exploration of the inventor and their impact. **Introduce the Inventor and Invention:** Display a brief biography of the chosen inventor (e.g., Thomas Edison) and a description of their key invention (e.g., the light bulb). Highlight the invention's original purpose and the problem it solved. Discuss the historical context of the invention. Explain how it met a specific demand at the time. **Analyze the Invention's Impact:** Break down the invention's impact on society using the following categories: ● Economic: How did the invention create new industries or jobs? ● Political: Did the invention influence any laws or regulations? ● Social: How did it change daily life for people? ● Cultural: Are there any cultural shifts or movements associated with the invention? Provide real-world examples for each category. For instance, discuss how the light bulb extended working hours and influenced urban development. **Examine Modifications and Evolution:** Present examples of how the invention has been modified to meet new demands. For the light bulb, discuss advancements like LED technology. Explain how these modifications led to new products and applications. For instance, how LEDs are used in screens and energy-efficient lighting. Encourage students to think about the redesign process. Ask them to consider how each part of the original invention relates to its modern counterparts.
Day 2: Students will begin researching famous inventor Think, Pair, Share Research Guidance	8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ITH.1 8.2.8.ITH.2	Think: Ask students to individually think about how the chosen invention (e.g., the light bulb) has been modified over time to meet new demands. Give them 3 minutes to jot down their thoughts. Pair: Have students pair up and share their ideas with a partner. Encourage them to discuss specific modifications and how these changes led to new products. Allow 5 minutes for this discussion. Share: Bring the class back together and ask pairs to share their insights. Record key points on the board, focusing on how the invention evolved and its broader impacts.

		Class Discussion: Facilitate a class discussion on the recorded points. Guide students to connect the modifications to economic, political, social, and cultural impacts. Reflection: Ask students to write a brief reflection on how the invention's evolution demonstrates the interconnectedness of technological advancements and societal changes. Collect these reflections for assessment.
Day 3: Students finish research slides and begin building model of their famous inventor.	8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ITH.1 8.2.8.ITH.2	Research Assignment: Direct students to select a famous inventor from a provided list. Instruct them to research the inventor's key contributions and the impact of their invention. Students should focus on: ● The original purpose of the invention. ● How the invention has been modified over time. ● The economic, political, social, and cultural impacts of the invention. Presentation Preparation: Have students create a brief presentation (10 slides) summarizing their findings. Ensure they include: ● A brief biography of the inventor. ● Description of the invention and its original purpose. ● Examples of modifications and new products derived from the invention. ● Analysis of the invention's impact on society. Support: Circulate to provide guidance and answer questions as students work on their research and presentations.
Day 4: Students finish research slides and begin building a model of their landmark.	8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ITH.1 8.2.8.ITH.2	**Independent practice** • Direct students to finish their research and model of their famous inventor.
Day 5: Students present slides and projects. Student reflections	8.2.8.NT.3 8.2.8.NT.4 8.2.8.ETW.2 8.2.8.ITH.1 8.2.8.ITH.2	**Student Presentations** Reflection: How has the invention you studied been modified to meet new demands? What is one way the invention you studied has impacted society?

Inclusive concepts
Differentiation guide **Advanced learners** • Encourage deeper analysis by having them compare multiple inventors and their inventions. • Assign a more complex presentation format, such as a video or interactive timeline. • Ask them to predict future modifications and impacts of the invention. **Striving learners** • Provide graphic organizers to help structure their research. • Pair them with a peer mentor for guidance. • Allow additional time for research and presentation preparation. • Offer sentence starters and templates for their reflections and presentations.

8th Grade STEM Career Project

Unit Learning Goals
Research Project Students will research and compare the education requirements, income potential, and primary duties of two STEM careers. They will also develop a plan outlining the steps needed to pursue one of these careers. Student-facing objective: By the end of this lesson, I'll be able to compare the education, income, and duties of two STEM careers and create a plan to pursue one of them. **Standards** • 8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options. • 9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest. • 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest. • 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. • 9.2.8.CAP.6: Compare the costs of postsecondary education with the potential increase in income from a career of choice. • 9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest. • 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.

Core Instructional Materials	Supplemental Materials
● Chromebook ● Internet	● Websites :_____ ● Google Slides ● Code.org video explaining the internet

Daily Targets	NJSLS Performance Expectations	Instructional Activities
Day 1:	8.1.8.IC.1 9.2.8.CAP.1 9.2.8.CAP.2	**Notice and wonder:** Display an image of a scientist working in a lab and an engineer working on a construction site. Ask students to spend 2 minutes silently observing the images. Then, prompt them to discuss with a partner:

Introduction to Research Process Introduction to STEM Careers Education and Training Requirements Income Potential and Career Planning	9.2.8.CAP.3 9.2.8.CAP.6 9.2.8.CAP.8 9.2.8.CAP.9	• What do you notice about each career? • What do you wonder about the education and skills needed for these careers? **Introduction to STEM Careers:** Display a list of various STEM careers on the board (e.g., software engineer, biochemist, mechanical engineer, data scientist). Briefly describe each career, focusing on primary duties and real-world applications. Highlight the importance of STEM careers in solving real-world problems. **Education and Training Requirements:** Choose two STEM careers from the list (e.g., software engineer and biochemist). For each career, outline the typical education path (e.g., high school courses, college degrees, certifications). Discuss additional training or experiences (e.g., internships, apprenticeships, dual enrollment). Emphasize the trade-offs and benefits of different educational paths. **Income Potential and Career Planning:** Present data on the average income for the two chosen careers. Compare the costs of postsecondary education with the potential increase in income. Discuss how career choices, educational choices, skills, economic conditions, and personal behavior affect income. Guide students in developing a basic career plan, including steps they can take now (e.g., relevant high school courses, extracurricular activities).
Day 2: Students will begin researching STEM Careers. Think, Pair, Share Research Guidance	8.1.8.IC.1 9.2.8.CAP.1 9.2.8.CAP.2 9.2.8.CAP.3 9.2.8.CAP.6 9.2.8.CAP.8 9.2.8.CAP.9	Think: Ask students to individually think about the two STEM careers discussed (software engineer and biochemist). Have them write down: One key educational requirement for each career. One primary duty for each career. One factor that affects income for each career. Pair: Pair students and have them share their thoughts with their partner. Encourage them to discuss: Similarities and differences in educational paths. How the primary duties of each career might impact daily work life. How different factors might influence income in each career. Share: Bring the class back together. Ask pairs to share their findings with the class. Record key points on the board, focusing on: Common themes in education and training.

		Variations in primary duties. Factors influencing income. Clarify: Address any misconceptions or questions that arise during the sharing session. Provide additional context or examples as needed. Connect: Guide students to connect this information to their own career interests. Ask them to consider: Which aspects of the discussed careers appeal to them. How they might apply the discussed educational paths and career planning steps to their own goals.
Day 3: Students finish research slides and begin building model.	8.1.8.IC.1 9.2.8.CAP.1 9.2.8.CAP.2 9.2.8.CAP.3 9.2.8.CAP.6 9.2.8.CAP.8 9.2.8.CAP.9	**Research Activity:** Direct students to use the provided resources to research two STEM careers of their choice. They should focus on: ● Education requirements ● Income potential ● Primary duties **Worksheet Completion:** Hand out a worksheet where students will: ● Compare the education paths for both careers. ● List the primary duties for each career. ● Analyze the income potential and factors affecting it. **Career Plan Development:** Instruct students to draft a basic career plan for one of the chosen careers, including: ● High school courses and extracurricular activities. ● Postsecondary education and training. ● Steps to gain relevant experience (e.g., internships, volunteering). **Model Building:** Have students start brainstorming and sketching ideas for a model that represents one of the careers they researched. This model will be built and presented later in the project.
Day 4: Students finish research slides and begin building a model of their STEM Career.	8.1.8.IC.1 9.2.8.CAP.1 9.2.8.CAP.2 9.2.8.CAP.3 9.2.8.CAP.6 9.2.8.CAP.8 9.2.8.CAP.9	**Independent practice** • Direct students to finish their research and model of their STEM Career.
Day 5:	8.1.8.IC.1	**Student Presentations**

Students present slides and projects. Student reflections	9.2.8.CAP.1 9.2.8.CAP.2 9.2.8.CAP.3 9.2.8.CAP.6 9.2.8.CAP.8 9.2.8.CAP.9	Reflection: Ask students to answer these questions on their way out: What is one key educational requirement for a STEM career you researched today? How does the income potential of one of the STEM careers you researched compare to the cost of its education?

Inclusive concepts
Differentiation guide **Advanced learners** Encourage deeper research into emerging STEM fields. Assign additional tasks such as comparing three careers instead of two. Have them create a more detailed career plan, including long-term goals and potential challenges. **Striving learners** Provide structured templates for research and career plans. Pair them with peers for collaborative research. Offer additional guidance and check-ins to ensure understanding and progress.