Grade 5 STEM Unit 3: Coding and Programming

Content Area: **STEM**
Course(s): **STEM Grade 5**
Time Period: **MP1**
Length: **7 days**
Status: **Published**

NJSLS

8.1.5.AP.3	Create programs that include sequences, events, loops, and conditionals.
8.1.5.AP.4	Break down problems into smaller, manageable sub-problems to facilitate program development.
8.1.5.AP.5	Modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program.
8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
8.2.5.ED.3	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
3-LS2-1	Construct an argument that some animals form groups that help members survive.
3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Science and Engineering Practices

Engaging in Argument from Evidence

Construct an argument with evidence, data, and/or a model. (3- LS2-1), (3-LS4-3)

Constructing Explanations and Designing Solutions

Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2), (3-LS4-2)

Disciplinary Core Ideas

LS2.D: Social Interactions and Group Behavior

Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (3-LS2-1)

LS3.A: Inheritance of Traits

Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2)

LS3.B: Variation of Traits

The environment also affects the traits that an organism develops. (3-LS3-2)

LS4.B: Natural Selection

Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

LS4.C: Adaptation

For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4- 3)

Crosscutting Concepts

Cause and Effect

Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1), (3-LS3-2), (3-LS4-2), (3- LS4-3)

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

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

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

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.

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 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 does computational thinking help break down complex problems into smaller, manageable components?

How does debugging and troubleshooting contribute to the development of coding skills and problem-solving abilities?

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 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 presentation

Activities - How will we teach the content and skills?

- Coding Intro Activity
- Coding Angry Birds
- Drawing Geometrical Shapes using Codes
- Animal Adaptation Code.org activity

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 Animal Adaptations

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Coding and Programming	Engineering design process and	Students will be reintroduced to

	problem-solving.	the concepts of coding and programming through an introductory activity in Code.org

Key Resources

- www.code.org
- www.awea.org
- www.energyquest.ca.gov/
- www.eia.gov/kids/
- www.nrel.gov

21st Century Life and Careers

9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CI.4	Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).
9.4.5.TL.5	Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).

Interdisciplinary Connections/Companion Standards

NJSLS ELA

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1), (3-LS4-2), (3-LS4-3)

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1), (3-LS3-2), (3-LS4-2), (3-LS4-3)

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1), (3-LS4-3)

RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-2), (3-LS4-2), (3-LS4-3)

W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-2), (3-LS4-2), (3-LS4-3)

SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-2), (3-LS4-2), (3-LS4-3)

NJSLS Mathematics

MP.4 Model with mathematics. (3-LS2-1), (3-LS3-2), (3-LS4-2), (3-LS4-3)

3.NBT Number and Operations in Base Ten (3-LS2-1)

MP.2 Reason abstractly and quantitatively. (3-LS3-2), (3-LS4-2), (3-LS4-3)

3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-2)

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. (3-LS4-2), (3-LS4-3)