

# Florham Park Public Schools

## STEAM Lab Curriculum

### Kindergarten - 2nd Grade

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Philosophy
<p>In today's technology rich society, it's paramount that students be workplace ready with the 21st Century skills needed to be successful, problem solvers and global contributors. A foundation of Science, Technology, Engineering, Art and Mathematics principles will help students be successful in solving tomorrow's problems.</p> <p>This is a non traditional model of Education in which the classroom resembles a work environment and students contribute to solving problems in the community. STEAM careers, experiences and skills drive the curriculum. Curriculum is integrated in authentic problem-based learning that is STEAM career-oriented and cross-disciplinary. Students collaborate in teams to solve problems. Teachers facilitate teams of students towards solving problems and developing work for skills commonly the skills required by a STEAM businesses in the area or region. Frequently, schools have partnerships with businesses to provide materials, resources, and capital.</p>

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Kindergarten - Scope and Sequence (**Units are not sequential**)

**Grade K Scope and Sequence for STEAM**

Students participate in rotating marking periods.	Unit	Number of Instructional Days
MP -1	<b>Coding</b> - Intro to coding, beginning coding and intermediate coding	<b>12 Instructional Days</b>
MP -2	<b>STEAM Challenges</b> - Intro challenges, simple STEAM challenges, advanced STEAM challenges	<b>12 Instructional Days</b>
MP -3	<b>Engineering/Robotics</b> - Intro to engineering/robotics, robotics challenge task	<b>12 Instructional Days</b>

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Kindergarten Coding Unit Summary
Students will be utilizing the Course A program provided through Code.org. Course A offers computer science curriculum for beginning readers around the kindergarten age range. Students will learn to program using commands like loops and events. The lessons featured in this course also teach students to collaborate with others meaningfully, investigate different problem-solving techniques, persist in the face of difficult tasks, and learn about internet safety.
Standards
<p><b>Common Core English Language Arts Standards</b></p> <p>K.L.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts.</p> <p>K.RL.10 - Actively engage in group reading activities with purpose and understanding.</p> <p>K.RL.7 - With prompting and support, describe the relationship between illustrations and the story in which they appear (e.g., what moment in a story an illustration depicts).</p> <p>K.SL.1 - Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.</p> <p>K.SL.2 - Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.</p> <p>K.SL.5 - Add drawings or other visual displays to descriptions as desired to provide additional detail.</p> <p><b>Common Core Math Standards</b></p> <p>K.CC.4 - Understand the relationship between numbers and quantities; connect counting to cardinality.</p>

K.G.1 - Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.  
 K.MD.1 - Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.  
 MP.1 - Make sense of problems and persevere in solving them  
 MP.2 - Reason abstractly and quantitatively  
 MP.3 - Construct viable arguments and critique the reasoning of others  
 MP.4 - Model with mathematics  
 MP.5 - Use appropriate tools strategically  
 MP.7 - Look for and make use of structure  
 MP.8 - Look for and express regularity in repeated reasoning

## 2020 NJSLS - Computer Science and Design Thinking

### Core Ideas

Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process

Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images).

Computers follow precise sequences of steps that automate tasks

People work together to develop programs for a purpose, such as expressing ideas or addressing problems.

The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary).

### Performance Expectations

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information.

8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.

8.1.2.AP.4: Break down a task into a sequence of steps.

8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.

8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.

### CSTA K-12 Computer Science Standards

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.

1A-AP-14 - Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

### Next Generation Science Standards

K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3 - Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

K-LS1-1 - Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-PS3-2 - Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.\*[Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

### Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.  
 CRP2. Apply appropriate academic and technical skills.  
 CRP4. Communicate clearly and effectively and with reason.  
 CRP6. Demonstrate creativity and innovation.  
 CRP7. Employ valid and reliable research strategies.  
 CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  
 CRP9. Model integrity, ethical leadership and effective management.  
 CRP11. Use technology to enhance productivity.  
 CRP12. Work productively in teams while using cultural global competence

Essential Questions	Enduring Understanding
How does the emerging learner understand coding concepts such as writing and analyzing code?	In the primary grade levels, there are many important foundations students must know and carry throughout their tenure in a school system. Understanding age appropriate tasks, such as recognizing patterns, will not only assist in coding but assist in other content areas as well.
How do students take a mental concept and create code that translates that concept?	Being able to take a concept and make it a reality requires great skill, especially when it comes to programming. Students, during this unit, will do just that.
How does persistence in programming translate across the curriculum?	Persistence in writing code translates to persistence in math, ELA, and other core content areas. When students learn how to work through their problems they'll see greater long term success.

Student Learning Objectives
<ul style="list-style-type: none"> <li>• Today I will teach you to log into Code.org.</li> <li>• Today I will teach you to view an activity in Code.org</li> <li>• Today I will teach you to persevere through coding projects.</li> <li>• Today I will teach you to sequence using Angry Birds.</li> <li>• Today I will teach you to complete the Happy Maps project.</li> <li>• Today I will teach you to program with more advanced concepts.</li> <li>• Today I will teach you to build on the simpler directional coding and add actions to it.</li> <li>• Today I will teach you the practical usage of loops.</li> <li>• Today I will teach you to program with various forms of block coding to solve tasks.</li> <li>• Today I will teach you to utilize loops to create images and pictures.</li> </ul>

## Kindergarten Coding Unit Sequence

Introduction to Coding		Timeframe: 1-2 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Learning how to access Code.org</li> <li>Learn basic concepts associated with debugging</li> </ul>	<ol style="list-style-type: none"> <li>Accesses and set up for Code.org student accounts using the simple login method</li> <li>View/ complete the Debugging activity provided on Code.org Course A: Lesson 1</li> </ol>	Teacher observation Debugging Activity Completion
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see resources provided through Code.org</li> </ul>		

Beginning Lessons in Code.org		Timeframe: 5 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Persistence with coding</li> <li>Beginning methods to sequencing</li> <li>Beginning usage of algorithms</li> <li>Cooperative programming</li> </ul>	<ol style="list-style-type: none"> <li>Course A: Lesson 2 - Watch the video Stevie and the Big Project.               <ol style="list-style-type: none"> <li>Discuss persistence with coding</li> <li>Complete the activity provided through Code.org</li> </ol> </li> <li>Course A: Lesson 3 - Watch the video Plant a Seed and complete the worksheet associated with it               <ol style="list-style-type: none"> <li>Discuss how taking care of a plant is like an algorithm</li> </ol> </li> <li>Course A: Lesson 4 - Students will partner and start sequencing with Angry Birds               <ol style="list-style-type: none"> <li>This lesson introducing computer lab rules as well as working well with a partner</li> </ol> </li> <li>Course A: Lesson 5 - Complete the Happy Maps activity with the materials provided on Code.org</li> </ol>	Teacher observation Worksheet Completion for Lessons 2-5
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see additional extension resources provided through Code.org</li> </ul>		



Intermediate Lessons in Code.org		Timeframe: 6 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Continuing persistence with coding</li> <li>Intermediate methods to sequencing</li> <li>Intermediate usage of algorithms</li> <li>Continue with cooperative programming</li> </ul>	<ol style="list-style-type: none"> <li>Course A: Lesson 6 is a lesson where students can work in partners or individually to program with more advanced concepts</li> <li>Course A: Lesson 7 builds on the simpler directional coding and adds actions to it. Students can work individually or with partners</li> <li>Course A: Lesson 8 has a video which discusses how to behave online and includes a simple 3 question assessment.</li> <li>Course A: Lesson 9 is an offline activity which discusses the practical usage of loops.</li> <li>Course A: Lesson 10 continues with the students programming with various forms of block coding to solve tasks. Students should be striving for persistence with their coding, as well as being a good partner.</li> <li>Course A: Lesson 11 continues with block programming and should be focused on all students striving for programming independence.</li> <li>Course A: Lesson 12 utilizes loops to create images and pictures.</li> </ol>	<p>Teacher observation</p> <p>Worksheets for lessons 6-12</p> <p>Written assessments</p>
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see additional extension resources provided through Code.org</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>Rubric based projects</li> <li>Verbal Discussions</li> <li>Teacher observations</li> <li>Written short answer assessments</li> <li>Repeat verbal directions back</li> </ul> <p><b>Summative Assessments:</b></p>	<p><b>Special Education</b></p> <ul style="list-style-type: none"> <li><a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li><a href="#">Subgroup Accommodations and Modifications</a></li> <li><a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>Preview content and concepts</li> <li>Behavior management plan</li> <li>Highlight text</li> <li>Small group setting</li> </ul>

<ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <p><b>Benchmark Assessments:</b></p> <ul style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <p><b>Alternative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul>	<p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• <i>Alternative formative and summative assessments</i></li> <li>• <i>Guided Reading</i></li> <li>• <i>Personal agendas</i></li> <li>• <i>Project-based learning</i></li> <li>• <i>Problem-based learning</i></li> <li>• <i>Stations/centers</i></li> <li>• <i>Tiered activities/assignments</i></li> <li>• <i>Varying organizers for instructions</i></li> </ul> <p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• <i>Clubbing activities</i></li> <li>• <i>Exploration by interest</i></li> <li>• <i>Flexible groupings</i></li> </ul> <p><b>English Language Learners</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> <p><b>Students at Risk for Failure</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> <p><b>Gifted and Talented</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul> <p><b>Students with 504 Plans</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul>
<p><b>Core Instructional and Supplemental Materials Professional Resources:</b></p>	<p><b>Core Instructional, Supplemental, Instructional, and Intervention Resources</b></p>

<div data-bbox="226 94 613 126" data-label="Section-Header"> <p><b>Core Professional Resources:</b></p> </div> <div data-bbox="277 159 777 289" data-label="List-Group"> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul> </div> <div data-bbox="226 321 730 354" data-label="Section-Header"> <p><b>Supplemental Professional Resources:</b></p> </div> <div data-bbox="277 386 583 467" data-label="List-Group"> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul> </div>	<div data-bbox="1186 94 1585 126" data-label="Section-Header"> <p><b>Core Instructional Resources:</b></p> </div> <div data-bbox="1228 159 1459 313" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul> </div> <div data-bbox="1186 345 1522 378" data-label="Section-Header"> <p><b>Supplemental Resources:</b></p> </div> <div data-bbox="1186 410 1465 540" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul> </div> <div data-bbox="1186 573 1507 605" data-label="Section-Header"> <p><b>Intervention Resources:</b></p> </div> <div data-bbox="1228 638 1432 768" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul> </div>
<div data-bbox="478 893 882 925" data-label="Section-Header"> <p><b>Interdisciplinary Connections</b></p> </div>	<div data-bbox="1306 893 1869 925" data-label="Section-Header"> <p><b>Integration of Technology through NJSLS</b></p> </div>
<div data-bbox="262 958 844 1036" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul> </div>	<div data-bbox="1222 958 1417 1060" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul> </div>
<div data-bbox="436 1120 924 1153" data-label="Section-Header"> <p><b>Integration of 21st Century Themes</b></p> </div>	<div data-bbox="1407 1120 1768 1153" data-label="Section-Header"> <p><b>Media Literacy Integration</b></p> </div>
<div data-bbox="262 1185 1096 1490" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul> </div>	<div data-bbox="1222 1185 1957 1312" data-label="List-Group"> <ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul> </div>

Career Education	Global Perspectives
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
<ul style="list-style-type: none"> <li>• <a href="#">Course A - COMPLETE COURSE</a></li> <li>• <a href="#">Course A - Overview from Code.org</a></li> <li>• <a href="#">Course A - Standards</a></li> <li>• <a href="#">Course A - Vocabulary</a></li> <li>• <a href="#">Course A - Other Resources</a></li> <li>• <a href="#">Course A - Lessons PDF</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Course A - COMPLETE COURSE</a></li> <li>• <a href="#">Course A - Overview from Code.org</a></li> <li>• <a href="#">Course A - Standards</a></li> <li>• <a href="#">Course A - Vocabulary</a></li> <li>• <a href="#">Course A - Other Resources</a></li> <li>• <a href="#">Course A - Lessons PDF</a></li> </ul>

### Kindergarten STEAM Challenges Unit Summary

In this unit, students will need to be problem solvers to complete the various STEAM related challenges. Problem solving, persistence and trial and error will be important life skill for students to learn and use in order to be successful. This level of rigor will be increased as the students progress through each subsequent grade level and will need to continue to use these skill not only in school, but in the workforce and beyond as they get older.

### Standards

#### NGSS Standards

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.
- K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.
- K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

#### 2020 NJSL - Computer Science and Design Thinking

##### Core Ideas

Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).  
 Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide.

Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process.

*Computers follow precise sequences of steps that automate tasks.*

*Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.*

*Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.*

*Limitations (constraints) must be considered when engineering designs.*

*Human needs and desires determine which new tools are developed.*

*Technology has changed the way people live and work.*

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

##### Performance Expectations

8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.

8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.  
 8.1.2.AP.4: Break down a task into a sequence of steps.  
 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.  
 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.  
 8.2.2.ED.1: Communicate the function of a product or device.  
 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.  
 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.  
 8.2.2.ED.4: Identify constraints and their role in the engineering design process.  
 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.  
 8.2.2.ITH.2: Explain the purpose of a product and its value.  
 8.2.2.ITH.3: Identify how technology impacts or improves life.  
 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks  
 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.  
 8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.  
 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

#### Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.  
 CRP2. Apply appropriate academic and technical skills.  
 CRP4. Communicate clearly and effectively and with reason.  
 CRP6. Demonstrate creativity and innovation.  
 CRP7. Employ valid and reliable research strategies.  
 CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  
 CRP9. Model integrity, ethical leadership and effective management.  
 CRP11. Use technology to enhance productivity.  
 CRP12. Work productively in teams while using cultural global competence

Essential Questions	Enduring Understanding
How do we problem-solve utilizing various tasks?	Problem solving through hands on methods will allow students to physically work through problems and learn to communicate their ideas with other students.
How do students begin to learn STEAM concepts?	The field of science, technology, engineering, arts and math are all interconnected. These topics can be explored through a variety of tasks and problem solving scenarios.
How can students effectively share ideas with partners or a group?	Being a good communicator is a skill that must be taught as early as possible. Being able to talk through issues or problems with a partner is a great life skill.

#### Student Learning Objectives

- Today I will teach you computational thinking and computer programming as tools used in design and engineering.
- Today I will teach you to use various materials to create a paper rocket ship.
- Today I will teach you to use various materials to create the largest bubble possible.
- Today I will teach you to balance a bottle cap on only 1 straw and must stay balanced for 1 minute.
- Today I will teach you to pick a number card from 1 to 20 and build the tallest tower you can with that number of cups.
- Today I will teach you to find the best material to stop a falling marble dropped from 12 inches.
- Today I will teach you to create a rainstick that creates a “rain” sound for 3 seconds.
- Today I will teach you to use cardboard tubes (or another substitute) to create a robot that is at least 6 tubes tall.
- Today I will teach you to create a list of commands for a friend to follow across a grid using a coin or other object.
- Today I will teach you to create a structure that can fly at least 3 feet using only paper loops and a drinking straw.
- Today I will teach you to find material that would slow down a car going down a ramp in the most effective manner possible using paper loops and a drinking straw.
- Today I will teach you to create a maze in which a rolling marble changes direction at least 5 times.

**Kindergarten STEAM Challenges**  
**Unit Sequence**

Intro to STEAM Challenges - Focus on Empathy		Timeframe: 1 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Persistence when solving a problem</li> <li>Discuss the concept of empathy</li> </ul>	<ol style="list-style-type: none"> <li>Refer to the code.org lesson on persistence and rewatch the correlating video/materials as needed</li> <li>Complete the KidsHealth lesson on empathy and feelings. This will help students understand the tasks related to empathy and a more personal level.</li> </ol>	Teacher observation KidsHealth Worksheet #1 - "I Feel..." KidsHealth Worksheet #2 - "How Would You Feel If..."
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li><b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li><b>Gifted Learners</b> – Students can create "bugs" in their creations and have other students solve the problems</li> </ul>		

Simple STEAM Challenges		Timeframe: 5 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Basic engineering</li> <li>Volume and spacial awareness</li> <li>Balance and structure building</li> <li>Friction regulation</li> </ul>	<ol style="list-style-type: none"> <li><b>3,2,1, Blast Off!</b> - Students will use various materials to create a paper rocket ship.</li> <li><b>Big Bubble Wand</b> - Students will use various materials to create the largest bubble possible.</li> <li><b>Bottle Cap Balance</b> - Students must balance a bottle cap on only 1 straw and must stay balanced for 1 minute</li> <li><b>Count and Stack</b> - Pick a number card from 1 to 20 and build the tallest tower you can with that number of cups.</li> <li><b>Stop That Marble: Friction</b> - Find the best material to stop a falling marble. The marble must be dropped from 12 inches about a container</li> </ol>	Teacher observation Worksheets associated with each lesson STEM Performance Rubric
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li><b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li><b>Gifted Learners</b> – Students can create "bugs" in their creations and have other students solve the problems</li> </ul>		



Advanced STEAM Challenges		Timeframe: 6 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Engineering and timing</li> <li>Engineering various structures</li> <li>Writing an algorithm</li> <li>Engineering complete flight structures</li> <li>Using materials to create friction</li> <li>Gravity and physics</li> </ul>	<p>6. <b>Making it Rain</b> - In this lesson students will create a rainstick. This must main the “rain” sound for 3 seconds.</p> <p>a. Empathy Focus: Your parent is trying to put your younger brother or sister to sleep and the sound of rain does the trick. Make a rain stick to help your baby sibling.</p> <p>7. <b>Tube Dude</b> - Use cardboard tubes (or another substitute) to create a robot that is at least 6 tubes tall.</p> <p>8. <b>Command Me</b> - Write a list of command for a friend to follow across a grid using a coin or other object. Must have a minimum of 15 commands.</p> <p>9. <b>Loop the Loop</b> - Using on paper loops and a drinking straw, create a structure that can fly at least 3 feet.</p> <p>10. <b>Rough Road: Friction</b> - Students must find material that would slow down a car going down a ramp in the most effective manner possible.</p> <p>a. Empathy Focus: The roads can be very slippery when icy and on town has lots of car crashes because of it. Help the town create safer roads!</p> <p>11. <b>Marble Roll and Run</b> - Make a maze in which a rolling marble changes the direction at least 5 times.</p> <p>a. Empathy Focus: Rock slides keep happening and in Yosemite National Park. Design a structure that slows down the rock as it falls!</p>	<p>Teacher observation</p> <p>Worksheets associated with each lesson</p> <p>STEM Performance Rubric</p>
Differentiation		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li><b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li><b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
<div data-bbox="214 183 1148 248"><b>Formative Assessments:</b></div> <ul data-bbox="277 264 592 410" style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> <div data-bbox="214 427 1148 492"><b>Summative Assessments:</b></div> <ul data-bbox="277 508 739 654" style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <div data-bbox="214 670 1148 735"><b>Benchmark Assessments:</b></div> <ul data-bbox="277 751 644 841" style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <div data-bbox="214 857 1148 922"><b>Alternative Assessments:</b></div> <ul data-bbox="277 938 648 1052" style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul>	<div data-bbox="1169 183 2009 248"><b>Special Education</b></div> <ul data-bbox="1232 264 1978 370" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <div data-bbox="1169 370 2009 402"><b>Differentiation:</b></div> <ul data-bbox="1232 402 1507 500" style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <div data-bbox="1169 500 2009 532"><b>High-Prep Differentiation:</b></div> <ul data-bbox="1232 532 1680 735" style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <div data-bbox="1169 735 2009 768"><b>Low-Prep Differentiation:</b></div> <ul data-bbox="1232 768 1463 841" style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul> <div data-bbox="1169 857 2009 922"><b>English Language Learners</b></div> <ul data-bbox="1232 938 1978 1117" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> <div data-bbox="1169 1133 2009 1198"><b>Students at Risk for Failure</b></div> <ul data-bbox="1232 1214 1978 1287" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> <div data-bbox="1169 1304 2009 1369"><b>Gifted and Talented</b></div> <ul data-bbox="1232 1385 1978 1490" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul>

	<div> <b>Students with 504 Plans</b> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> </div>
<b>Core Instructional and Supplemental Materials Professional Resources:</b>	<b>Core Instructional, Supplemental, Instructional, and Intervention Resources</b>
<div> <b>Core Professional Resources:</b> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul> </div> <div> <b>Supplemental Professional Resources:</b> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul> </div>	<div> <b>Core Instructional Resources:</b> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul> </div> <div> <b>Supplemental Resources:</b> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul> </div> <div> <b>Intervention Resources:</b> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul> </div>
<b>Interdisciplinary Connections</b>	<b>Integration of Technology through NJSLs</b>
<ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul>

Integration of 21st Century Themes	Media Literacy Integration
<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
Career Education	Global Perspectives
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
<ul style="list-style-type: none"> <li>• <a href="#">Empathy Lesson from the KidsHealth</a></li> <li>• <a href="#">Link to the scanned handouts for the Kindergarten STEAM tasks</a></li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">STEM to STEAM Resources - Edutopia</a></li> <li>• <a href="#">STEAM Resources - Edutopia</a></li> <li>• <a href="#">STEAM Resources and Downloads</a></li> <li>• <a href="#">Resources for Maker Spaces</a></li> </ul>

<b>Kindergarten Engineering/Robotics Unit Summary</b>
<p>Critical thinking and planning are very important STEAM skills, and even the youngest Ozobot programmer can practice these skills with OzoCodes. This unit focuses on having students perform various tasks with a small robot (called and Ozobot). Students will need to understand a concept or challenge they need to complete, figure out a way to solve it, and translate that to the Ozobot using it's programming language.</p>
<b>Standards</b>
<p><b>21st Century Standards:</b>  CCSS.MATH.PRACTICE.  MP1 Make sense of problems and persevere in solving them. CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.  MP7 Look for and make use of structure  CCSS.MATH.CONTENT.K.CC.B.4  CCSS.MATH.CONTENT.K.CC.B.4.A  CCSS.MATH.CONTENT.K.CC.B.4.B  CCSS.MATH.CONTENT.K.CC.B.4.C  CCSS.MATH.CONTENT.K.CC.B.5  CCSS.MATH.CONTENT.K.CC.C.6  CCSS.MATH.CONTENT.K.CC.C.7  CCSS.MATH.CONTENT.1.OA.A.2  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, and use and troubleshoot current technologies and are able to transfer their knowledge to exploring emerging technologies.  ISTE 4a Students know and use a deliberate design process for generative ideas testing theories, creating innovative artifacts, or solving authentic problems.  ISTE 4d Students exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.</p> <p><b>2020 NJSLS - Computer Science and Design Thinking</b>  <b>Core Ideas</b>  Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).  Individuals develop and follow directions as part of daily life.  A sequence of steps can be expressed as an algorithm that a computer can process.  <i>Computers follow precise sequences of steps that automate tasks.</i>  <i>Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.</i>  <i>Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.</i>  <i>Limitations (constraints) must be considered when engineering designs.</i>  <i>Human needs and desires determine which new tools are developed.</i>  <i>Technology has changed the way people live and work.</i></p>

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

### **Performance Expectations**

8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.

8.1.2.AP.4: Break down a task into a sequence of steps.

8.2.2.ED.1: Communicate the function of a product or device.

8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

8.2.2.ED.4: Identify constraints and their role in the engineering design process.

8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.

8.2.2.ITH.2: Explain the purpose of a product and its value.

8.2.2.ITH.3: Identify how technology impacts or improves life.

8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks

8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.

8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

### **8.2 Standards**

8.2.2.A.1 Define products produced as a result of technology or of nature.

8.2.2.A.2 Describe how designed products and systems are useful at school, home and work.

8.2.2.A.3 Identify a system and the components that work together to accomplish its purpose.

8.2.2.A.4 Choose a product to make and plan the tools and materials needed.

8.2.2.A.5 Collaborate to design a solution to a problem affecting the community.

8.2.2.B.1 Identify how technology impacts or improves life.

8.2.2.B.2 Demonstrate how reusing a product affects the local and global environment.

8.2.2.B.3 Identify products or systems that are designed to meet human needs.

8.2.2.B.4 Identify how the ways people live and work has changed because of technology.

8.2.2.C.1 Brainstorm ideas on how to solve a problem or build a product.

8.2.2.C.2 Create a drawing of a product or device that communicates its function to peers and discuss.

8.2.2.C.3 Explain why we need to make new products.

8.2.2.C.4 Identify designed products and brainstorm how to improve one used in the classroom.

8.2.2.C.5 Describe how the parts of a common toy or tool interact and work as part of a system.

8.2.2.C.6 Investigate a product that has stopped working and brainstorm ideas to correct the problem.

8.2.2.D.1 Collaborate and apply a design process to solve a simple problem from everyday experiences.

8.2.2.D.2 Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.

8.2.2.D.3 Identify the strengths and weaknesses in a product or system.

8.2.2.D.4 Identify the resources needed to create technological products or systems.

8.2.2.D.5 Identify how using a tool (such as a bucket or wagon) aids in reducing work.

8.2.2.E.1 List and demonstrate the steps to an everyday task.

8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.

8.2.2.E.3 Create algorithms (a sets of instructions) using a pre-defined set of commands (e.g., to move a student or a character through a maze).

8.2.2.E.4 Debug an algorithm (i.e., correct an error).

8.2.2.E.5 Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).

**Career Ready Practices:**

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence

Essential Questions	Enduring Understanding
What is a robot?	Students must learn that a robot is a system of many parts working together as a whole. Much like a community, knowing how a robot functions will aide in its effectiveness.
How do students effectively translate an idea or concept to another medium such as a robot?	Visualizing the outcome of a product will assist in its completion. This process must be practiced and done when it comes to transferring an idea to another medium such as a robot or program.
How can students use their language skills to speak a “robotic programming” language.	Effective communication to another person is a life skill that can never be over emphasized. Effectively communicating ideas to a robot or digital medium require a high level of problems solving and consideration.

Student Learning Objectives
<ul style="list-style-type: none"> <li>• Today I will teach you the commands for an Ozobot.</li> <li>• Today I will teach you how to create a command for an Ozobot.</li> <li>• Today I will teach you the color codes for the Ozobot.</li> <li>• Today I will teach you to create a free drawing using Ozobots.</li> <li>• Today I will teach you to create a line for your Ozobot.</li> <li>• Today I will teach you to write your name using your Ozobot.</li> <li>• Today I will teach you to write your vocabulary words using your Ozobot.</li> <li>• Today I will teach you to draw a shape with OzoCodes.</li> <li>• Today I will teach you to create a pattern with OzoCodes.</li> <li>• Today I will teach you to play the Hungry, Hungry Ozobot Game.</li> <li>• Today I will teach you to code a story.</li> <li>• Today I will teach you to program your OzoBot to complete a 100 cm dash as fast as possible.</li> </ul>

**Kindergarten Engineering/Robotics  
Unit Sequence**

<b>Intro to Engineering - Using Ozobots</b>		<b>Timeframe:</b> 4 days
<b>Concepts</b>	<b>Lesson Sequence</b>	<b>Formative Assessments</b>
<ul style="list-style-type: none"> <li>• Familiarity with the Ozobots</li> <li>• Learning the Ozoblocks software</li> <li>• Learning the programming language of the Ozobots</li> <li>• Problem solving and decision making</li> </ul>	<ol style="list-style-type: none"> <li>1. Basic Training Lesson 1: Drawing Lines and Maps               <ol style="list-style-type: none"> <li>a. Introduce robots, Ozobots, commands (what are they and how do we create them)</li> </ol> </li> <li>2. Basic Training Lesson 2: Introduction to Color Codes               <ol style="list-style-type: none"> <li>a. Builds on the coding language for Ozobot, focusing on color, order and sequencing</li> </ol> </li> <li>3. Basic Training Lesson 3: Drawing Color Codes               <ol style="list-style-type: none"> <li>a. Discusses choice in programming and provides students with a programming challenge</li> </ol> </li> <li>4. Basic Training Lesson 4: Free Drawing Lines and Color Codes               <ol style="list-style-type: none"> <li>a. This lesson allows the students to create their own line for the Ozobot to follow</li> </ol> </li> </ol>	Teacher Observation Completed Worksheets for each lesson.
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

<b>Robotics Challenges and Tasks</b>		<b>Timeframe:</b> 8 days
<b>Concepts</b>	<b>Lesson Sequence</b>	<b>Formative Assessments</b>
<ul style="list-style-type: none"> <li>• Critical Thinking</li> <li>• Sequencing</li> <li>• Visual programming</li> </ul>	<ol style="list-style-type: none"> <li>5. <b>Write Your Name with OzoCodes</b> Lesson</li> <li>6. <b>Write a vocabulary word</b> with OzoCodes. This lesson will follow the structure of Lesson 5 but with a different end product.</li> <li>7. <b>Draw a shape with OzoCodes</b>. This lesson will follow the structure of Lesson 5 but with a different end product.</li> <li>8. <b>Create a pattern with OzoCodes</b>. This lesson will follow the structure of Lesson 5 but with a different end product.</li> <li>9. <b>Hungry, Hungry Ozobot</b> Game</li> </ol>	Teacher Assessment Collected worksheets used alongside each activity



	<p>10. <b>Code a Story - Here was A Cold Lady Who Swallowed Some Snow</b> Lesson</p> <p>11. <b>Code a Story- Old Lady</b> - This activity will require students to code along with a story</p> <p>12. <b>Ozo Dash</b> this activity will require students to program their OzoBot to complete a 100 cm dash as fast as possible.</p>	
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> <p><b>Summative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <p><b>Benchmark Assessments:</b></p> <ul style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <p><b>Alternative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Homework - extended drawing at home</li> </ul>	<p><b>Special Education</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul> <p><b>English Language Learners</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> </ul>

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<p><b>Core Instructional and Supplemental Materials Professional Resources:</b></p>	<p><b>Core Instructional, Supplemental, Instructional, and Intervention Resources</b></p>
<p><b>Core Professional Resources:</b></p> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul> <p><b>Supplemental Professional Resources:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul>	<p><b>Core Instructional Resources:</b></p> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul> <p><b>Supplemental Resources:</b></p> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul>

	<b>Intervention Resources:</b> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul>
<b>Interdisciplinary Connections</b>	<b>Integration of Technology through NJSLS</b>
<ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul>
<b>Integration of 21st Century Themes</b>	<b>Media Literacy Integration</b>
<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
<b>Career Education</b>	<b>Global Perspectives</b>
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
Teacher Resources <ul style="list-style-type: none"> <li>• <a href="#">Ozobot Evo Guide</a></li> <li>• <a href="#">Ozoblockly Getting started</a></li> </ul>	Lesson Resources and Links <ul style="list-style-type: none"> <li>• <a href="#">Lesson 1-4: K-2 Basic Training Color Codes</a></li> <li>• <a href="#">Lesson 5-8: Write your name (and other words/shapes)</a></li> </ul>

- [Ozobot Calibration Tips](#)
- [Ozobot Color Codes Reference](#)
- [Ozobot Educator Guide](#)
- [Ozobot Log Sheet](#)
- [Ozobot Tips](#)

- [Lesson 9: Hungry, Hungry Ozobot](#)
- [Lesson 10: Cold Lady Story](#)
- [Lesson 11: Clean Energy Cruise](#)
- [Lesson 12: Ozo Dash Challenge](#)

1st Grade STEAM Lab Units	
1st Grade Scope and Sequence	<a href="#">Link</a>
Unit 1 - Coding	<a href="#">Link</a>
Unit 2 - STEAM Challenges	<a href="#">Link</a>
Unit 3 - Engineering/Robotics	<a href="#">Link</a>

1st Grade - Scope and Sequence (**Units are not sequential**)

**Grade 1 Scope and Sequence for STEAM**

Students participate in rotating marking periods.	Unit	Number of Instructional Days
MP -1	<b>Coding</b> - Intro to coding, beginning coding and intermediate coding	<b>12 Instructional Days</b>
MP -2	<b>STEAM Challenges</b> - Intro challenges, simple STEAM challenges, advanced STEAM challenges	<b>12 Instructional Days</b>
MP -3	<b>Engineering/Robotics</b> - Intro to engineering/robotics, robotics challenge task	<b>12 Instructional Days</b>

1st Grade Coding Unit Summary
Students will be utilizing Course B in Code.org. Course B was developed with first graders in mind. Tailored to a novice reading level, this course also assumes limited knowledge of shapes and numbers. This course provides more complex unplugged activities and more variety in puzzles. Students will learn the basics of programming, collaboration techniques, investigation and critical thinking skills, persistence in the face of difficulty, and internet safety. At the end of this course students will create their very own custom game from Play Lab that they can share with a link.
Standards
<b>Common Core English Language Arts Standards</b> 1.L.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., because). 1.SL.1 - Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. 1.SL.1.a - Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). 1.SL.1.b - Build on others' talk in conversations by responding to the comments of others through multiple exchanges. 1.SL.1.c - Ask questions to clear up any confusion about the topics and texts under discussion. 1.SL.2 - Ask and answer questions about key details in a text read aloud or information presented orally or through other media. 1.SL.5 - Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings. 1.W.6 - With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

- 2.SL.1 - Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.  
 2.SL.2 - Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

### Common Core Math Standards

- K.CC.4 - Understand the relationship between numbers and quantities; connect counting to cardinality.  
 K.G.1 - Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.  
 1.G.1 - Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.  
 1.G.2 - Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape,  
 1.MD.2 - Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no  
 1.MD.4 - Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.  
 MP.1 - Make sense of problems and persevere in solving them  
 MP.2 - Reason abstractly and quantitatively  
 MP.3 - Construct viable arguments and critique the reasoning of others  
 MP.4 - Model with mathematics  
 MP.5 - Use appropriate tools strategically  
 MP.6 - Attend to precision  
 MP.7 - Look for and make use of structure  
 MP.8 - Look for and express regularity in repeated reasoning  
 1.OA.1 - Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for  
 1.OA.5 - Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).  
 1.OA.6 - Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g.,  $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$ ); decomposing a number leading to a ten (e.g.,  $13 - 4 = 13 - 3 - 1$ )

### 2020 NJSL - Computer Science and Design Thinking

#### Core Ideas

- Individuals develop and follow directions as part of daily life.  
 A sequence of steps can be expressed as an algorithm that a computer can process  
 Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images).  
 Computers follow precise sequences of steps that automate tasks  
 People work together to develop programs for a purpose, such as expressing ideas or addressing problems.  
 The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary).

#### Performance Expectations

- 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.  
 8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information.  
 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.  
 8.1.2.AP.4: Break down a task into a sequence of steps.  
 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.  
 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.

**CSTA K-12 Computer Science Standards**

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.

1A-AP-13 - Give attribution when using the ideas and creations of others while developing programs.

1A-AP-14 - Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

1B-IC-18 - Discuss computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.

2.L.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., When other kids are happy that makes me happy).

**Next Generation Science Standards**

K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3 - Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

K.L.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

K.SL.1 - Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.

K.SL.2 - Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

**Career Ready Practices:**

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence

Essential Questions	Enduring Understanding
How does the emerging learning understand coding concepts such as writing and analyzing code?	In the primary grade levels, there are many important foundations students must know and carry throughout their tenure in a school system. Understanding age appropriate tasks, such as recognizing patterns, will not only assist in coding but assist in other content areas as well.
How do students take a mental concept and create code that translates that concept?	Being able to take a concept and make it a reality requires great skill, especially when it comes to programming. Students, during this unit, will do just that.
How does persistence in programming translate across the curriculum?	When it comes to computer sciences, and programming specifically, content knowledge and learning is scaffolded with the previously taught concepts. The same goes for the idea of persistence.
How do we successfully debug a program?	Problem solving is a crucial skill to master and there is no easier way to practice this skill



then with “debugging” code.

### Student Learning Objectives

- Today I will teach you to access and set up for Code.org student accounts using the simple login method.
- Today I will teach you to complete the Debugging activity provided on Code.org.
- Today I will teach you to watch the video on programming and complete the activities provided.
- Today I will teach about digital footprints.
- Today I will teach you to debug a program.
- Today I will teach you to create loops to make efficient coding.
- Today I will teach you to write more advanced coding using loops.
- Today I will teach you to program using a collect block to write more advanced coding.
- Today I will teach you to incorporate drawing tasks within your coding.

### [TABLE OF CONTENTS](#)

[1st Grade STEAM Lab Units](#)

### 1st Grade Coding Unit Sequence

Introduction to Coding			Timeframe: 1-2 days
Concepts	Lesson Sequence	Formative Assessments	
<ul style="list-style-type: none"><li>● Learning how to access Code.org</li><li>● Learn basic concepts associated with debugging</li></ul>	<ol style="list-style-type: none"><li>1. Accesses and set up for Code.org student accounts using the simple login method</li><li>2. View/ complete the Debugging activity provided on Code.org Course B: Lesson 1</li></ol>	Teacher observation Debugging Activity Completion	
Differentiation			
<ul style="list-style-type: none"><li>● <b>Special Needs</b> – see resources provided through Code.org</li><li>● <b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li><li>● <b>Gifted Learners</b> – see additional extension resources provided through Code.org</li></ul>			

Beginning Lessons in Code.org			Timeframe: 5 days
Concepts	Lesson Sequence	Formative Assessments	
<ul style="list-style-type: none"> <li>• Introduce the concept of a digital footprint</li> <li>• Persistence with coding</li> </ul>	<ol style="list-style-type: none"> <li>1. Course B: Lesson 2 - Students will watch the video on programming and will complete the activities provided</li> </ol>	Teacher observation Worksheets completion for Lessons 2-5	

<ul style="list-style-type: none"> <li>Beginning methods to sequencing</li> <li>Beginning usage of algorithms</li> <li>Cooperative programming</li> </ul>	<ol style="list-style-type: none"> <li>Course B: Lesson 3 - Students will watch the video on digital footprints and complete the worksheet associated with it</li> <li>Course B: Lesson 4 - Students will watch the video on debugging and complete the worksheet associated with it.</li> <li>Course B: Lesson 5 - Students will work on programming and debugging programs.</li> </ol>	
<b>Differentiation</b>		
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Intermediate Lessons in Code.org		Timeframe: 6 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Using and fair use media</li> <li>Continuing persistence with coding</li> <li>Intermediate methods to sequencing</li> <li>Intermediate usage of algorithms</li> <li>Continue with cooperative programming</li> </ul>	<ol style="list-style-type: none"> <li>Course B: Lesson 6 - This lesson teaches the students about using content that is not their own.</li> <li>Course B: Lesson 7 - This lesson will build on skills learned in the previous lessons and will build on the coding skills taught in the previous lessons.</li> <li>Course B: Lesson 8 - This is an offline lesson about creating loops to make efficient coding.</li> <li>Course B: Lesson 9 - This lesson will have students write more advanced coding using loops.</li> <li>Course B: Lesson 10 - Students will program using a collect block to write more advanced coding.</li> <li>Course B: Lesson 11 - Incorporates drawing tasks within the coding that the students will be using.</li> </ol>	Teacher Observation Worksheets for lessons 6-11 Written Assessments
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see additional extension resources provided through Code.org</li> </ul>		

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Formative Assessments:	Special Education

<ul style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul>
<p><b>Summative Assessments:</b></p>	
<ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul>	<p><b>English Language Learners</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul>
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Resources	Links
<ul style="list-style-type: none"> <li>• <a href="#">Course B - COMPLETE COURSE</a></li> <li>• <a href="#">Course B - Overview from Code.org</a></li> <li>• <a href="#">Course B - Standards</a></li> <li>• <a href="#">Course B - Vocabulary</a></li> <li>• <a href="#">Course B - Other Resources</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Course B - COMPLETE COURSE</a></li> <li>• <a href="#">Course B - Overview from Code.org</a></li> <li>• <a href="#">Course B - Standards</a></li> <li>• <a href="#">Course B - Vocabulary</a></li> <li>• <a href="#">Course B - Other Resources</a></li> </ul>

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1st Grade STEAM Challenges Unit Summary
<p>In this unit, students will continue using the problem solving skills learned in the previous year to complete these STEAM challenges. The major difference with this unit (for 1st grade) is the increase in lessons relating to empathy. It's vital for students to not only understand how to accomplish a task, but why they must accomplish it. Building in more empathy goals will help the students become more accustomed to this.</p>
Standards
<p><b>NGSS Standards</b></p> <p>K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p>K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p>K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p> <p>K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.</p>

- K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.  
 K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

## **2020 NJSL - Computer Science and Design Thinking**

### **Core Ideas**

Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).  
 Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process.

*Computers follow precise sequences of steps that automate tasks.*

*Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.*

*Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.*

*Limitations (constraints) must be considered when engineering designs.*

*Human needs and desires determine which new tools are developed.*

*Technology has changed the way people live and work.*

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

### **Performance Expectations**

- 8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.
- 8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.
- 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.
- 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.
- 8.1.2.AP.4: Break down a task into a sequence of steps.
- 8.2.2.ED.1: Communicate the function of a product or device.
- 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ED.4: Identify constraints and their role in the engineering design process.
- 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.
- 8.2.2.ITH.2: Explain the purpose of a product and its value.
- 8.2.2.ITH.3: Identify how technology impacts or improves life.
- 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks
- 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
- 8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.
- 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

### **8.2 Standards**

- 8.2.2.A.1 Define products produced as a result of technology or of nature.
- 8.2.2.A.2 Describe how designed products and systems are useful at school, home and work.
- 8.2.2.A.3 Identify a system and the components that work together to accomplish its purpose.
- 8.2.2.A.4 Choose a product to make and plan the tools and materials needed.
- 8.2.2.A.5 Collaborate to design a solution to a problem affecting the community.
- 8.2.2.B.1 Identify how technology impacts or improves life.

8.2.2.B.2 Demonstrate how reusing a product affects the local and global environment.  
 8.2.2.B.3 Identify products or systems that are designed to meet human needs.  
 8.2.2.B.4 Identify how the ways people live and work has changed because of technology.  
 8.2.2.C.1 Brainstorm ideas on how to solve a problem or build a product.  
 8.2.2.C.2 Create a drawing of a product or device that communicates its function to peers and discuss.  
 8.2.2.C.3 Explain why we need to make new products.  
 8.2.2.C.4 Identify designed products and brainstorm how to improve one used in the classroom.  
 8.2.2.C.5 Describe how the parts of a common toy or tool interact and work as part of a system.  
 8.2.2.C.6 Investigate a product that has stopped working and brainstorm ideas to correct the problem.  
 8.2.2.D.1 Collaborate and apply a design process to solve a simple problem from everyday experiences.  
 8.2.2.D.2 Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.  
 8.2.2.D.3 Identify the strengths and weaknesses in a product or system.  
 8.2.2.D.4 Identify the resources needed to create technological products or systems.  
 8.2.2.D.5 Identify how using a tool (such as a bucket or wagon) aids in reducing work.  
 8.2.2.E.1 List and demonstrate the steps to an everyday task.

8.2.2.E.3 Create algorithms (a set of instructions) using a predefined set of commands (e.g., to move a student or a character through a maze).

8.2.2.E.4 Debug an algorithm (i.e., correct an error).

8.2.2.E.5 Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).

#### **Career Ready Practices:**

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence

Essential Questions	Enduring Understanding
How do we problem solve utilizing various tasks?	Continuing to solve problems through age appropriate hands on activities is great for student development. The tasks in this unit provide age appropriate physical challenges for students.
How do students continue to learn STEAM concepts?	The fields of science, technology, engineering, arts and math are, at their core, all centered around being good problem solvers. This topic can be explored through a variety of tasks and problem solving scenarios.
How can students effectively share ideas with partners or a group?	Building and emphasizing effective communication is something that must be deliberate and intentional. In this unit, communication will be paramount to success.

#### **Student Learning Objectives**

- Today I will teach you to create a symmetrical paper heart.
- Today I will teach you to create a path along a wall that will make a marble take more than 20 seconds to reach the bottom.
- Today I will teach you to design a structure that slows down the rock as it falls!
- Today I will teach you to create a banjo that can play different notes.
- Today I will teach you to create a hat that can hold a sheet of paper in front of you.
- Today I will teach you to create a card house that is at least 1 foot tall without using glue or tape.
- Today I will teach you to Line up dominoes so that, when they fall, they cause an item to roll or fall.
- Today I will teach you to Create a boat that floats.
- Today I will teach you to create the tallest free-standing structure.
- Today I will teach you to create the largest bubble you can.
- Today I will teach you to find a way to soften the sound of a noisy toy.
- Today I will teach you to create a ramp that will cause a toy car to gain speed going down it.

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**1st Grade STEAM Challenges  
Unit Sequence**

<b>Intro to STEAM Challenges - Focus on Empathy</b>		<b>Timeframe:</b> 1 days
<b>Concepts</b>	<b>Lesson Sequence</b>	<b>Formative Assessments</b>
<ul style="list-style-type: none"> <li>• Persistence when solving a problem</li> <li>• Discuss the concept of empathy</li> </ul>	<ol style="list-style-type: none"> <li>1. Refer to the code.org lesson on persistence and rewatch the correlating video/materials as needed               <ol style="list-style-type: none"> <li>a. Complete the KidsHealth lesson on empathy and feelings. This will help students understand the tasks related to empathy and a more personal level.</li> </ol> </li> </ol>	Teacher observation KidsHealth Worksheet #1 - "I Feel..." KidsHealth Worksheet #2 - "How Would You Feel If..."
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create "bugs" in their creations and have other students solve the problems</li> </ul>		

<b>Simple STEAM Challenges</b>		<b>Timeframe:</b> 5 days
<b>Concepts</b>	<b>Lesson Sequence</b>	<b>Formative Assessments</b>
<ul style="list-style-type: none"> <li>• Learning the problem solving process for STEAM challenges</li> </ul>	<ol style="list-style-type: none"> <li>2. <b>Heart Art</b> - The focus of this lesson is having the students go through the process of using the STEAM challenge</li> </ol>	Teacher observation Worksheets associated with each lesson



<ul style="list-style-type: none"> <li>• Problem solving</li> <li>• Gravity</li> <li>• Friction</li> <li>• Sound production</li> <li>• Engineering</li> <li>• Trial and error</li> </ul>	<p>sheets by creating a symmetrical paper heart.</p> <ol style="list-style-type: none"> <li>3. <b>Simply Marbel-ous: Gravity</b> - Create a path along a wall that will make a marble take more than 20 seconds to reach the bottom               <ol style="list-style-type: none"> <li>a. Empathy Focus: Rock slides keep happening and in Yosemite National Park. Design a structure that slows down the rock as it falls!</li> </ol> </li> <li>4. <b>Box Banjo: Sound</b> - Create a banjo that can play different notes.</li> <li>5. <b>The Mad Hatter</b> - Create a hat that can hold a sheet of paper in front of you.               <ol style="list-style-type: none"> <li>a. Empathy Focus: A group of workers in a field need protection from the sun! Make a hat for them that keeps them cool!</li> </ol> </li> <li>6. <b>It's Not Easy Making Green</b> - Use two or more different colors of paint to create at least three different shades of green.               <ol style="list-style-type: none"> <li>a. Your little brother or sister is making a picture but doesn't have 3 of the colors they need for the grass! Help them by mixing the colors you have.</li> </ol> </li> </ol>	<p>STEM Performance Rubric</p>
<p align="center"><b>Differentiation</b></p>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Advanced STEAM Challenges		Timeframe: 6 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>• Engineering with minimal supplies</li> <li>• Physics</li> <li>• Transfer of energy</li> <li>• Flotation</li> <li>• Advanced engineering</li> <li>• Fluid dynamics</li> </ul>	<ol style="list-style-type: none"> <li>7. <b>House of Cards</b> - Without using glue or tape, create a card house that is at least 1 foot tall.</li> <li>8. <b>The Domino Effect: Physics</b> - Line up dominoes so that, when they fall, they cause somethings to roll or fall.</li> <li>9. <b>Float That Boat!</b> - Create a boat that floats.               <ol style="list-style-type: none"> <li>a. Empathy Focus: A family is stuck on an island and needs to get off! Create a boat that can carry them to safety.</li> </ol> </li> <li>10. <b>Marshmallow Mansion</b> - Create the tallest structure you can. It must be able to stand on its own.               <ol style="list-style-type: none"> <li>a. Empathy Focus: Boats keep crashing near the beach because there isn't a lighthouse to show them the</li> </ol> </li> </ol>	<p>Teacher observation Worksheets associated with each lesson STEM Performance Rubric</p>

	<p>way! Create the tallest lighthouse you can to keep these boats safe.</p> <p><b>11. Big Bubble Blast</b> - Create the largest bubble you can.</p> <p><b>12. Hide That Sound!</b> - Find a way to soften the sound of a noisy toy.</p> <p>a. Empathy Focus: Your baby brother or sister can't fall to sleep because of a toy that plays sounds at night. Create something that makes the toy as quiet as possible.</p> <p><b>13. Road Work: Friction</b> - Create a ramp that will cause a toy car to gain speed going down it.</p> <p>a. Empathy Focus: The slide in the playground is too slow! We need to make it faster for students to go down!</p>	
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> <p><b>Summative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <p><b>Benchmark Assessments:</b></p>	<p><b>Special Education</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul>

<ul style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <p><b>Alternative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul>	<p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• <i>Clubbing activities</i></li> <li>• <i>Exploration by interest</i></li> <li>• <i>Flexible groupings</i></li> </ul> <p><b>English Language Learners</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> <p><b>Students at Risk for Failure</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> <p><b>Gifted and Talented</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul> <p><b>Students with 504 Plans</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul>
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Resources	Links
<ul style="list-style-type: none"><li>• <a href="#">1st Grade STEAM Challenges - Worksheets</a></li><li>• </li></ul>	<ul style="list-style-type: none"><li>• <a href="#">STEM to STEAM Resources - Edutopia</a></li><li>• <a href="#">STEAM Resources - Edutopia</a></li><li>• <a href="#">STEAM Resources and Downloads</a></li><li>• <a href="#">Resources for Maker Spaces</a></li></ul>

## 1st Grade Engineering Unit Summary

Critical thinking abilities are heightened in this unit of study. Students will need to take their prior knowledge of the Ozobots and apply them to many different challenges. Students will again need to understand a concept or challenge they need to complete, figure out a way to solve it, and translate that to the Ozobot using its programming language.

### Standards

#### 21st Century Standards:

##### NGSS Standards

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.
- K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.
- K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

#### 2020 NJSL - Computer Science and Design Thinking

##### Core Ideas

Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).

Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process.

*Computers follow precise sequences of steps that automate tasks.*

*Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.*

*Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.*

*Limitations (constraints) must be considered when engineering designs.*

*Human needs and desires determine which new tools are developed.*

*Technology has changed the way people live and work.*

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

##### Performance Expectations

8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

*8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.*

*8.1.2.AP.4: Break down a task into a sequence of steps.*

8.2.2.ED.1: Communicate the function of a product or device.

8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

8.2.2.ED.4: Identify constraints and their role in the engineering design process.

- 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.
- 8.2.2.ITH.2: Explain the purpose of a product and its value.
- 8.2.2.ITH.3: Identify how technology impacts or improves life.
- 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks
- 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.
- 8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.
- 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

## 8.2 Standards

- 8.2.2.A.1 Define products produced as a result of technology or of nature.
- 8.2.2.A.2 Describe how designed products and systems are useful at school, home and work.
- 8.2.2.A.3 Identify a system and the components that work together to accomplish its purpose.
- 8.2.2.A.4 Choose a product to make and plan the tools and materials needed.
- 8.2.2.A.5 Collaborate to design a solution to a problem affecting the community.
- 8.2.2.B.1 Identify how technology impacts or improves life.
- 8.2.2.B.2 Demonstrate how reusing a product affects the local and global environment.
- 8.2.2.B.3 Identify products or systems that are designed to meet human needs.
- 8.2.2.B.4 Identify how the ways people live and work has changed because of technology.
- 8.2.2.C.1 Brainstorm ideas on how to solve a problem or build a product.
- 8.2.2.C.2 Create a drawing of a product or device that communicates its function to peers and discuss.
- 8.2.2.C.3 Explain why we need to make new products.
- 8.2.2.C.4 Identify designed products and brainstorm how to improve one used in the classroom.
- 8.2.2.C.5 Describe how the parts of a common toy or tool interact and work as part of a system.
- 8.2.2.C.6 Investigate a product that has stopped working and brainstorm ideas to correct the problem.
- 8.2.2.D.1 Collaborate and apply a design process to solve a simple problem from everyday experiences.
- 8.2.2.D.2 Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
- 8.2.2.D.3 Identify the strengths and weaknesses in a product or system.
- 8.2.2.D.4 Identify the resources needed to create technological products or systems.
- 8.2.2.D.5 Identify how using a tool (such as a bucket or wagon) aids in reducing work.
- 8.2.2.E.1 List and demonstrate the steps to an everyday task.
- 8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.
- 8.2.2.E.3 Create algorithms (sets of instructions) using a predefined set of commands (e.g., to move a student or a character through a maze).
- 8.2.2.E.4 Debug an algorithm (i.e., correct an error).
- 8.2.2.E.5 Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).

## Career Ready Practices:

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP5. Consider the environmental, social and economic impacts of decisions.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence	
Essential Questions	Enduring Understanding
What is a robot?	Students must learn that a robot is a system of many parts working together as a whole. Each of these parts have a specific role and knowing how to interact with these parts will lead to success.
How do students effectively translate an idea or concept to another medium such as a robot?	Visualizing and translating more complex ideas is a process must be practiced. When it comes to transferring an idea to another medium such as a robot or program, as the outcomes get more complex, so must the planning.
How can students use their language skills to speak a “robotic programming” language.	As students understand and develop language over a period of time, so must they with the language that a robot or program understands. Effectively communicating ideas to a robot or digital medium require a high level of problems solving and consideration.

Student Learning Objectives
<ul style="list-style-type: none"> <li>• Today I will teach you the basic commands of an Ozobot.</li> <li>• Today I will teach you the codes for color with your Ozobot.</li> <li>• Today I will teach you color code using your Ozobot.</li> <li>• Today I will teach you to create your own line for the Ozobot to follow.</li> <li>• Today I will teach you how your Obzobot sees the environment.</li> <li>• Today I will teach you the point counter OzoCodes.</li> <li>• Today I will teach you about the first 4 presidents of the United States and how to use OzoCodes to navigate their Ozobot in the correct order.</li> <li>• Today I will teach you first lesson of OzoBlockly (the Ozobot’s online programming language.)</li> <li>• Today I will teach you to program their OzoBot to complete a 100 cm dash as fast as possible.</li> </ul>

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[1st Grade STEAM Lab Units](#)

### 1st Grade Engineering Unit Sequence

Intro to Engineering - Using Ozobots		Timeframe: 4 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>• Familiarity with the Ozobots</li> <li>• Learning the Ozoblocks software</li> <li>• Learning the programming language of the Ozobots</li> </ul>	<ol style="list-style-type: none"> <li>1. Basic Training Lesson 1: Drawing Lines and Maps               <ol style="list-style-type: none"> <li>a. Introduce robots, Ozobots, commands (what are they and how do we create them)</li> </ol> </li> <li>2. Basic Training Lesson 2: Introduction to Color Codes</li> </ol>	Teacher Observation Completed Worksheets for each lesson.



<ul style="list-style-type: none"> <li>Problem solving and decision making</li> </ul>	<ol style="list-style-type: none"> <li>a. Builds on the coding language for Ozobot, focusing on color, order and sequencing</li> </ol> <ol style="list-style-type: none"> <li>3. Basic Training Lesson 3: Drawing Color Codes               <ol style="list-style-type: none"> <li>a. Discusses choice in programming and provides students with a programming challenge</li> </ol> </li> <li>4. Basic Training Lesson 4: Free Drawing Lines and Color Codes               <ol style="list-style-type: none"> <li>a. This lesson allows the students to create their own line for the Ozobot to follow</li> </ol> </li> </ol>	
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li><b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li><b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Robotics Challenges and Tasks		Timeframe: 8 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Critical Thinking</li> <li>Sequencing</li> <li>Visual programming</li> <li>Block Coding</li> </ul>	<ol style="list-style-type: none"> <li>5. <b>Write Your Name with OzoCodes</b> Lesson</li> <li>6. <b>Mission to Mars</b> - This lesson will</li> <li>7. Create - Students will bring in objects from home to code with their OzoBots</li> <li>8. <b>Ozobot Sees</b> - This lesson will focus on teaching students how Ozobot sees its environment</li> <li>9. <b>Modeling Animal Behavior</b> - Students will learn about point counter OzoCodes.</li> <li>10. <b>President's Parade</b> - Students will learn about the first 4 presidents of the United States and will need to use OzoCodes to navigate their Ozobot in the correct order</li> <li>11. <b>OzoBlockly Basic Training 1</b> - This lesson will have the students learning the first lesson of OzoBlockly, the Ozobot's online programming language.</li> <li>12. <b>Ozo Dash</b> this activity will require students to program their OzoBot to complete a 100 cm dash as fast as possible.</li> </ol>	
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li><b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li><b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
<div data-bbox="216 228 1148 293"> <b>Formative Assessments:</b> </div> <ul data-bbox="275 310 594 456" style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> <div data-bbox="216 472 1148 537"> <b>Summative Assessments:</b> </div> <ul data-bbox="275 553 737 699" style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <div data-bbox="216 716 1148 781"> <b>Benchmark Assessments:</b> </div> <ul data-bbox="275 797 642 886" style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <div data-bbox="216 902 1148 967"> <b>Alternative Assessments:</b> </div> <ul data-bbox="275 984 646 1097" style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul>	<div data-bbox="1182 228 2001 293"> <b>Special Education</b> </div> <ul data-bbox="1234 310 1976 415" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p data-bbox="1182 415 1335 440"><b>Differentiation:</b></p> <ul data-bbox="1234 440 1507 545" style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p data-bbox="1182 545 1430 570"><b>High-Prep Differentiation:</b></p> <ul data-bbox="1234 570 1682 773" style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <p data-bbox="1182 773 1423 797"><b>Low-Prep Differentiation:</b></p> <ul data-bbox="1234 797 1461 886" style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul> <div data-bbox="1182 902 2001 967"> <b>English Language Learners</b> </div> <ul data-bbox="1234 976 1969 1162" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> <div data-bbox="1182 1179 2001 1243"> <b>Students at Risk for Failure</b> </div> <ul data-bbox="1234 1252 1969 1341" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> <div data-bbox="1182 1357 2001 1422"> <b>Gifted and Talented</b> </div> <ul data-bbox="1234 1430 1969 1520" style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul>

	<ul style="list-style-type: none"> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul>
	<b>Students with 504 Plans</b>
	<ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul>
<b>Core Instructional and Supplemental Materials Professional Resources:</b>	<b>Core Instructional, Supplemental, Instructional, and Intervention Resources</b>
<b>Core Professional Resources:</b> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul>	<b>Core Instructional Resources:</b> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul>
<b>Supplemental Professional Resources:</b> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul>	<b>Supplemental Resources:</b> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul>
	<b>Intervention Resources:</b> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul>
<b>Interdisciplinary Connections</b>	<b>Integration of Technology through NJSLs</b>
<ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul>

Integration of 21st Century Themes	Media Literacy Integration
<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
Career Education	Global Perspectives
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
<p>Teacher Resources</p> <ul style="list-style-type: none"> <li>• <a href="#">Ozobot Evo Guide</a></li> <li>• <a href="#">Ozoblockly Getting started</a></li> <li>• <a href="#">Ozobot Calibration Tips</a></li> <li>• <a href="#">Ozobot Color Codes Reference</a></li> <li>• <a href="#">Ozobot Educator Guide</a></li> <li>• <a href="#">Ozobot Log Sheet</a></li> <li>• <a href="#">Ozobot Tips</a></li> </ul>	<p>Lesson Resources and Links</p> <ul style="list-style-type: none"> <li>• <a href="#">Lesson 1-4: K-2 Basic Training Color Codes</a></li> <li>• <a href="#">Lesson 5: Write Your Name</a></li> <li>• <a href="#">Lesson 6: Mission to Mars</a></li> <li>• <a href="#">Lesson 7: Create!</a></li> <li>• <a href="#">Lesson 8: Ozobot Sees</a></li> <li>• <a href="#">Lesson 9: Modeling Animal Habits</a></li> <li>• <a href="#">Lesson 10: Presidents Parade</a></li> <li>• <a href="#">Lesson 11: OzoBlockly Basic Training 1</a></li> <li>• <a href="#">Lesson 12: Ozo Dash Challenge</a></li> </ul>

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## 2nd Grade STEAM Lab Units

2nd Grade - Scope and Sequence

[Link](#)

Unit 1 - Coding

[Link](#)

Unit 2 - STEAM Challenges

[Link](#)

Unit 3 - Engineering/Robotics

[Link](#)

2nd Grade - Scope and Sequence (**Units are not sequential**)**Grade 2 Scope and Sequence for STEAM**

Students participate in rotating marking periods.	Unit	Number of Instructional Days
<b>MP -1</b>	<b>Coding</b> - Intro to coding, beginning coding and intermediate coding	<b>12 Instructional Days</b>
<b>MP -2</b>	<b>STEAM Challenges</b> - Intro challenges, simple STEAM challenges, advanced STEAM challenges	<b>12 Instructional Days</b>
<b>MP -3</b>	<b>Engineering/Robotics</b> - Intro to engineering/robotics, robotics challenge task	<b>12 Instructional Days</b>

2nd Grade Coding Unit Summary
Course C was developed for students in and around the second grade. It uses a limited understanding of shapes and elementary math concepts. Students will create programs with loops, events, and conditionals. They will translate their initials into binary, investigate different problem-solving techniques, and discuss how to respond to cyberbullying. By the end of the course, students will create interactive games that they can share. Each concept in Course C is taught from the beginning, graduating toward experiences that allow for growth and creativity to provide all students a rich and novel programming experience.
Standards
<b>Common Core English Language Arts Standards</b> 2.L.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., When other kids are happy that makes me happy). 2.SL.1 - Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. 2.SL.1.a - Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). 2.SL.1.b - Build on others' talk in conversations by linking their comments to the remarks of others. 2.SL.1.b - Build on others' talk in conversations by linking their comments to the remarks of others. 2.SL.2 - Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. 3-5-ETS1-1 - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 5.L.6 - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition). 5.NBT.5 - Fluently multiply multi-digit whole numbers using the standard algorithm. 5.SL.1 - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing

their own clearly.

5.SL.1.a - Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

5.SL.4 - Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

5.SL.6 - Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

11-12.SL.1 - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively

11-12.SL.1.d - Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation

11-12.SL.6 - Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate

### **Common Core Math Standards**

2.G.1 - Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.5 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

2.G.2 - Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

2.G.3 - Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths.

2.MD.1 - Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

MP.1 - Make sense of problems and persevere in solving them

MP.2 - Reason abstractly and quantitatively

MP.3 - Construct viable arguments and critique the reasoning of others

MP.5 - Use appropriate tools strategically

MP.6 - Attend to precision

MP.7 - Look for and make use of structure

MP.8 - Look for and express regularity in repeated reasoning

2.OA.1 - Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a system

### **2020 NJSLS - Computer Science and Design Thinking**

#### **Core Ideas**

Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process

Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images).

Computers follow precise sequences of steps that automate tasks

People work together to develop programs for a purpose, such as expressing ideas or addressing problems.

The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary).

#### **Performance Expectations**

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information.

8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.

8.1.2.AP.4: Break down a task into a sequence of steps.

8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.

8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.

### **CSTA K-12 Computer Science Standards**

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.  
 1A-AP-14 - Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.  
 1B-AP-10 - Create programs that include sequences, events, loops, and conditionals.

### Next Generation Science Standards

K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.  
 K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.  
 K-2-ETS1-3 - Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

### Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.  
 CRP2. Apply appropriate academic and technical skills.  
 CRP4. Communicate clearly and effectively and with reason.  
 CRP5. Consider the environmental, social and economic impacts of decisions.  
 CRP6. Demonstrate creativity and innovation.  
 CRP7. Employ valid and reliable research strategies.  
 CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  
 CRP9. Model integrity, ethical leadership and effective management.  
 9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.  
 9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Essential Questions	Enduring Understanding
How does increasing the rigor in coding concepts such as writing and analyzing code impact the learner?	As the rigors of learning progresses in other content areas, so must the rigor increase in the computer sciences. The coding concepts in this unit begin to increase and build upon previously taught concepts in a greater more applicable way.
How do students take a mental concept and create code that translates that concept?	Being able to take a concept and make it a reality requires great skill, especially when it comes to programming. Students, during this unit, will do just that. In 2nd grade, the concepts and thought processes are more complex
How does persistence in programming translate across the curriculum?	When it comes to computer sciences, and programming specifically, content knowledge and learning is scaffolded with the previously taught concepts. The same goes for the idea of persistence.
How do we successfully debug a program?	Problem solving is a crucial skill to master and there is no easier way to practice this skill then with “debugging” code.

### Student Learning Objectives



- Today I will teach you to read and write code.
- Today I will teach you to debug and problem solve issues within your coding.
- Today I will teach you to create your own projects to share with their classmates.
- Today I will teach you to program algorithms with Angry Birds.
- Today I will teach you to debug programs with Angry Birds.
- Today I will teach you to complete the paper airplane task.
- Today I will teach you to write a code to create artwork.
- Today I will teach you to act out loops through dance moves in an unplugged activity.
- Today I will teach you to create more complex programming with loops.
- Today I will teach you to program and create art with loops.
- Today I will teach you to use the more advanced collecting block to program.
- Today I will teach you to build your own Flappy Bird game.

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## [2nd Grade STEAM Lab Units](#)

### 2nd Grade Coding Unit Sequence

Introduction to Coding		Timeframe: 1 day
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>• Learning how to access Code.org</li> <li>• Learn how persistence applies to programming</li> </ul>	<ol style="list-style-type: none"> <li>1. Accesses and set up for Code.org student accounts using the simple login method</li> <li>2. View and complete the building a foundation lesson found on Code.org, Course C: Lesson 1. Materials needed: Spice Gumdrops, toothpicks and a small dixie cup.</li> </ol>	Teacher observation
Differentiation		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Partner students with various with one or two other students.</li> <li>• <b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li>• <b>Gifted Learners</b> – Challenge students by completing the task on their own.</li> </ul>		

Beginning Lessons in Code.org		Timeframe: 5 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>• Basics of algorithms</li> </ul>	<ol style="list-style-type: none"> <li>1. Course C: Lesson 2 - Students will watch the video on</li> </ol>	Teacher observation

<ul style="list-style-type: none"> <li>Basics of debugging</li> <li>Basics of cooperative programming</li> <li>Basics of additional programming tasks beyond movement</li> </ul>	<p>programming algorithms with Angry Birds and complete the tasks assigned to them.</p> <ol style="list-style-type: none"> <li>Course C: Lesson 3 - Students will start learning about debugging programs with Angry Birds.</li> <li>Course C: Lesson 4 - Students will watch a video on algorithms and complete the paper airplane task</li> <li>Course C: Lesson 5 - Students will program movement and collecting blocks.</li> </ol>	Worksheets completion for Lessons 2-5
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see additional extension resources provided through Code.org</li> </ul>		

Intermediate Lessons in Code.org		Timeframe: 6 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Students will use movement blocks to create artwork</li> <li>Students will create more complex programs using loops.</li> <li>Students will create artwork with loops</li> <li>Students will learn about creating events</li> </ul>	<ol style="list-style-type: none"> <li>Course C: Lesson 6 - This lesson has the students writing code that creates artwork</li> <li>Course C: Lesson 7 - This lesson has the students acting out loops through dance moves in an unplugged activity.</li> <li>Course C: Lesson 8 - In this lesson, students will create more complex programming with loops.</li> <li>Course C: Lesson 9 - In this lesson, students will be programming and creating art with loops</li> <li>Course C: Lesson 10 - Students will use the more advanced collecting block to program.</li> <li>Course C: Lesson 11 - This is an offline event that explains what events are</li> <li>Course C: Lesson 12 - Students will be building their own Flappy Bird game.</li> </ol>	<p>Teacher Observation</p> <p>Worksheets for lessons 6-12</p> <p>Written Assessments</p>
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li><b>Special Needs</b> – see resources provided through Code.org</li> <li><b>ESL</b> – Use the translation feature provided through Code.org (at the the bottom right corner of each web page)</li> <li><b>Gifted Learners</b> – see additional extension resources provided through Code.org</li> </ul>		

Evidence of Learning (Assessments)	Accommodations and Modifications
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<div data-bbox="216 115 1146 180"> <b>Formative Assessments:</b> </div> <div data-bbox="216 180 1146 358"> <ul style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> </div> <div data-bbox="216 358 1146 423"> <b>Summative Assessments:</b> </div> <div data-bbox="216 423 1146 602"> <ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> </div> <div data-bbox="216 602 1146 667"> <b>Benchmark Assessments:</b> </div> <div data-bbox="216 667 1146 789"> <ul style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> </div> <div data-bbox="216 789 1146 854"> <b>Alternative Assessments:</b> </div> <div data-bbox="216 854 1146 1005"> <ul style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul> </div>	<div data-bbox="1171 115 2003 180"> <b>Special Education</b> </div> <div data-bbox="1171 180 2003 781"> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul> </div> <div data-bbox="1171 781 2003 846"> <b>English Language Learners</b> </div> <div data-bbox="1171 846 2003 1057"> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> </div> <div data-bbox="1171 1057 2003 1122"> <b>Students at Risk for Failure</b> </div> <div data-bbox="1171 1122 2003 1235"> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> </div> <div data-bbox="1171 1235 2003 1300"> <b>Gifted and Talented</b> </div> <div data-bbox="1171 1300 2003 1446"> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul> </div> <div data-bbox="1171 1446 2003 1520"> <b>Students with 504 Plans</b> </div>
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	<ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul>
<b>Core Instructional and Supplemental Materials Professional Resources:</b>	<b>Core Instructional, Supplemental, Instructional, and Intervention Resources</b>
<div><b>Core Professional Resources:</b></div> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul> <div><b>Supplemental Professional Resources:</b></div> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul>	<div><b>Core Instructional Resources:</b></div> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul> <div><b>Supplemental Resources:</b></div> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul> <div><b>Intervention Resources:</b></div> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul>
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<ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul>
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<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
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Resources	Links
<ul style="list-style-type: none"> <li>• <a href="#">Course C - COMPLETE COURSE</a></li> <li>• <a href="#">Course C - Overview from Code.org</a></li> <li>• <a href="#">Course C - Standards</a></li> <li>• <a href="#">Course C - Vocabulary</a></li> <li>• <a href="#">Course C - Other Resources</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Course C - COMPLETE COURSE</a></li> <li>• <a href="#">Course C - Overview from Code.org</a></li> <li>• <a href="#">Course C - Standards</a></li> <li>• <a href="#">Course C - Vocabulary</a></li> <li>• <a href="#">Course C - Other Resources</a></li> </ul>

## 2nd Grade STEAM Challenges Unit Summary

In this unit, students will continue building on the problem solving skills learned in the previous years. The major difference with this unit (for 2nd grade) is the subject matter in which the empathy lessons are focusing on. These lessons, while still focusing on perseverance, grit and determination, also have an increased focus on empathy for others in the community. Completing challenges that impact their families, communities and beyond are one of main themes for this unit.

### Standards

#### NGSS Standards

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.
- K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.
- K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
- 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
- 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
- 2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

#### 2020 NJSLS - Computer Science and Design Thinking

##### Core Ideas

Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).

Individuals develop and follow directions as part of daily life.

A sequence of steps can be expressed as an algorithm that a computer can process.

*Computers follow precise sequences of steps that automate tasks.*

Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.

*Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.*

*Limitations (constraints) must be considered when engineering designs.*

*Human needs and desires determine which new tools are developed.*

*Technology has changed the way people live and work.*

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

##### Performance Expectations

8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

**8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.**

**8.1.2.AP.4: Break down a task into a sequence of steps.**

8.2.2.ED.1: Communicate the function of a product or device.

8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

8.2.2.ED.4: Identify constraints and their role in the engineering design process.

8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.

8.2.2.ITH.2: Explain the purpose of a product and its value.

8.2.2.ITH.3: Identify how technology impacts or improves life.

8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks

8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.

8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

**8.2 Standards**

8.2.2.A.1 Define products produced as a result of technology or of nature.

8.2.2.A.2 Describe how designed products and systems are useful at school, home and work.

8.2.2.A.3 Identify a system and the components that work together to accomplish its purpose.

8.2.2.A.4 Choose a product to make and plan the tools and materials needed.

8.2.2.A.5 Collaborate to design a solution to a problem affecting the community.

8.2.2.B.1 Identify how technology impacts or improves life.

8.2.2.B.2 Demonstrate how reusing a product affects the local and global environment.

8.2.2.B.3 Identify products or systems that are designed to meet human needs.

8.2.2.B.4 Identify how the ways people live and work has changed because of technology.

8.2.2.C.1 Brainstorm ideas on how to solve a problem or build a product.

8.2.2.C.2 Create a drawing of a product or device that communicates its function to peers and discuss.

8.2.2.C.3 Explain why we need to make new products.

8.2.2.C.4 Identify designed products and brainstorm how to improve one used in the classroom.

8.2.2.C.5 Describe how the parts of a common toy or tool interact and work as part of a system.

8.2.2.C.6 Investigate a product that has stopped working and brainstorm ideas to correct the problem.

8.2.2.D.1 Collaborate and apply a design process to solve a simple problem from everyday experiences.

8.2.2.D.2 Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.

8.2.2.D.3 Identify the strengths and weaknesses in a product or system.

8.2.2.D.4 Identify the resources needed to create technological products or systems.

8.2.2.D.5 Identify how using a tool (such as a bucket or wagon) aids in reducing work.

8.2.2.E.1 List and demonstrate the steps to an everyday task.

8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.

8.2.2.E.3 Create algorithms (a sets of instructions) using a predefined set of commands (e.g., to move a student or a character through a maze).

8.2.2.E.4 Debug an algorithm (i.e., correct an error).

8.2.2.E.5 Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).

**Career Ready Practices:**

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Essential Questions	Enduring Understanding
How do we problem solve, utilizing various tasks that focus on empathy?	Solving problems are great. Solving problems that help others by means of empathy is even better. In this unit, the idea of empathy is stress and requires students to not only solve a problem, but solve a problem that someone else is experiencing.
How do students continue to learn STEAM concepts?	The rigor of the STEAM challenges increases in this unit and requires students to draw on prior knowledge and outside resources to complete their tasks.
How can students effectively share ideas with partners or a group?	Building and emphasizing effective communication is something that must be deliberate and intentional. In this unit, students need to increase their communication in order to be successful.

### Student Learning Objectives

- Today I will teach you to persevere when coding.
- Today I will teach you to use cardboard boxes and rubber bands to create guitars that each make a different sound.
- Today I will teach you to build a house that stays the coolest in direct sunlight.
- Today I will teach you to create a tool that a meteorologist would use to measure changes in the weather.
- Today I will teach you to create a bat that has a wingspan that is exactly the same length as your own arm span.
- Today I will teach you to build a paper airplane that can travel across the room.
- Today I will teach you to create the tallest structure you can that stands on its own.
- Today I will teach you to create a home for a caterpillar that will meet all its changing needs.
- Today I will teach you to figure out a way to heat water without electricity or fire.
- Today I will teach you to create a bridge that is at least 1 foot long and can support the weight of a toy car.
- Today I will teach you to design a way to play music so that everyone in the next room can hear the music clearly without changing the volume.
- Today I will teach you to create a device that can allow you to talk to someone in another room.
- Today I will teach you to use solid objects to form the tallest tower possible.



## 2nd Grade STEAM Challenges

### Unit Sequence

Intro to STEAM Challenges - Focus on Empathy			Timeframe: 1 days
Concepts	Lesson Sequence	Formative Assessments	
<ul style="list-style-type: none"><li>● Persistence when solving a problem</li><li>● Discuss the concept of empathy</li></ul>	<ol style="list-style-type: none"><li>1. Refer to the code.org lesson on persistence and rewatch the correlating video/materials as needed<ol style="list-style-type: none"><li>a. Complete the KidsHealth lesson on empathy and feelings. This will help students understand the tasks related to empathy and a more personal level.</li></ol></li></ol>	Teacher observation KidsHealth Worksheet #1 - “I Feel...” KidsHealth Worksheet #2 - “How Would You Feel If...”	
Differentiation			
<ul style="list-style-type: none"><li>● <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li><li>● <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li><li>● <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li></ul>			

Simple STEAM Challenges			Timeframe: 5 days
Concepts	Lesson Sequence	Formative Assessments	
<ul style="list-style-type: none"> <li>Effective heating and cooling techniques</li> <li>Engineering tools for measurement</li> <li>Basic engineering</li> </ul>	<ol style="list-style-type: none"> <li><b>Good Vibrations</b> - Use cardboard boxes and rubber bands to create guitars that each make a different sound.               <ol style="list-style-type: none"> <li>Empathy Focus: Our music teacher needs some extra instruments! Let's help him by building some of our own.</li> </ol> </li> <li><b>Cool My Home</b> - Build a house that stays the coolest in direct sunlight.               <ol style="list-style-type: none"> <li>Empathy Focus: There is a house in Florham Park that doesn't have air conditioning. Design a house that will help keep them cool next summer!</li> </ol> </li> <li><b>I'm a Meteorologist: Weather Tools</b> - Create a tool that a meteorologist would use to measure changes in the weather.               <ol style="list-style-type: none"> <li>Empathy Focus: The weather man doesn't have a tool to measure changes in the weather. Help him by creating one of your own.</li> </ol> </li> <li><b>Batty Challenge: Measurement</b> - Create a bat that has a wingspan that is exactly the same length as your own arm span.</li> <li><b>High in the Sky</b> - Build a paper airplane that can travel</li> </ol>	Teacher observation Worksheets associated with each lesson STEM Performance Rubric	

	across the room.	
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

<b>Advanced STEAM Challenges</b>		<b>Timeframe:</b> 6 days
<b>Concepts</b>	<b>Lesson Sequence</b>	<b>Formative Assessments</b>
<ul style="list-style-type: none"> <li>• Advanced engineering</li> <li>• Life Cycles</li> <li>• Temperature</li> <li>• Engineering with sound</li> </ul>	<p>7. <b>Towering Heights</b> - Using only the materials provided, create the tallest structure you can that stands on its own.</p> <p>a. Empathy Focus:</p> <p>8. <b>Home Sweet Home: Life Cycles</b> - Create a home for a caterpillar that will meet all its changing needs.</p> <p>9. <b>In Hot Water</b> - Figure out a way to heat water without electricity or fire.</p> <p>a. Empathy Focus:</p> <p>10. <b>Bridging the Gap</b> - Create a bridge that is at least 1 foot long and can support the weight of a toy car.</p> <p>a. Empathy Focus:</p> <p>11. <b>Sound Can Really Move</b> - Design a way to play music so that everyone in the next room can hear the music clearly without change the volume.</p> <p>a. Empathy Focus:</p> <p>12. <b>The Better to Hear You With: Sound</b> - Create a device that can allow you to talk to someone in another room</p> <p>a. Empathy Focus:</p> <p>13. <b>A Solid Tower</b> - Use solid objects to form the tallest tower possible. (pg 41)</p>	<p>Teacher observation</p> <p>Worksheets associated with each lesson</p> <p>STEM Performance Rubric</p>
<b>Differentiation</b>		
<ul style="list-style-type: none"> <li>• <b>Special Needs</b> – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list</li> <li>• <b>ESL</b> – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list</li> <li>• <b>Gifted Learners</b> – Students can create “bugs” in their creations and have other students solve the problems</li> </ul>		

<b>Evidence of Learning (Assessments)</b>	<b>Accommodations and Modifications</b>

<p><b>Formative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based projects</li> <li>• Verbal Discussions</li> <li>• Teacher observations</li> <li>• Written short answer assessments</li> <li>• Repeat verbal directions back</li> </ul> <p><b>Summative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Rubric based final projects for each unit</li> <li>• Observation of student application of skills</li> <li>• Completion of individual assignments and projects</li> <li>• Participation in activities</li> <li>• Time on task</li> </ul> <p><b>Benchmark Assessments:</b></p> <ul style="list-style-type: none"> <li>• rough drafts for each project</li> <li>• Rubric based final project for each unit</li> <li>• Student self-assessment</li> </ul> <p><b>Alternative Assessments:</b></p> <ul style="list-style-type: none"> <li>• Homework - extended drawing at home</li> <li>• Presentations</li> <li>• Quick response chalkboards</li> <li>• Verbal and written Critiques</li> </ul>	<p><b>Special Education</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <a href="#">Curricular Modifications and Guidance for Students Educated in Special Class Settings</a></li> </ul> <p><b>Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Preview content and concepts</li> <li>• Behavior management plan</li> <li>• Highlight text</li> <li>• Small group setting</li> </ul> <p><b>High-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Alternative formative and summative assessments</li> <li>• Guided Reading</li> <li>• Personal agendas</li> <li>• Project-based learning</li> <li>• Problem-based learning</li> <li>• Stations/centers</li> <li>• Tiered activities/assignments</li> <li>• Varying organizers for instructions</li> </ul> <p><b>Low-Prep Differentiation:</b></p> <ul style="list-style-type: none"> <li>• Clubbing activities</li> <li>• Exploration by interest</li> <li>• Flexible groupings</li> </ul> <p><b>English Language Learners</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Unit 1: Curriculum for ELL</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• Multi-language glossary</li> <li>• Pupil edition in Spanish</li> <li>• Vocabulary flash cards</li> </ul> <p><b>Students at Risk for Failure</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> </ul> <p><b>Gifted and Talented</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Differentiation for All Students (Special Needs, ESL, Gifted Learners, &amp; Mainstream Learners)</a></li> <li>• <a href="#">Subgroup Accommodations and Modifications</a></li> <li>• <i>Math in Focus or Big Ideas G &amp; T Activities</i></li> </ul> <p><b>Students with 504 Plans</b></p>
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<div><b>Core Professional Resources:</b></div> <ul style="list-style-type: none"> <li>• AliceKeeler.com</li> <li>• <a href="https://scratch.mit.edu/educators/">https://scratch.mit.edu/educators/</a></li> <li>• <a href="https://www.tynker.com/k2-school/coding-curriculum">https://www.tynker.com/k2-school/coding-curriculum</a></li> <li>• <a href="https://code.org/educate/curriculum/elementary-school">https://code.org/educate/curriculum/elementary-school</a></li> <li>• <a href="https://www.teachengineering.org/standards/ngss">https://www.teachengineering.org/standards/ngss</a></li> </ul> <div><b>Supplemental Professional Resources:</b></div> <ul style="list-style-type: none"> <li>• <a href="https://ngss.nsta.org/">https://ngss.nsta.org/</a></li> <li>• <a href="https://www.techlearning.com/">https://www.techlearning.com/</a></li> <li>• <a href="http://ed.ted.com/">http://ed.ted.com/</a></li> </ul>	<div><b>Core Instructional Resources:</b></div> <ul style="list-style-type: none"> <li>• Scratch</li> <li>• Code.org</li> <li>• Tynker.com</li> <li>• Chromebooks</li> <li>• Ozobots</li> <li>• LEGO education kits</li> </ul> <div><b>Supplemental Resources:</b></div> <ul style="list-style-type: none"> <li>• Noise canceling headphones</li> <li>• Tool usage online classes</li> <li>• Online resources:</li> <li>• <a href="#">Wixie</a></li> <li>• <a href="#">Clever</a></li> </ul> <div><b>Intervention Resources:</b></div> <ul style="list-style-type: none"> <li>• Tinkercad - Learn</li> <li>• Discovery design</li> <li>• Khan Academy</li> <li>• Safety videos</li> <li>• Templates</li> </ul>
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<b>Integration of 21st Century Themes</b>	<b>Media Literacy Integration</b>

<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving</li> <li>• Communication and Collaboration</li> <li>• Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
<b>Career Education</b>	<b>Global Perspectives</b>
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
<ul style="list-style-type: none"> <li>• <a href="#">2nd Grade STEAM Challenges - Worksheets</a></li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">STEM to STEAM Resources - Edutopia</a></li> <li>• <a href="#">STEAM Resources - Edutopia</a></li> <li>• <a href="#">STEAM Resources and Downloads</a></li> <li>• <a href="#">Resources for Maker Spaces</a></li> </ul>

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## [2nd Grade STEAM Lab Units](#)

2nd Grade Engineering Unit Summary
Combining the Ozocodes with the Ozoblockly program means that students will be directly programming their small robots in this unit. The level of rigor and programming increases as well as the functionality within the Ozobot. Students in this unit will need to culminate what they've learned the past 3 years and apply it to various tasks with their small robot.
Standards
<b>NGSS Standards</b> K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new

or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.

K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

## **2020 NJSL - Computer Science and Design Thinking**

### **Core Ideas:**

*Individuals develop and follow directions as part of daily life.*

*A sequence of steps can be expressed as an algorithm that a computer can process.*

*Computers follow precise sequences of steps that automate tasks.*

*Computers follow precise sequences of steps that automate tasks.*

*Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.*

*Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.*

*Limitations (constraints) must be considered when engineering designs.*

*Human needs and desires determine which new tools are developed.*

*Technology has changed the way people live and work.*

*Various tools can improve daily tasks and quality of life.*

*Innovation and the improvement of existing technology involves creative thinking.*

### **Performance Expectations:**

8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.

8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.

8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.

8.1.2.AP.4: Break down a task into a sequence of steps.

8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.

8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.

8.2.2.ED.1: Communicate the function of a product or device.

8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

8.2.2.ED.4: Identify constraints and their role in the engineering design process.

8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.

8.2.2.ITH.2: Explain the purpose of a product and its value.

8.2.2.ITH.3: Identify how technology impacts or improves life.

8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks

8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.

8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

**Career Ready Practices:**

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

9.3.ST-SM.4 Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Essential Questions	Enduring Understanding
What complexities is a robot?	Students must learn that a robot is a system of many parts working together as a whole. Each of these parts have a specific role and knowing how to interact with these parts will lead to success.
How do students effectively translate an idea or concept to another medium such as a robot using a digital tool?	Visualizing and translating more complex ideas is a process that must be practiced. When it comes to programming with a medium (such as a computer program) to get a desired outcome, students must rely on prior knowledge and problem solving to be successful.
How can students use their language skills to speak a “robotic programming” language written with code.	Effectively communicating ideas to a robot through a digital medium requires a higher level of problems solving and consideration. This unit will require students to code with a computer program in order to speak the robot’s “language”.

**Student Learning Objectives**

- Today I will teach you the Ozobot commands.
  - Today I will teach you how to create the Ozobot commands.
  - Today I will teach you to build on the coding language for your Ozobot, focusing on color, order and sequencing.
  - Today I will teach you to create a free drawing using the Ozobots.
  - Today I will teach you to add color codes to the Ozobots.
  - Today I will teach you to create your own line for your Ozobot to follow.
  - Today I will teach you the OzoBlockly online programming language.
  - Today I will teach you to program your OzoBot to complete a 100 cm dash as fast as possible.

## 2nd Grade Engineering Unit Sequence

Intro to Engineering - Using Ozobots		Timeframe: 4 Days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Familiarity with the Ozobots</li> <li>Learning the Ozoblocks software</li> <li>Learning the programming language of the Ozobots</li> <li>Problem solving and decision making</li> </ul>	<ol style="list-style-type: none"> <li>Basic Training Lesson 1: Drawing Lines and Maps               <ol style="list-style-type: none"> <li>Introduce robots, Ozobots, commands (what are they and how do we create them)</li> </ol> </li> <li>Basic Training Lesson 2: Introduction to Color Codes               <ol style="list-style-type: none"> <li>Builds on the coding language for Ozobot, focusing on color, order and sequencing</li> </ol> </li> <li>Basic Training Lesson 3: Drawing Color Codes               <ol style="list-style-type: none"> <li>Discusses choice in programming and provides students with a programming challenge</li> </ol> </li> <li>Basic Training Lesson 4: Free Drawing Lines and Color Codes               <ol style="list-style-type: none"> <li>This lesson allows the students to create their own line for the Ozobot to follow</li> </ol> </li> </ol>	Teacher Observation Completed Worksheets for each lesson.
Differentiation		
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Robotics Challenges and Tasks		Timeframe: 8 days
Concepts	Lesson Sequence	Formative Assessments
<ul style="list-style-type: none"> <li>Visual Programming Basics</li> <li>Movement Forward</li> <li>Turn and rotate</li> <li>Setting LED colors</li> <li>Loading the Ozobot and running programs</li> </ul>	<ol style="list-style-type: none"> <li><b>Write Your Name with OzoCodes</b> Lesson</li> <li>Immigration Lesson part 1</li> <li>Immigration Lesson part 2</li> <li><b>Ozoblockly Basic Training 1</b> - This lesson will have the students learning the first lesson of OzoBlockly, the Ozobot online programming language.</li> <li><b>Ozoblockly Basic Training 2</b> - This lesson will continue to have the students learning OzoBlockly.</li> <li><b>Ozoblockly Basic Training 3</b> - This lesson will continue to have the students learning OzoBlockly.</li> <li><b>Ozoblockly Basic Training 4</b> - This lesson will continue to</li> </ol>	



- have the students learning OzoBlockly.
12. **Ozo Dash** this activity will require students to program their OzoBot to complete a 100 cm dash as fast as possible.

### Differentiation

- **Special Needs** – Printed visuals, multisensory objects, teachers can provide a printed vocabulary list
- **ESL** – Alternate responses (verbal instead of written response), Online Translators for words or phrases, teachers can provide a printed vocabulary list
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<b>Interdisciplinary Connections</b>	<b>Integration of Technology through NJSLS</b>
<ul style="list-style-type: none"> <li>• Math- Measuring/scaling</li> <li>• Science- Environmental factors</li> <li>• Social studies- solving real world problems using new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Chromebook</li> <li>• Google classroom</li> <li>• Projectors</li> <li>• Ozobots</li> </ul>
<b>Integration of 21st Century Themes</b>	<b>Media Literacy Integration</b>
<ul style="list-style-type: none"> <li>• Creativity and Innovation</li> <li>• Critical Thinking and Problem Solving Communication and Collaboration Information Literacy</li> <li>• Media Literacy</li> <li>• Life and Career Skills</li> <li>• Global and Environmental Awareness</li> <li>• Problem Solving Skills</li> <li>• Personal Literacy</li> <li>• Business</li> <li>• <b>Initiative and Self Direction:</b></li> <li>• Manage Goals and Time</li> <li>• Work Independently</li> <li>• Be Self-directed Learners</li> </ul>	<ul style="list-style-type: none"> <li>• Ask students to look for specific things when they read printed material, and then ask questions about those items</li> <li>• Use print and online materials to practice reading and comprehension skills</li> <li>• Ask students to look for specific things when they view videos and then ask questions about those items</li> </ul>
<b>Career Education</b>	<b>Global Perspectives</b>
<ul style="list-style-type: none"> <li>• Global awareness</li> <li>• Technology Careers</li> <li>• Coding</li> <li>• Computer Software</li> <li>• Engineering</li> <li>• Robotics</li> </ul>	<ul style="list-style-type: none"> <li>• Black History Month</li> <li>• National Women's History Month</li> <li>• Week of Respect</li> <li>• Red Ribbon Week</li> </ul>

Resources	Links
<p>Teacher Resources</p> <ul style="list-style-type: none"> <li>• <a href="#">Ozobot Evo Guide</a></li> <li>• <a href="#">Ozoblockly Getting started</a></li> <li>• <a href="#">Ozobot Calibration Tips</a></li> <li>• <a href="#">Ozobot Color Codes Reference</a></li> <li>• <a href="#">Ozobot Educator Guide</a></li> <li>• <a href="#">Ozobot Log Sheet</a></li> </ul>	<p>Lesson Resources and Links</p> <ul style="list-style-type: none"> <li>• <a href="#">Lesson 1-4: K-2 Basic Training Color Codes</a></li> <li>• <a href="#">Lesson 5: Write Your Name</a></li> <li>• <a href="#">Lesson 6 &amp; 7: Immigration With Ozobot</a></li> <li>• <a href="#">Lesson 8: OzoBlockly Training 1</a></li> <li>• <a href="#">Lesson 9: OzoBlockly Training 2</a></li> <li>• <a href="#">Lesson 10: OzoBlockly Training 3</a></li> </ul>

- [Ozobot Tips](#)

- [Lesson 11: OzoBlockly Training 4](#)
- [Lesson 12: Ozo Dash Challenge](#)

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