Grade 8 STEM Unit 3: Coding

Content Area: **STEM**
Course(s): **STEM Grade 8**
Time Period: **MP1**
Length: **8 days**
Status: **Published**

NJSLS

8.1.8.AP.3	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
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.

Rationale and Transfer Goals

Teaching coding in middle school provides students with valuable skills such as problem-solving, logical thinking, and creativity. It also introduces them to technology, an essential aspect of our world. Coding promotes computational thinking and can lead to future career opportunities in technology-related fields. Additionally, it fosters teamwork, as coding often involves collaboration on projects, enhancing communication skills. Overall, learning coding early equips students with tools to navigate the digital age effectively.

Enduring Understandings

1. Algorithmic Thinking: Students should understand that coding involves breaking down tasks into smaller steps (algorithms) to solve problems efficiently and logically.

2. Programming Logic: Students should grasp the concept of conditional statements, loops, and variables, which are fundamental to creating functional programs and applications.

3. Problem-Solving Skills: Students should learn that coding is a powerful tool for solving real-world problems and that different coding solutions can be applied to various scenarios.

4. Debugging and Persistence: Students should understand that debugging is a natural part of coding and that persistence and troubleshooting are essential skills in identifying and rectifying errors.

Essential Questions

How can engineers effectively communicate and collaborate to achieve their goals?

How does coding contribute to solving real-world problems and improving daily life?

What are the fundamental concepts and principles underlying coding languages and algorithms?

How can the engineering design process be used to address complex challenges and develop innovative solutions?

What role does creativity play in the development of engineering solutions?

How can engineers effectively communicate and collaborate to achieve their goals?

How can the skills acquired through coding education be transferable to other areas of learning and future career opportunities?

Content - What will students know?

- Beginner and intermediate coding techniques
- Complex problem identification
- Brainstorming and Problem Solving

Skills - What will students be able to do?

- Define Coding

- Develop code
- Create an interactive animation using behaviors in computer science.
- Develop models of for a time capsule

Activities - How will we teach the content and skills?

- Coding Intro Activity
- Coding Angry Birds
- Writing Time Capsule
- Coding Time Capsule

Evidence/Assessments - How will we know what students have learned?

- Question and answer worksheet accompanying google slides Pre/post quiz
- Final Code.org assignment for Angry Birds
- Final presentation for time capsule

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Coding and Programming	Engineering design process and problem-solving.	Students will be reintroduced to the concepts of coding and programming through an introductory activity in Code.org

Key Resources

www.code.org

21st Century Life and Careers

9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.

Career Readiness, Life Literacies, & Key Skills

9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
9.4.8.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.

Interdisciplinary Connections/Companion Standards

LA.RL.5.4	Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.
LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RL.4.4	Determine the meaning of words and phrases as they are used in a text, including those that allude to significant characters found in literature.
LA.RL.4.7	Make connections between specific descriptions and directions in a text and a visual or oral representation of the text.
LA.RL.5.7	Analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text (e.g., graphic novel, multimedia presentation of fiction, folktale, myth, poem).
LA.W.4.1.A	Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose.
LA.W.4.3	Write narratives to develop real or imagined experiences or events using narrative technique, descriptive details, and clear event sequences.
LA.W.4.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
LA.W.4.6	With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.
LA.L.4.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
LA.L.4.5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
LA.L.4.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of

	being (e.g., quizzed, whined, stammered) and that are basic to a particular topic (e.g., wildlife, conservation, and endangered when discussing animal preservation).
LA.L.3.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings.