			Course: STEM **Grade Level: 1** **Unit: 4Cs**
Course/Subject: STEM **Unit: 4Cs**	**Grade:** **1**	**Unit:** 4Cs	**Suggested Timeline:** **(cycle days)** 4 Cycle Days

Grade Level Summary	
Grade Level Units	Unit 1: 4Cs Unit 2: Design Engineering Process Unit 3: Coding Unit 4: Makerspace

Unit Title	4C's
Unit Summary	This introduction of STEM (Science, Technology, Engineering and Math) allows first grade students to see how the 4C's (communication, collaboration, creativity and critical thinking) and the Engineering Design Process can be used to promote design thinking to generate new ideas and unleash the creative potential in all students so that they can become makers, designers, artists and engineers. First grade students are introduced to the 4Cs in order to understand how each are used in the STEM classroom both individually and collaboratively. Students will extend and reinforce their understandings of communication, collaboration, critical thinking, and creativity with various challenges and group learning experiences. Students will be able to transfer their knowledge of the 4C's to help them by modeling effective representations of each throughout the school year.

Unit Essential Questions:	**Key Understandings:**
1. What do I need to do to be an effective communicator? 2. How can I use critical thinking to help me solve problems? 3. How does collaboration help when working in groups?	1. Students will be able to effectively communicate by making eye contact, taking turns, and listening to others. 2. Students will critically think to solve problems using both new and prior information. 3. Students will know that working collaboratively with others is important because everyone's opinion can differ.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
ISTE-1b	Build networks and customize their learning environments in ways that support the learning process
ISTE-6a	Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication
Profile of a Graduate: Critical Thinking	Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Profile of a Graduate: Critical Thinking	Problem solve, by identifying a problem, brainstorming solutions for that problem, and selecting the best solution
Profile of a Graduate: Creativity	Innovation through problem-solving, taking risks, and exploring
Profile of a Graduate: Communication	Speaking, including appropriate dialogue and effective public speaking, listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Ability to use inquiry to solve problems by taking risks and exploring

Important Standards Addressed in the Unit:	
CC.1.5.1.A	Participate in collaborative conversations with peers and adults in small and larger groups.
CC.1.5.1.C	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
CC.1.5.1.E	Produce complete sentences when appropriate to task and situation.

Misconceptions:	**Proper Conceptions:**
• That all students think alike • Thinking that communication is only in speaking and words • Thinking that I can do it better than a group	• Students can use visuals or drawings and even body language to communicate • Students can make a contribution to the class or a project • Students can work together on a task

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
• Participate in collaborative conversations • Think critically to solve problems • Organize their creativity through written and visual means	• Ask and answer questions to gather details • Ask and answer questions in order to seek help	• Students are expected to work collaboratively in a class or group setting • Students are expected to use critical thinking skills to solve problems

Academic Vocabulary:

• STEM • Communication • Collaboration • Critical thinking • Ask	• Changes • Conclusion • Describe • If • Observe • Pattern	• Predict • Show • Tell • Together • Tools • Try

Evidence: Assessments and Performance Task(s)

- STEM Journal
- Reflections in Student Journal focusing on making improvements, and to know that it is okay to fail

- Collaborative Learning

Interdisciplinary Connections:

- 1st Grade English Language Arts Standards
- 1st Grade Guidance Standards
- 1st Grade Math Standards
- 1st Grade Science Standards
- 1st Grade Social Studies Standards
- ISTE Standards for Students
- Next Generation Science Standards
- Profile of a Graduate

Additional Resources:

- LAUNCH, John Spencer and A.J. Juliani

Created By:

Teresa Lowery and Stephanie Flowers

			Course: STEM **Grade Level: 1** **Unit: Engineering Design Process**
Course/Subject: STEM **Unit: Engineering Desgin Process**	**Grade:** **1**	**Unit:** Engineering Design Process	**Suggested Timeline:** **(cycle days)** 10 Cycle Days

Grade Level Summary	
Grade Level Units	Unit 1: 4Cs Unit 2: Engineering Design Process Unit 3: Coding Unit 4: Makerspace

Unit Title	Engineering Design Process
Unit Summary	This introduction of STEM allows first grade students to learn how the steps in the Engineering Design Process can be used to promote design thinking to generate new ideas. Students can use this knowledge to unleash the creative potential so that they can become makers, designers, artists and engineers. First grade students will also learn how they can navigate the Engineering Design Process to help them solve new problems and new ideas. Students will be able to transfer their knowledge of the 4C's and the Engineering Design Process by modeling effective representations of each throughout the school year.

Unit Essential Questions:	**Key Understandings:**
4. Why do we use the engineering design process to solve design challenges? 5. How can the engineering design process benefit us in solving problems in our daily lives? 6. Why do engineers and designers strive to improve products used in our daily lives?	4. Students will be able to explain that design involves a set of steps that can be performed in different sequences and repeated as needed. 5. Students will be able to create sketches, with annotations, in an Engineering Design Journal. 6. Students will see the benefits of making modifications to improve their design.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
ISTE-3d	Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE-4a	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

ISTE-4c	Students develop, test and refine prototypes as part of a cyclical design process.
ISTE-4d	Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
ISTE-5c	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
ISTE-6a	Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
Profile of a Graduate: Critical Thinking	Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
Profile of a Graduate: Critical Thinking	Problem solve, by identifying a problem, brainstorming solutions for that problem, and selecting the best solution
Profile of a Graduate: Creativity	Innovation through problem-solving, taking risks, and exploring
Profile of a Graduate: Communication	Speaking, including appropriate dialogue and effective public speaking, listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Ability to use inquiry to solve problems by taking risks and exploring

Important Standards Addressed in the Unit:	
CC.1.5.1.A	Participate in collaborative conversations with peers and adults in small and larger groups.
CC.1.5.1.C	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
CC.1.5.1.E	Produce complete sentences when appropriate to task and situation.

Misconceptions:	**Proper Conceptions:**
• There is no need for the design process, you should just be able to create • Revisions are not necessary	• Students can use the Engineering Design Process to identify problems and develop and improve solutions. • Critical thinking can help students solve problems by using given materials for creation. • Revisions allows students to learn to challenge their own ideas, thus deepening and strengthening their argument.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
• Engineering Design Process • Engineering • Simple Machines • Prototype • Fail • Perseverance	• Follow step-by-step process of designing • Use the Engineering Design Process to develop ideas or creations • Test creations and redesign, if necessary	• Students will use the Engineering Design Process to solve real-world problems • Students will use perseverance while working on a task.

Academic Vocabulary:

• Structure • Perseverance • Ask • Imagine • Plan • Revise	• Because • Found • Why	

Evidence: Assessments and Performance Task(s)

- STEM Journal
- Reflections in Student Journal focusing on making improvements, and to know that it is okay to fail
- Collaborative Learning

Interdisciplinary Connections:

- 1st Grade English Language Arts Standards
- 1st Grade Guidance Standards
- 1st Grade Math Standards
- 1st Grade Science Standards
- 1st Grade Social Studies Standards
- ISTE Standards for Students
- Next Generation Science Standards
- Profile of a Graduate

Additional Resources:

- LAUNCH, John Spencer and A.J. Juliani

Created By:

Teresa Lowery and Stephanie Flowers

			Course: STEM **Grade Level: 1** **Unit: Coding**
Course/Subject: STEM **Unit: Coding**	**Grade:** **1**	**Unit:** Engineering Design Process	**Suggested Timeline:** **(cycle days)** 8 Cycle Days

Grade Level Summary	
Grade Level Units	Unit 1: 4Cs Unit 2: Engineering Design Process Unit 3: Coding Unit 4: Makerspace

Unit Title	Coding
Unit Summary	This introduction of STEM allows first grade students to be introduced to basic computer programming concepts and tools. They will also learn valuable problem-solving strategies to help be successful not only in programming but in life. Unplugged programming and online tools are resources that the students utilize to learn about the digital world. Students learn how to write and interpret algorithms. The beginning concepts of debugging and sequencing are presented to students. These skills present a strong foundation for beginner computer programmers.

Unit Essential Questions:	**Key Understandings:**
7. How do I create an algorithm? 8. What is computer code? 9. How can I write computer code? 10. What do I do when computer code is written incorrectly? 11. Why is sequence important in coding?	7. Computer algorithms are directions computers follow in order to complete a task. 8. Computer programmers create computer code or software that can be used in all areas of life. 9. Students can use decoding skills to run a program. 10. Students can arrange events in sequential order.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
ISTE-1c	Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
ISTE-1d	Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

ISTE-5d	Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.
ISTE-7c	Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
Profile of a Graduate: Critical Thinking	Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
Profile of a Graduate: Critical Thinking	Problem solve, by identifying a problem, brainstorming solutions for that problem, and selecting the best solution
Profile of a Graduate: Creativity	Innovation through problem-solving, taking risks, and exploring
Profile of a Graduate: Communication	Speaking, including appropriate dialogue and effective public speaking, listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Ability to use inquiry to solve problems by taking risks and exploring

Important Standards Addressed in the Unit:	
CC.1.5.1.A	Participate in collaborative conversations with peers and adults in small and larger groups.
CC.1.5.1.C	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
CC.1.5.1.E	Produce complete sentences when appropriate to task and situation.
CC.1.5.1.F	Add drawings or other visual displays when sharing aloud to clarify ideas, thoughts, and feelings.
CC.1.5.1.G	Demonstrate command of the conventions of standard English when speaking, based on Grade 1 level and content.
Computer Science	1A.AP.08 Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks. 1A.AP.09 Model the way programs store and manipulate data by using numbers or other symbols to represent information. 1A.AP.10 Develop programs with sequences and simple loops, to express ideas or address a problem. 1A.AP.11 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions. 1B.AP.15 Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

Misconceptions:	**Proper Conceptions:**
• Students can only use problem-solving in Science or Math classes.	• Students can use problem-solving skills in all areas of life and in learning. • Students will create coding thorough various resources including unplugged activities.

• Students think that coding is just learning about technology skills. • Students think that computer science is only used in certain careers.	• Students will make connections with programming sequences and storytelling.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
• Algorithm • Problem-solving • Patterns • Sequencing • Computer Programming • Decoding/Debugging	• Identify and solve problems using appropriate technology. • Decompose large activities into series of smaller events. • Arrange sequential events into their logical order • Translate an algorithm into a program	• Students will learn how to select appropriate technology to solve problems. • Students will arrange events into sequential order. • Students will create algorithms to solve problems and create new code. • Students will debug code, when necessary.

Academic Vocabulary:

• Programming • Algorithm • Pattern • Debugging • Decode • Loop	• Command • Data • Function • Input	

Evidence: Assessments and Performance Task(s)

- STEM Journal
- Reflections in Student Journal focusing on making improvements, and to know that it is okay to fail
- Collaborative Learning
- Coding online resources (ex. Code.org)

Interdisciplinary Connections:

- 1st Grade English Language Arts Standards
- 1st Grade Guidance Standards
- 1st Grade Math Standards
- 1st Grade Science Standards
- 1st Grade Social Studies Standards
- ISTE Standards for Students
- Next Generation Science Standards
- Profile of a Graduate

Additional Resources:

- LAUNCH, John Spencer and A.J. Juliani

Created By:
Teresa Lowery and Stephanie Flowers

			Course: STEM **Grade Level: 1** **Unit: Makerspace**
Course/Subject: STEM **Unit:**	**Grade:** **1**	**Unit:** Makerspace	**Suggested Timeline:** **(cycle days)** 8 Cycle Days

Grade Level Summary	
Grade Level Units	Unit 1: 4Cs Unit 2: Engineering Design Process Unit 3: Coding Unit 4: Makerspace

Unit Title	Makerspace
Unit Summary	This introduction of STEM allows first grade students to discover their creativity using design thinking. Students will investigate their passions and create various projects. Students will be provided with the necessary tools and materials for the project, but their creativity is limitless. This unit is a culmination of the 4Cs and the Design Engineering Process and gives students an opportunity to showcase the learning they experienced throughout the year. Projects will be displayed at the school Discovery Open House.

Unit Essential Questions:	**Key Understandings:**
12. How can a makerspace change our learning experience? 13. Why are exploration and creation an important part of learning?	11. Makerspace gives students the opportunity to explore different projects to find their passion which can drive their learning experiences and help them gain a deeper understanding. 12. Exploring and creating are important parts of learning, because it give students ownership of their learning experience.

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
ISTE-1a	Articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
ISTE-3d	Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
ISTE-4a	Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

ISTE-4d	Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
ISTE-6a	Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
ISTE-6b	Create original works or responsibly repurpose or remix digital resources into new creations.
Profile of a Graduate: Critical Thinking	Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
Profile of a Graduate: Critical Thinking	Problem solve, by identifying a problem, brainstorming solutions for that problem, and selecting the best solution
Profile of a Graduate: Creativity	Innovation through problem-solving, taking risks, and exploring
Profile of a Graduate: Communication	Speaking, including appropriate dialogue and effective public speaking, listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Listening with the goal of understanding another's point of view
Profile of a Graduate: Communication	Ability to use inquiry to solve problems by taking risks and exploring

Important Standards Addressed in the Unit:	
CC.1.5.1.A	Participate in collaborative conversations with peers and adults in small and larger groups.
CC.1.5.1.C	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
CC.1.5.1.E	Produce complete sentences when appropriate to task and situation.

Misconceptions:	**Proper Conceptions:**
• Students do not realize that ideas can lead to major innovations and can change the world. • Students think makerspace is just using high-technology items like in a computer class.	• A makerspace is a place where students can create using a variety of tools and materials. • Students will use critical thinking skills to create. • Students will present their ideas and creations to their peers.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
• Problem-solving • Perseverance • Fail • Creativity • Critical Thinking • Listening • Communication • Collaboration	• Taking ownership of their learning experiences. • Gaining knowledge and skills to investigate or respond to authentic challenges or problems.	• Students will use creativity to solve real-world problems. • Taking ownership of their learning experiences. • Students will communicate effectively with the teacher and their peers.

Academic Vocabulary:

- Makerspace
- Makers
- Creation Station
- Empathy
- Perseverance
- Improve
- Imagine
- Inspiration
- Ownership

Evidence: Assessments and Performance Task(s)

- STEM Journal
- Reflections in Student Journal focusing on making improvements, and to know that it is okay to fail
- Collaborative Learning
- Use creation station items appropriately

Interdisciplinary Connections:

- 1st Grade English Language Arts Standards
- 1st Grade Guidance Standards
- 1st Grade Math Standards
- 1st Grade Science Standards
- 1st Grade Social Studies Standards
- ISTE Standards for Students
- Next Generation Science Standards
- Profile of a Graduate

Additional Resources:

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Teresa Lowery and Stephanie Flowers