

# **Deal School Curriculum**



## **Computer Science and Design Thinking**

### **Curriculum Guide Grades K-8**

# Deal School

Deal, New Jersey

2024

Board of Education

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### Developed and Written

August – November 2014

### Revised

December 2018  
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### Board Approved

August 2024

# Grade K – 2 Deal School Curriculum

## Computer Science and Design Thinking

Disciplinary Concepts and Core Ideas: Computing Systems

### Desired Outcomes

**Computing Systems:** People interact with a wide variety of computing devices that collect, store, analyze and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.

Enduring Understandings	Essential Questions
<ul style="list-style-type: none"> <li>Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally.</li> <li>A computing system is composed of software and hardware.</li> <li>Describing a problem is the first step toward finding a solution when computing systems do not work as expected.</li> </ul>	<ul style="list-style-type: none"> <li>In what ways does technology make life easier?</li> <li>How do the basic operations help me use technology more efficiently?</li> <li>How should technology be used?</li> <li>When can you expect technology to be effective?</li> </ul>
	Learners will know....
	<p><b>8.1.2.CS.1:</b> Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.</p> <p><b>8.1.2.CS.2:</b> Explain the functions of common software and hardware components of computing systems.</p> <p><b>8.1.2.CS.3:</b> Describe basic hardware and software problems using accurate terminology.</p>
Learners will be able to...	
<ul style="list-style-type: none"> <li>By the end of 2nd Grade students will be able to select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.</li> <li>By the end of 2nd Grade students will be able to explain the functions of</li> </ul>	

<p>common software and hardware components of computing systems.</p> <ul style="list-style-type: none"> <li>• By the end of 2nd Grade students will be able to describe basic hardware and software problems using accurate terminology.</li> </ul>
<b>Assessment Evidence</b>
<p><b>Summative:</b>  ePortfolios  Project Presentations  Computed based pre and post tests</p> <p><b>Formative:</b>  Daily Journals  Quick Checks  Project Specific Rubrics  Exit Slips  Student Self-Assessment  Peer review  Pre-Assessments</p> <p><b>Alternative Assessment:</b>  Class Discussion  Teacher Observation  Class Participation  ePortfolios</p>
<b>Suggested Learning Plan</b>
<p>Students will visit the lab once a week for the school year.</p> <p>The structure of the daily lesson will be in the format of a 44-minute period.</p> <ul style="list-style-type: none"> <li>• 10 minutes – Do/Now summary and whole group instruction</li> <li>• 30 minutes – Independent work with teacher monitoring and guidance</li> <li>• 4 minutes – Wrap up/review</li> </ul>
<b>List of Core Instructional and Supplemental Materials</b>
<p>SeeSaw  Brain Pop Jr.  Google Apps  ABCYa.com</p>
Students will use ipads and/or laptops during class.

Deal School Curriculum	
Grade K - 2 Computer Science and Design Thinking	
Disciplinary Concepts and Core Ideas: Networks and the Internet	
<b>Desired Outcomes</b>	
<p><b><u>Networks and the Internet:</u></b> Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.</p>	
<b>Enduring Understandings</b>	<b>Essential Questions</b>
<ul style="list-style-type: none"> <li>Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide.</li> <li>Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access.</li> </ul>	<ul style="list-style-type: none"> <li>What is a computer network?</li> <li>How do computer networks provide greater connectivity in the computing world?</li> <li>Why is network security important?</li> </ul>
	<b>Learners will know....</b>
	<p><b>8.1.2.NI.1:</b> Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.</p> <p><b>8.1.2.NI.2:</b> Describe how the Internet enables individuals to connect with others worldwide.</p> <p><b>8.1.2.NI.3:</b> Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others.</p> <p><b>8.1.2.NI.4:</b> Explain why access to devices need to be secured.</p>
<b>Learners will be able to...</b>	

- By the end of 2nd grade learners will be able to model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.
- By the end of 2nd grade learners will be able to describe how the Internet enables individuals to connect with others worldwide.
- By the end of 2nd grade learners will be able to create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others.
- By the end of 2nd grade learners will be able to explain why access to devices need to be secured.

### Assessment Evidence

#### **Summative:**

ePortfolios

Project Presentations

Computed based pre and post tests

#### **Formative:**

Daily Journals

Quick Checks

Project Specific Rubrics

Exit Slips

Student Self-Assessment

Peer review

Pre-Assessments

#### **Alternative Assessment:**

Class Discussion

Teacher Observation

Class Participation

ePortfolios

### Suggested Learning Plan

Students come to the lab once a week for the school year.

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- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### List of Core Instructional and Supplemental Materials

SeeSaw  
 Brain Pop Jr.  
 Google Apps  
 Common Sense Education  
 Scratch Jr.  
 Code.org

Deal School Curriculum	
Grade K - 2 Computer Science and Design Thinking	
Disciplinary Concepts and Core Ideas: Impacts of Computing	
Desired Outcomes	
<b><u>Impacts of Computing:</u></b> Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.	
Enduring Understandings	Essential Questions
<ul style="list-style-type: none"> <li>Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).</li> </ul>	<ul style="list-style-type: none"> <li>How are computers impacting our society?</li> <li>How can I use technology to solve problems and create innovative solutions?</li> <li>How can technology help people collaborate and communicate effectively?</li> </ul>
	<b>Learners will be able to....</b>  <b>8.1.2.IC.1:</b> Compare how individuals live and work before and after the implementation of new computing technology.
<b>Learners will be able to...</b> <ul style="list-style-type: none"> <li>By the end of 2nd grade students will be able to compare how individuals live and work before and after the implementation of new computing technology.</li> </ul>	
Assessment Evidence	
<b>Summative:</b> ePortfolios Project Presentations Computed based pre and post tests	



**Formative:**

Daily Journals  
 Quick Checks  
 Project Specific Rubrics  
 Exit Slips  
 Student Self-Assessment  
 Peer review  
 Pre-Assessments

**Alternative Assessment:**

Class Discussion  
 Teacher Observation  
 Class Participation  
 ePortfolios

**Suggested Learning Plan**

Students come to the lab once a week for the school year.

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 Common Sense Education

**Deal School Curriculum****Grade K - 2 Computer Science and Design Thinking**

Disciplinary Concepts and Core Ideas: Data & Analysis

**Desired Outcomes**

**Data and Analysis:** Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

**Enduring Understandings**

**Essential Questions**

<ul style="list-style-type: none"> <li>• Individuals collect, use, and display data about individuals and the world around them.</li> <li>• Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved.</li> <li>• Data can be used to make predictions about the world.</li> </ul>	<ul style="list-style-type: none"> <li>• How can technology help people collaborate and communicate effectively?</li> <li>• How does technology help people communicate globally?</li> <li>• How does the automation of data help the human experience?</li> </ul> <p><b>Learners will be able to....</b></p> <p><b><u>8.1.2.DA.1:</u></b> Collect and present data, including climate change data, in various visual formats.</p> <p><b><u>8.1.2.DA.2:</u></b> Store, copy, search, retrieve, modify, and delete data using a computing device.</p> <p><b><u>8.1.2.DA.3:</u></b> Identify and describe patterns in data visualizations.</p> <p><b><u>8.1.2.DA.4:</u></b> Make predictions based on data using charts or graphs.</p>
<p><b>Learners will be able to...</b></p> <ul style="list-style-type: none"> <li>• By the end of 2nd grade learners will be able to collect and present data, including climate change data, in various visual formats.</li> <li>• By the end of 2nd grade learners will be able to store, copy, search, retrieve, modify, and delete data using a computing device.</li> <li>• By the end of 2nd grade learners will be able to identify and describe patterns in data visualizations.</li> <li>• By the end of 2nd grade learners will be able to make predictions based on data using charts or graphs.</li> </ul>	
<p><b>Assessment Evidence</b></p>	
<p><b>Summative:</b> ePortfolios Project Presentations Computed based pre and post tests</p> <p><b>Formative:</b> Daily Journals Quick Checks</p>	

Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

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Common Sense Education

**Deal School Curriculum**

**Grade K - 2 Computer Science and Design Thinking**

Disciplinary Concepts and Core Ideas: Algorithms and Programming

**Desired Outcomes**

**Algorithms & Programming:** An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

**Enduring Understandings**

**Essential Questions**

<ul style="list-style-type: none"> <li>• Individuals develop and follow directions as part of daily life.</li> <li>• A sequence of steps can be expressed as an algorithm that a computer can process.</li> <li>• Real world information can be stored and manipulated in programs as data (e.g., numbers, words, colors, images).</li> <li>• Computers follow precise sequences of steps that automate tasks.</li> <li>• Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.</li> <li>• People work together to develop programs for a purpose, such as expressing ideas or addressing problems.</li> <li>• The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary).</li> </ul>	<ul style="list-style-type: none"> <li>• How does computer programming and computational thinking affect human activity and career life?</li> <li>• What is the difference between a Program and an App?</li> <li>• What is an algorithm?</li> <li>• How is algorithmic thinking developed?</li> </ul>
	<p><b>Learners will be able to....</b></p> <p><b><u>8.1.2.AP.1:</u></b> Model daily processes by creating and following algorithms to complete tasks.</p> <p><b><u>8.1.2.AP.2:</u></b> Model the way programs store and manipulate data by using numbers or other symbols to represent information.</p> <p><b><u>8.1.2.AP.3:</u></b> Create programs with sequences and simple loops to accomplish tasks.</p> <p><b><u>8.1.2.AP.4:</u></b> Break down a task into a sequence of steps.</p> <p><b><u>8.1.2.AP.5:</u></b> Describe a program's sequence of events, goals, and expected outcomes.</p> <p><b><u>8.1.2.AP.6:</u></b> Debug errors in an algorithm or program that includes sequences and simple loops.</p>
<p><b>Learners will be able to...</b></p> <ul style="list-style-type: none"> <li>• By the end of 2nd grade students will be able to model daily processes by creating and following algorithms to complete tasks.</li> <li>• By the end of 2nd grade students will be able to model the way programs store and manipulate data by using numbers or other symbols to represent information.</li> <li>• By the end of 2nd grade students will be able to create programs with sequences and simple loops to accomplish tasks.</li> </ul>	

- By the end of 2nd grade students will be able to break down a task into a sequence of steps.
- By the end of 2nd grade students will be able to describe a program's sequence of events, goals, and expected outcomes.
- By the end of 2nd grade students will be able to debug errors in an algorithm or program that includes sequences and simple loops.

### Assessment Evidence

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#### **Formative:**

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SeeSaw

Brain Pop Jr.

Google Apps

Scratch Jr.  
Code.org  
Ozobots  
Dash Robots  
Wonder App  
Osmo  
Kodable

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Project Presentations  
Computed based pre and post tests

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Brain Pop Jr.

Google Apps  
Kodable  
Code.org  
Scratch

### Pacing Guide

[Kindergarten Pacing Guide](#)

[First Grade Pacing Guide](#)

[Second Grade Pacing Guide](#)

### 21st CENTURY LIFE AND CAREERS

- 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job
- 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.
- 9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.

### Accommodations and Modifications

#### **Gifted and Talented**

- Provide appropriate challenges for wide ranging skills and development areas.
- Participate in inquiry and project-based learning units of study.

#### **English Language Learners**

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

#### **Students with IEPs/504**

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

#### **At Risk Learners**

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

Interdisciplinary Connections/Cross Curricular Opportunities	
L.RF.K.4. Read emergent-reader texts (decodable texts, including words with one-to-one letter-sound correspondences) orally with sufficient decoding accuracy to support comprehension.	
L.WF.K.1 Demonstrate command of the conventions of writing.	
L.WF.K.3 Demonstrate command of the conventions of sentence composition.	
SL.PE.K.1. Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.	
4.3.1.C.6 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	
Integration of Technology	
Students will use ipads and/or laptops during class.	





Deal Elementary School  
Content Area: STEAM  
Grade Span: K-2  
Revised By: Lindsey Pietrocola

**Deal School District**

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## Deal School Curriculum- S.T.E.A.M. (K-2)

### STATE STANDARDS

Interdisciplinary & Cross Curricular Connections and Standards:

[2020 New Jersey Student Learning Standards – Computer Science and Design Thinking Introduction](#)

[2020 New Jersey Student Learning Standards – Career Readiness, Life Literacies, and Key Skills Introduction](#)

[2023 NJSLS-ELA](#)

2023 NJSLS [Mathematics](#)

[2020 New Jersey Student Learning Standards Science Kindergarten through Grade 12](#)

Topic	Cumulative Progress Indicator (CPI)
<b>Computer Science and Design Thinking</b>	<p><b>8.2.2.ED.1:</b> Communicate the function of a product or device.</p> <p><b>8.2.2.ED.2:</b> Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.</p> <p><b>8.2.2.ED.4:</b> Identify constraints and their role in the engineering design process.</p> <p><b>8.2.2.ITH.1:</b> Identify products that are designed to meet human wants or needs.</p> <p><b>8.2.2.ITH.2:</b> Explain the purpose of a product and its value.</p> <p><b>8.2.2.ITH.3:</b> Identify how technology impacts or improves life.</p> <p><b>8.2.2.ITH.4:</b> Identify how various tools reduce work and improve daily tasks.</p> <p><b>8.2.2.ITH.5:</b> Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.</p> <p><b>8.2.2.NT.1:</b> Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.</p> <p><b>8.2.2.NT.2:</b> Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.</p> <p><b>8.2.2.ETW.1:</b> Classify products as resulting from nature or produced as a result of technology.</p> <p><b>8.2.2.ETW.2:</b> Identify the natural resources needed to create a product.</p> <p><b>8.2.2.ETW.3:</b> Describe or model the system used for recycling technology.</p> <p><b>8.2.2.ETW.4:</b> Explain how the disposal of or reusing a product affects the local and global environment.</p> <p><b>8.2.2.EC.1:</b> Identify and compare technology used in different schools, communities, regions, and parts of the world.</p>
<b>2020 NJSLS Science</b>	<p><b><i>Motion and Stability- Forces and Interactions</i></b></p> <p><b>K-PS2-1</b> 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><b>K-PS2-2</b> Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p> <p><b>K.ETS1.A</b> A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.</p> <p><b><i>Energy</i></b></p> <p><b>K-PS3-1</b> Make observations to determine the effect of sunlight on Earth's surface.</p>

	<p><b>K-PS3-2</b> Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.</p> <p><b>Engineering Design</b></p> <p><b>K-2-ETS1-1</b> Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p><b>K-2-ETS1-2</b> 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><b>K-2-ETS1-3</b> Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.</p> <p><b>Molecules to Organisms: Structures and Processes</b></p> <p><b>K-LS1-1</b> Use observations to describe patterns of what plants and animals (including humans) need to survive.</p> <p><b>Earth and Human Activity</b></p> <p><b>K-ESS3-1</b> Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.</p> <p><b>K-ESS3-2</b> Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.</p> <p><b>K-ESS3-3</b> Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.</p>
<b>2020 Career Readiness, Life Literacies and Key Skills</b>	<b>9.1.2.CAP.1</b> Make a list of different types of jobs and describe the skills associated with each job.
<b>2023 NJSLS Mathematics</b>	MP.2 MP.2D MP.4 MP.5 K.CC.A K.MD.A.1 K.MD.A.2
<b>2023 NJSLS ELA</b>	RI.K.1 W.K.2 W.K.7 SL.K.3
<b>UNIT DESCRIPTION</b>	

## **Engineering Design**

People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

## **Enduring Understandings**

### ***Computer Science and Design Thinking***

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.

### ***Science***

#### ***Motions and Stability (forces and interactions)***

Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

With guidance, plan and conduct and investigation in collaboration with peers

When objects touch or collide they push on one another and can change motion.

A bigger push or pull makes things speed up or slow down more quickly.

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Scientists use different ways to study the world.

### ***-Energy***

Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem

Sunlight warms Earth's surface.

Events have causes that generate observable patterns.

Scientists use different ways to study the world.

### ***-Engineering Design***

Ask questions based on observations to find more information about the natural and/or designed world(s).

Define a simple problem that can be solved through the development of a new or improved object or tool.

Develop a simple model based on evidence to represent a proposed object or tool.

A situation that people want to change or create can be approached as a problem to be solved through engineering.

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

Before beginning to design a solution, it is important to clearly understand the problem.

Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions, such as climate change, to other people.

Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

The shape and stability of structures of natural and designed objects are related to their function(s).

### ***-Career Awareness, Life Literacies and Key Skills***

Different types of jobs require different knowledge and skills.

Brainstorming can create new, innovative ideas.

Critical thinkers must first identify a problem then develop a plan to address it in order to effectively solve a problem.

Young people can have a positive impact on the natural world in the fight against climate change.

Individuals should practice safe behaviors when using the Internet.

Individuals from different cultures may have different points of view and experiences.

Digital tools and media resources provide access to vast stores of information that can be searched.

Digital tools can be used to display data in various ways.

A variety of diverse sources, contexts, disciplines and cultures provide valuable and necessary information that can be used for different purposes.  
 Information is shared or conveyed in a variety of formats and sources.  
 Digital tools have a purpose.  
 Collaboration can simplify the work an individual has to do and sometimes produce a better product.

### Essential Questions

How does technology change thinking?  
 In what ways does technology make life easier?  
 What encourages innovation and technology?  
 What does it mean to be creative?  
 What can our imagination be used for?  
 How can our imagination be used to solve a problem?  
 What does it mean to be innovative?  
 How can we come up with new ideas to solve a problem?  
 What does it mean to be a problem- solver  
 What can we learn from our mistakes?  
 What must you know about a problem before you can develop a solution?  
 How can making mistakes be an important part of learning?  
 Why is it important to know the resources you have to solve a problem?  
 What are some advantages to planning before starting a project?

### Learners will be able to...

- By the end of second grade students will be able to communicate the function of a product or device.
- By the end of second grade students will be able to collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- By the end of second grade students will be able to select and use appropriate tools and materials to build a product using the design process.
- By the end of second grade students will be able to identify constraints and their role in the engineering design process.

### Assessment Evidence

#### Summative:

ePortfolios  
 Project Presentations  
 Computed based pre and post tests

#### Formative:

Daily Journals  
 Quick Checks

Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

**Potential Unit Activities**

**Activity 1: Building a Tower**

- **Problem:** How can we build the tallest tower?
- **Design Process:**
  - Brainstorm ideas for tower shapes and materials.
  - Sketch a design.
  - Construct the tower using provided materials (e.g., blocks, toothpicks, marshmallows).
  - Test the tower's stability.
  - Improve the design based on the test results.

**Activity 2: Designing a Vehicle**

- **Problem:** How can we design a vehicle that can carry a small object?
- **Design Process:**
  - Brainstorm ideas for vehicle types (e.g., car, truck, boat).
  - Sketch a design.
  - Construct the vehicle using provided materials (e.g., cardboard, recycled materials).
  - Test the vehicle's ability to move and carry weight.
  - Improve the design based on the test results.

**Activity 3: Creating a Shelter**

- **Problem:** How can we design a shelter to protect a small toy from the weather?
- **Design Process:**
  - Brainstorm ideas for shelter types (e.g., tent, house, igloo).
  - Sketch a design.
  - Construct the shelter using provided materials (e.g., cardboard boxes, plastic wrap, blankets).
  - Test the shelter's ability to protect the toy.

- Improve the design based on the test results.

#### Activity 4: Designing a Toy

- **Problem:** How can we design a fun toy to play with?
- **Design Process:**
  - Brainstorm ideas for toy types (e.g., puzzle, spinner, building blocks).
  - Sketch a design.
  - Construct the toy using provided materials (e.g., paper, cardboard, recycled materials).
  - Test the toy's playability and durability.
  - Improve the design based on the test results.

#### Suggested Learning Plan

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

#### List of Core Instructional and Supplemental Materials

Animationish  
 Seesaw  
 Google Sketchup  
 Google Earth  
 Brain Pop  
 Code.org  
[Diversity, Equity & Inclusion Educational Resources](#)

## Disciplinary Concepts and Core Ideas: Interaction and Ethics of Technology and Humans (K-2)

### UNIT DESCRIPTION

**Interaction of Technology and Humans** Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

### Enduring Understandings

#### ***Interaction of Technology and Humans***

- 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.

#### ***Ethics and Culture***

- The availability of technology for essential tasks varies in different parts of the world.

#### **Science**

##### ***Motions and Stability (forces and interactions)***

- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- With guidance, plan and conduct and investigation in collaboration with peers
- When objects touch or collide they push on one another and can change motion.
- A bigger push or pull makes things speed up or slow down more quickly.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.
- Scientists use different ways to study the world.

#### ***Energy***

- Make observations (firsthand or from media) to collect data that can be used to make comparisons.
- Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem
- Sunlight warms Earth's surface.
- Events have causes that generate observable patterns.
- Scientists use different ways to study the world.

#### ***Engineering Design***

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Develop a simple model based on evidence to represent a proposed object or tool.
- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.
- Before beginning to design a solution, it is important to clearly understand the problem.
- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions, such as climate change, to other people.
- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.
- The shape and stability of structures of natural and designed objects are related to their function(s).



## Essential Questions

What encourages innovation and technology?  
 How does innovation and technological change influence our lives?  
 How do resources help us learn, design, and create technology?

## Learners will be able to...

- By the end of second grade students will be able to identify products that are designed to meet human wants or needs.
- By the end of second grade students will be able to explain the purpose of a product and its value.
- By the end of second grade students will be able to identify how technology impacts or improves life.
- By the end of second grade students will be able to identify how various tools reduce work and improve daily tasks.
- By the end of second grade students will be able to design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

## Assessment Evidence

### Summative:

ePortfolios  
 Project Presentations  
 Computed based pre and post tests

### Formative:

Daily Journals  
 Quick Checks  
 Project Specific Rubrics  
 Exit Slips  
 Student Self-Assessment  
 Peer review  
 Pre-Assessments

### Alternative Assessment:

Class Discussion  
 Teacher Observation  
 Class Participation  
 ePortfolios

## Suggested Learning Plan

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### **Unit Activities:**

#### **Activity 1: Technology Timeline**

- Create a timeline showcasing the evolution of technology, from simple tools to modern devices.
- Discuss how each invention has impacted society.
- Use pictures, drawings, or digital tools to illustrate the timeline.

#### **Activity 2: Technology in Our Homes**

- Conduct a class survey to identify the types of technology found in students' homes.
- Discuss the functions of each device and how it makes daily life easier.
- Create a class collage or digital presentation showcasing the results.

#### **Activity 3: Coding and Robotics**

- Introduce basic coding concepts using age-appropriate tools like ScratchJr or block-based coding platforms.
- Use robots or other programmable devices to complete simple tasks and challenges.
- Explore how coding can be used to control technology.

#### **Activity 4: Digital Citizenship**

- Discuss the importance of responsible technology use.
- Teach students about online safety, cyberbullying, and digital etiquette.
- Create a class pledge or digital poster promoting positive online behavior.

#### **Activity 5: Technology and Creativity**

- Use technology tools to create art, music, or stories.
- Explore how technology can enhance creativity and self-expression.
- Share and celebrate student-created digital projects.

### **List of Core Instructional and Supplemental Materials**

Animationish  
Seesaw  
Google Sketchup  
Google Earth

Brain Pop

Code.org

[Diversity, Equity & Inclusion Educational Resources](#)

## Disciplinary Concepts and Core Ideas: Nature and Effect of Technology (K-2)

### UNIT DESCRIPTION

#### **Nature of Technology**

Human population patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

### Enduring Understandings

#### ***Nature of Technology***

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

#### ***Effects of Technology on the Natural World***

-The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals.  
 -Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants.  
 -Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.

#### **Science**

##### *From Molecules to Organisms: Structures and Processes*

-Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.  
 -All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.  
 -Patterns in the natural and human designed world can be observed and used as evidence.  
 -Scientists look for patterns and order when making observations about the world.

#### ***Earth Systems***

-Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.  
 -Construct an argument with evidence to support a claim.  
 -Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.  
 -Plants and animals can change their environment.  
 -Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.  
 -Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.  
 -Systems in the natural and designed world have parts that work together.  
 -Scientists look for patterns and order when making observations about the world.

#### ***Earth and Human Activity***

-Ask questions based on observations to find more information about the designed world.  
 -Use a model to represent relationships in the natural world.

-Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

-Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.

-Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

-Systems in the natural and designed world have parts that work together.

People encounter questions about the natural world every day.

-People depend on various technologies in their lives; human life would be very different without technology.

-Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world.

-Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.

-Asking questions, making observations, and gathering information are helpful in thinking about problems.

-Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

### **-Engineering Design**

Ask questions based on observations to find more information about the natural and/or designed world(s).

Define a simple problem that can be solved through the development of a new or improved object or tool.

Develop a simple model based on evidence to represent a proposed object or tool.

A situation that people want to change or create can be approached as a problem to be solved through engineering.

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

Before beginning to design a solution, it is important to clearly understand the problem.

Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions, such as climate change, to other people.

Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

The shape and stability of structures of natural and designed objects are related to their function(s).

## **Essential Questions**

How does technology change thinking?

How does innovation and technological change influence our lives?

Why do humans create innovations and advancements in technology?

## **Learners will be able to...**

- By the end of second grade students will be able to model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.
- By the end of second grade students will be able to brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.
  - Identify different types of environments (e.g., forest, desert, ocean).
  - Understand how natural resources (e.g., water, food, shelter) influence where people live.
  - Explore how humans have adapted to different environments.
  - Design and build simple shelters that protect from the elements.
  - Use technology tools to research and present information.

## **Assessment Evidence**

**Summative:**

ePortfolios  
 Project Presentations  
 Computed based pre and post tests

**Formative:**

Daily Journals  
 Quick Checks  
 Project Specific Rubrics  
 Exit Slips  
 Student Self-Assessment  
 Peer review  
 Pre-Assessments

**Alternative Assessment:**

Class Discussion  
 Teacher Observation  
 Class Participation  
 ePortfolios

**Suggested Learning Plan**

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**Unit Activities****Activity 1: Exploring Different Environments**

- Discuss different types of environments (e.g., forests, deserts, oceans).
- Use books, pictures, and videos to explore these environments.
- Identify the plants and animals that live in each environment.
- Discuss the challenges and opportunities that living in each environment presents.

**Activity 2: Building a Shelter**

- **Problem:** How can we build a shelter to protect ourselves from the weather?
- **Design Process:**
  - Brainstorm ideas for shelter types (e.g., tent, igloo, house).
  - Sketch a design.

- Construct the shelter using provided materials (e.g., cardboard boxes, plastic wrap, blankets).
- Test the shelter's ability to protect from the elements.
- Improve the design based on the test results.

### **Activity 3: Mapping Our Community**

- Create a simple map of the local community.
- Identify natural features (e.g., rivers, mountains, forests) and human-made features (e.g., roads, buildings).
- Discuss how these features have influenced the development of the community.

### **Activity 4: Virtual Field Trips**

- Use technology tools (e.g., tablets, computers) to take virtual field trips to different environments.
- Explore the natural features and human settlements in these environments.
- Discuss the challenges and opportunities that people face in these environments.

Animationish

Seesaw

Google Sketchup

Google Earth

Brain Pop

Code.org

[Diversity, Equity & Inclusion Educational Resources](#)

## Accommodations and Modifications

### **Gifted and Talented**

- Provide appropriate challenges for wide ranging skills and development areas.
- Participate in inquiry and project-based learning units of study.

### **English Language Learners**

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

### **Students with IEPs/504**

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

### **At Risk Learners**

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

## Integration of Technology

Students will use ipads and/or desktops during class.

## Pacing Guide

[K-2 Pacing Guide STEAM Place- Based Education](#)



# Deal School Curriculum

## Grades 3 - 5 Computer Science and Design Thinking

### Desired Outcomes

**Computing Systems:** People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.

#### Enduring Understandings

- Computing devices may be connected to other devices to form a system as a way to extend their capabilities.
- Software and hardware work together as a system to accomplish tasks (e.g., sending, receiving, processing, and storing units of information).
- Shared features allow for common troubleshooting strategies that can be effective for many systems.

#### Essential Questions

- In what ways does technology make life easier?
- How do the basic operations help me use technology more efficiently?

#### Learners will know...

8.1.5.CS.1: Model how computing devices connect to other components to form a system.

8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.

8.1.5.CS.3: Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.

#### Learners will be able to...

- By the end of 5th grade learners will be able to model how computing devices connect to other components to form a system.
- By the end of 5th grade learners will be able to model how computer software and hardware work together as a system to accomplish tasks.
- By the end of 5th grade learners will be able to identify potential solutions for simple hardware and software problems using common troubleshooting strategies.

### Assessment Evidence

**Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

**Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

**Suggested Learning Plan**

Students come to the lab 3 days a week for a 60 day cycle and then rotate to other related arts classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**List of Core Instructional and Supplemental Materials**

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Scratch

**Deal School Curriculum**

Grades 3 - 5 Computer Science & Design Thinking

Desired Outcomes	
<p><i>Networks and the Internet: Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.</i></p>	
Enduring Understandings	Essential Questions
<ul style="list-style-type: none"> <li>Information needs a physical or wireless path to travel to be sent and received.</li> <li>Distinguishing between public and private information is important for safe and secure online interactions.</li> <li>Information can be protected using various security measures (i.e., physical and digital).</li> </ul>	<ul style="list-style-type: none"> <li>What is a computer network?</li> <li>How do computer networks provide greater connectivity in the computing world?</li> <li>Why is network security important?</li> </ul>
	<b>Learners will know...</b>
	<p><b>8.1.5.NI.1:</b> Develop models that successfully transmit and receive information using both wired and wireless methods.</p> <p><b>8.1.5.NI.2:</b> Describe physical and digital security measures for protecting sensitive personal information.</p>
<p><b>Learners will be able to...</b></p> <ul style="list-style-type: none"> <li>By the end of 5th grade learners will be able to develop models that successfully transmit and receive information using both wired and wireless methods.</li> <li>By the end of 5th grade learners will be able to describe physical and digital security measures for protecting sensitive personal information.</li> </ul>	
Assessment Evidence	
<p><b>Summative:</b>  ePortfolios  Project Presentations  Computed based pre and post tests</p> <p><b>Formative:</b>  Daily Journals  Quick Checks  Project Specific Rubrics  Exit Slips  Student Self-Assessment  Peer review  Pre-Assessments</p>	

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

**Suggested Learning Plan**

Students come to the lab 3 days a week for a 60 day cycle and then rotate to other related arts classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**List of Core Instructional and Supplemental Materials**

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch  
Google Applied Digital Skills

**Deal School Curriculum****Grades 3 - 5 Computer Science and Design Thinking****Desired Outcomes**

***Impacts of Computing:*** Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.

**Enduring Understandings**

- The development and modification of computing technology is driven by people's

**Essential Questions**

- How are computers impacting our society?
- How can I use technology to solve problems and create innovative solutions?

needs and wants and can affect individuals differently.	<ul style="list-style-type: none"> <li>How can technology help people collaborate and communicate effectively?</li> </ul>
	<b>Learners will know....</b>
	<p><b>8.1.5.IC.1:</b> Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.</p> <p><b>8.1.5.IC.2:</b> Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.</p>
<b>Learners will be able to...</b> <ul style="list-style-type: none"> <li>By the end of 5th grade learners will be able to identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.</li> <li>By the end of 5th grade learners will be able to identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.</li> </ul>	
<b>Assessment Evidence</b>	
<p><b>Summative:</b> ePortfolios Project Presentations Computed based pre and post tests</p> <p><b>Formative:</b> Daily Journals Quick Checks Project Specific Rubrics Exit Slips Student Self-Assessment Peer review Pre-Assessments</p> <p><b>Alternative Assessment:</b> Class Discussion Teacher Observation Class Participation ePortfolios</p>	
<b>Suggested Learning Plan</b>	
Students come to the lab 3 days a week for a 60 day cycle and then rotate to other related arts classes.	

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### List of Core Instructional and Supplemental Materials

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch  
Google Applied Digital Skills

## Deal School Curriculum

### Grades 3 - 5 Computer Science and Design Thinking

#### Desired Outcomes

**Data & Analysis:** Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

#### Enduring Understandings

- Data can be organized, displayed, and presented to highlight relationships
- The type of data being stored affects the storage requirements.
- Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data.
- Many factors influence the accuracy of inferences and predictions.

#### Essential Questions

- How can technology help people collaborate and communicate effectively?
- How does technology help people communicate globally?
- How does the automation of data help the human experience?

#### Learners will know...

**8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.

**8.1.5.DA.2:** Compare the amount of storage space required for different types of data.

- |  |  |
|--|--|
|  | <p><b><u>8.1.5.DA.3:</u></b> Organize and present collected data visually to communicate insights gained from different views of the data.</p> <p><b><u>8.1.5.DA.4:</u></b> Organize and present climate change data visually to highlight relationships or support a claim.</p> <p><b><u>8.1.5.DA.5:</u></b> Propose cause and effect relationships, predict outcomes, or communicate ideas using data.</p> |
|--|--|

**Learners will be able to...**

- By the end of 5th grade learners will be able to collect, organize, and display data in order to highlight relationships or support a claim.
- By the end of 5th grade learners will be able to compare the amount of storage space required for different types of data.
- By the end of 5th grade learners will be able to organize and present collected data visually to communicate insights gained from different views of the data.
- By the end of 5th grade learners will be able to organize and present climate change data visually to highlight relationships or support a claim.
- By the end of 5th grade learners will be able to propose cause and effect relationships, predict outcomes, or communicate ideas using data.

**Assessment Evidence**

**Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

**Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation

Class Participation  
ePortfolios

### Suggested Learning Plan

Students come to the lab 3 days a week for a 60 day cycle and then rotate to other related arts classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### List of Core Instructional and Supplemental Materials

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch  
Google Applied Digital Skills

## Deal School Curriculum

### Grades 3 - 5 Computer Science and Design Thinking

#### Desired Outcomes

**Algorithms & Programming:** An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

#### Enduring Understandings

- Different algorithms can achieve the same result.
- Some algorithms are more appropriate for a specific use than others.
- Programming languages provide variables, which are used to store and modify data.

#### Essential Questions

- How does computer programming and computational thinking affect human activity and career life?
- What is the difference between a Program and an App?
- What is an algorithm?
- How is algorithmic thinking developed?



<ul style="list-style-type: none"> <li>• A variety of control structures are used to change the flow of program execution (e.g., sequences, events, loops, conditionals).</li> <li>• Programs can be broken down into smaller parts to facilitate their design, implementation, and review. Programs can also be created by incorporating smaller portions of programs that already exist.</li> <li>• Individuals develop programs using an iterative process involving design, implementation, testing, and review.</li> </ul>	<p><b>Learners will know....</b></p> <p><b><u>8.1.5.AP.1:</u></b> Compare and refine multiple algorithms for the same task and determine which is the most appropriate.</p> <p><b><u>8.1.5.AP.2:</u></b> Create programs that use clearly named variables to store and modify data.</p> <p><b><u>8.1.5.AP.3:</u></b> Create programs that include sequences, events, loops, and conditionals.</p> <p><b><u>8.1.5.AP.4:</u></b> Break down problems into smaller, manageable sub-problems to facilitate program development.</p> <p><b><u>8.1.5.AP.5:</u></b> Modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program.</p> <p><b><u>8.1.5.AP.6:</u></b> Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.</p>
<p><b>Learners will be able to...</b></p> <ul style="list-style-type: none"> <li>• By the end of 5th grade learners will be able to compare and refine multiple algorithms for the same task and determine which is the most appropriate.</li> <li>• By the end of 5th grade learners will be able to create programs that use clearly named variables to store and modify data.</li> <li>• By the end of 5th grade learners will be able to create programs that include sequences, events, loops, and conditionals.</li> <li>• By the end of 5th grade learners will be able to break down problems into smaller, manageable sub-problems to facilitate program development.</li> <li>• By the end of 5th grade learners will be able to modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program.</li> <li>• By the end of 5th grade learners will be able to develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.</li> </ul>	
<p><b>Assessment Evidence</b></p>	
<p><b>Summative:</b>  ePortfolios  Project Presentations  Computed based pre and post tests</p>	

**Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

**Suggested Learning Plan**

Students come to the lab 3 days a week for a 60 day cycle and then rotate to other related arts classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**List of Core Instructional and Supplemental Materials**

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch  
Code.org  
Google CS First  
Google Applied Digital Skills  
Vidcode  
Khan Academy

**Pacing Guide**

[Grades 3 and 4](#)

## Grade 5

### 21st CENTURY LIFE AND CAREERS

#### **Career Awareness, Exploration and Preparation**

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.2 Identify various life roles and civic and work-related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

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

### Accommodations and Modifications

#### **Gifted and Talented**

- Provide appropriate challenge for wide ranging skills and development areas.
- Participate in inquiry and project-based learning units of study.

#### **English Language Learners**

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

#### **Students with IEPs/504**

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

#### **At Risk Learners**

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

### Interdisciplinary Connections/Cross Curricular Opportunities

L.RF.3.4. Read with sufficient accuracy and fluency to support comprehension.

L.WF.3.2. Demonstrate command of the conventions of encoding and spelling.

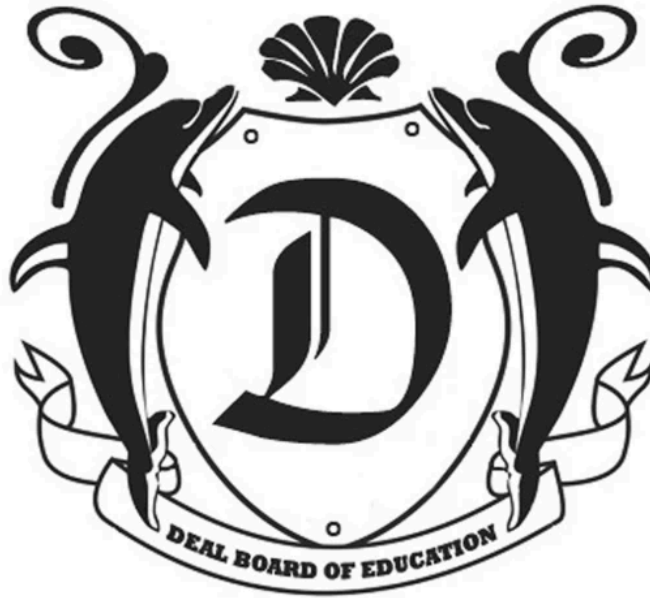
SL.PE.3.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 3 topics and texts, building on others' ideas and

expressing their own clearly.

6.1.5.CivicsPD.3: Explain how and why it is important that people from diverse cultures collaborate to find solutions to community, state, national, and global challenges.

### Integration of Technology

Students will use ipads and/or laptops during class.



Deal Elementary School  
Content Area: STEAM  
Grade Span: 3-5  
Revised By: Lindsey Pietrocola

**Deal School District**

201 Roseld Ave.  
Deal, NJ 07723  
732-531-0480  
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[www.dealschool.org](http://www.dealschool.org)

**STATE STANDARDS**

**Interdisciplinary & Cross Curricular Connections and Standards:**

[2020 New Jersey Student Learning Standards – Computer Science and Design Thinking Introduction](#)

[2020 New Jersey Student Learning Standards – Career Readiness, Life Literacies, and Key Skills Introduction](#)

[2023 NJSLS-ELA](#)

2023 NJSLS [Mathematics](#)

[2020 New Jersey Student Learning Standards Science Kindergarten through Grade 12](#)

Topic	Cumulative Progress Indicator (CPI)
<b>Computer Science and Design Thinking</b>	<p><b><i>Impacts of Computing</i></b>  8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.  8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.</p> <p><b><i>Data and Analysis</i></b>  8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.  8.1.5.DA.2: Compare the amount of storage space required for different types of data.  8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.  8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.  8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.</p> <p><b><i>Engineering Design</i></b>  8.2.5.ED.1: Explain the functions of a system and its subsystems.  8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.  8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.  8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).  8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.</p>

	<p>8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.</p> <p><b><i>Interaction of Technology and Humans</i></b></p> <p>8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.</p> <p>8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.</p> <p>8.2.5.ITH.3: Analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use.</p> <p>8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career.</p> <p><b><i>Effects of Technology on the Natural World</i></b></p> <p>8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.</p> <p>8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources.</p> <p>8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.</p> <p>8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.</p> <p>8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.</p> <p><b><i>Ethics and Culture</i></b></p> <p>8.2.5.EC.1: Analyze how technology has contributed to or reduced inequities in local and global communities and determine its short- and long-term effects.</p>
<p><b>2020 NJSLS Science</b></p>	<p><b><i>Motion and Stability: Forces and Interactions</i></b></p> <p><b>3-PS2-1</b> Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.</p> <p><b>3-PS2-2</b> Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.</p> <p><b>3-PS2-3</b> Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.</p> <p><b>3-PS2-4</b> Define a simple design problem that can be solved by applying scientific ideas about magnets.</p> <p><b><i>Earth's Systems</i></b></p> <p><b>3-ESS2-1</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p>

	<p><b>3-ESS2-2</b> Obtain and combine information to describe climates in different regions of the world.</p> <p><i>Earth and Human Activity</i></p> <p><b>3-ESS3-1</b> Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard.</p> <p><i>Engineering Design</i></p> <p><b>3-5-ETS1-1</b> Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p> <p><b>3-5-ETS1-2</b> Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p><b>3-5-ETS1-3</b> Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>
<b>2020 Career Readiness, Life Literacies and Key Skills</b>	<p><b>9.1.2.CAP.1:</b> Make a list of different types of jobs and describe the skills associated with each job.</p> <p><b>9.2.5.CAP.1:</b> Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.</p> <p><b>9.2.5.CAP.2:</b> Identify how you might like to earn an income.</p> <p><b>9.2.5.CAP.3:</b> Identify qualifications needed to pursue traditional and non-traditional careers and occupations.</p> <p><b>9.2.5.CAP.4:</b> Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.</p> <p><b>9.4.5.CI.1:</b> Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).</p> <p><b>9.4.5.CI.2:</b> Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).</p> <p><b>9.4.5.CI.3:</b> Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).</p> <p><b>9.4.5.CI.4:</b> Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).</p> <p><b>9.4.5.CT.1:</b> Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).</p>



	<p><b>9.4.5.CT.2:</b> Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).</p> <p><b>9.4.5.CT.3:</b> Describe how digital tools and technology may be used to solve problems.</p> <p><b>9.4.5.CT.4:</b> Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).</p> <p><b>9.4.5.GCA.1:</b> Analyze how culture shapes individual and community perspectives and points of view (e.g., 1.1.5.C2a, RL.5.9, 6.1.5.HistoryCC.8).</p> <p><b>9.4.5.IML.1:</b> Evaluate digital sources for accuracy, perspective, credibility and relevance (e.g., Social Studies Practice - Gathering and Evaluating Sources).</p> <p><b>9.4.5.IML.2:</b> Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).</p> <p><b>9.4.5.IML.3:</b> Represent the same data in multiple visual formats in order to tell a story about the data.</p> <p><b>9.4.5.IML.6:</b> Use appropriate sources of information from diverse sources, contexts, disciplines, and cultures to answer questions (e.g., RI.5.7, 6.1.5.HistoryCC.7, 7.1.NM.IPRET.5).</p> <p><b>9.4.5.IML.7:</b> Evaluate the degree to which information meets a need including social emotional learning, academic, and social (e.g., 2.2.5. PF.5).</p> <p><b>9.4.5.TL.4:</b> Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).</p> <p><b>9.4.5.TL.5:</b> Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d).</p>
<b>2023 NJSLS Mathematics</b>	<p><i>MP.2</i></p> <p><i>MP.4</i></p> <p><i>MP.5</i></p> <p><i>3.MD.A.2</i></p> <p><i>3.MD.B.3</i></p>
<b>2023 NJSLS ELA</b>	<p><i>RI.3.1</i></p> <p><i>RI.3.3</i></p> <p><i>RI.3.8</i></p> <p><i>RI.3.9</i></p> <p><i>W.3.7</i></p> <p><i>W.3.8</i></p> <p><i>SL.3.3</i></p>
<b>Disciplinary Concepts and Core Ideas: Engineering Design (3-5)</b>	
<b>UNIT DESCRIPTION</b>	

## **Engineering Design**

People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

## **Enduring Understandings**

### **Computer Science and Design Thinking**

#### *Data and Analysis*

- Data can be organized, displayed, and presented to highlight relationships.
- The type of data being stored affects the storage requirements.

Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data.

- Many factors influence the accuracy of inferences and predictions.

#### *Engineering Design*

- Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.
- Engineering design requirements include desired features and limitations that need to be considered.

### **Science**

#### *Engineering Design*

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.
- Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- People's needs and wants change over time, as do their demands for new and improved technologies.
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

### **Career Readiness, Life Literacies and Key Skills**

- An individual's passions, aptitude and skills can affect his/her employment and earning potential.
- Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.

- Curiosity and willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation.
- The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.
- Digital engagement can improve the planning and delivery of climate change actions.
- Culture and geography can shape an individual's experiences and perspectives.
- Digital tools and media resources provide access to vast stores of information, but the information can be biased or inaccurate.
- Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
- Accurate and comprehensive information comes in a variety of platforms and formats and is the basis for effective decision-making.
- Specific situations require the use of relevant sources of information.
- Different digital tools have different purposes.
- Collaborating digitally as a team can often develop a better artifact than an individual working alone.

### Essential Questions

- What does it mean to be creative?
- What can our imagination be used for?
- How can our imagination be used to solve a problem?
- What does it mean to be innovative?
- How can we come up with new ideas to solve a problem?
- What does it mean to be a problem- solver?
- What can we learn from our mistakes?
- What must you know about a problem before you can develop a solution?
- How can making mistakes be an important part of learning?
- Why is it important to know the resources you have to solve a problem?
- What are some advantages to planning before starting a project?

### Learners will be able to...

- By the end of fifth grade students will be able to explain the functions of a system and its subsystems.
- By the end of fifth grade students will be able to collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- By the end of fifth grade students will be able to follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

### Assessment Evidence

**Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

**Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

**Suggested Learning Plan**

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**List of Core Instructional and Supplemental Materials**

Animationish  
Seesaw  
Google Sketchup  
Google Earth  
Brain Pop  
Code.org  
[Diversity, Equity & Inclusion Educational Resources](#)

**Disciplinary Concepts and Core Ideas:  
Interaction, Impacts, and Ethics of Technology and Humans (3-5)**

**UNIT DESCRIPTION**

**Interaction, Impacts, and Ethics of Technology and Humans**

Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

**Enduring Understandings**

***Computer Science and Design Thinking***

***Impacts of Computing***

*The development and modification of computing technology is driven by an individual's needs and wants and can affect individuals differently.*

***Interaction of Technology and Humans***

*Societal needs and wants determine which new tools are developed to address real-world problems.*

*A new tool may have favorable or unfavorable results as well as both positive and negative effects on society.*

*Technology spurs new businesses and careers.*

***Ethics and Culture***

*Technological choices and opportunities vary due to factors such as differences in economic resources, location, and cultural values.*

***Science***

***Motion and Stability: Forces and Interactions***

*-Ask questions that can be investigated based on patterns such as cause and effect relationships.*

*-Define a simple problem that can be solved through the development of a new or improved object or tool.*

*-Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.*

*-Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.*

*-Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.*

*-The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.*

*-Objects in contact exert forces on each other.*

- Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.
- Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process.
- Science findings are based on recognizing patterns.
- Science investigations use a variety of methods, tools, and techniques.

### **Career Readiness, Life Literacies and Key Skills**

*An individual's passions, aptitude and skills can affect his/her employment and earning potential.*

*Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.*

*Curiosity and willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation.*

*The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.*

*Digital engagement can improve the planning and delivery of climate change actions.*

*Culture and geography can shape an individual's experiences and perspectives.*

*Digital tools and media resources provide access to vast stores of information, but the information can be biased or inaccurate.*

*Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.*

*Accurate and comprehensive information comes in a variety of platforms and formats and is the basis for effective decision-making.*

*Specific situations require the use of relevant sources of information.*

*Different digital tools have different purposes.*

*Collaborating digitally as a team can often develop a better artifact than an individual working alone.*

### **Essential Questions**

- What are the cultural, social, economic, and political effects of technology?
- What are the effects of technology on the environment?
- What is the role of society in the development and use of technology?
- What is the influence of technology on history?

### **Learners will be able to...**

- By the end of fifth grade students will be able to explain how societal needs and wants influence the development and function of a product and a system.
- By the end of fifth grade students will be able to evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

- By the end of fifth grade students will be able to analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use.

### Assessment Evidence

#### Summative:

ePortfolios  
Project Presentations  
Computed based pre and post tests

#### Formative:

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

#### Alternative Assessment:

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

### Suggested Learning Plan

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### List of Core Instructional and Supplemental Materials

Animationish  
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Google Sketchup  
Google Earth  
Brain Pop  
Code.org  
[Diversity, Equity & Inclusion Educational Resources](#)

### Disciplinary Concepts and Core Ideas:

## Nature and Effect of Technology on the World (3-5)

### UNIT DESCRIPTION

#### **Nature and Effect of Technology on the World**

Human population, patterns, and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

### Enduring Understandings

#### **Computer Science and Design Thinking**

##### *Nature of Technology*

- Technology innovation and improvement may be influenced by a variety of factors.
- Engineers create and modify technologies to meet people's needs and wants; scientists ask questions about the natural world.

##### *Effects of Technology on the Natural World*

- The technology developed for the human designed world can have unintended consequences for the environment.
- Technology must be continually developed and made more efficient to reduce the need for non-renewable resources.

#### **Science**

##### *Earth's Systems*

- Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships.
- Obtain and combine information from books and other reliable media to explain phenomena.
- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- Patterns of change can be used to make predictions.

##### *Earth and Human Activity*

- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.
- A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.
- Cause and effect relationships are routinely identified, tested, and used to explain change.



*-Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones).*

*-Science affects everyday life.*

### ***Career Readiness, Life Literacies and Key Skills***

*An individual's passions, aptitude and skills can affect his/her employment and earning potential. Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.*

*Curiosity and willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation.*

*The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.*

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*Collaborating digitally as a team can often develop a better artifact than an individual working alone.*

### **Essential Questions**

- What are the attributes of design?
- In what way can we apply engineering design?
- What is the role of troubleshooting research and development, invention and innovation and experimentation in problem solving?
- What are the benefits of the design process?
- How does the design process help with technology learning and creation?

### **Learners will be able to...**

- By the end of fifth grade students will be able to troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.
- By the end of fifth grade students will be able to identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.

- By the end of fifth grade students will be able to redesign an existing product for a different purpose in a collaborative team.
- By the end of fifth grade students will be able to identify how improvement in the understanding of materials science impacts technologies.

### Assessment Evidence

#### **Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

#### **Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
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#### **Alternative Assessment:**

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Code.org

[Diversity, Equity & Inclusion Educational Resources](#)

## Pacing Guide

[Grades 3 & 4 Pacing Guide - STEAM](#)  
[Grades 5 & 6 Pacing Guide - STEAM](#)

## Accommodations and Modifications

### Gifted and Talented

- Provide appropriate challenges for wide ranging skills and development areas.
- Participate in inquiry and project-based learning units of study.

### English Language Learners

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

### Students with IEPs/504

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

### At Risk Learners:

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

## Integration of Technology

Students will use ipads and/or laptops during class.

### **Circuitry**

MaKey MaKey

Snap Circuits - Electricity and Electronics

### **Computer Graphics**

Doodle 4 Google

Illustrator

Photoshop

Photoshop Elements

Punch Home Design Suite

SketchUp - 3D Modeling

Tinkercad

### **Digital Communications**

ACID Music Studio - Sound Engineering

CrazyTalk

CrazyTalk Animator  
Frames - Stop Motion Animation  
GarageBand - Sound Engineering  
Google Arts & Culture  
Google Sites  
PowerPoint  
STEM Career Exploration  
Storyboarding  
Video Production

**Express Challenges**

Digital Communications  
Mechanics and Structures  
Scientific Data and Analysis  
Software Engineering

**STEAM Challenges**

Orientation  
Circuitry  
Computer Graphics  
Digital Communications  
Mechanics and Structures  
Robotics and Control Technology  
Scientific Data and Analysis  
Software Engineering  
Sustainability

**Mechanics and Structures**

Bridge Designer  
fischertechnik Mechanic + Static

Deal School Curriculum	
Grade 6 - 8	
Computer Science and Design Thinking	
<b>Desired Outcomes</b>	
<u><b>Computing Systems:</b></u> People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.	
<b>Enduring Understandings</b>	<b>Essential Questions</b>
<ul style="list-style-type: none"> <li>The study of human computer interaction can improve the design of devices and extend the abilities of humans.</li> <li>Software and hardware determine a computing system's capability to store and process information. The design or selection of a computing system involves multiple considerations and potential trade-offs.</li> <li>Troubleshooting a problem is more effective when knowledge of the specific device along with a systematic process is used to identify the source of a problem.</li> </ul>	<ul style="list-style-type: none"> <li>In what ways does technology make life easier?</li> <li>How do the basic operations help me use technology more efficiently?</li> </ul>
	<b>Learners will know...</b> <u><b>8.1.8.CS.1:</b></u> Recommend improvements to computing devices in order to improve the ways users interact with the devices. <u><b>8.1.8.CS.2:</b></u> Design a system that combines hardware and software components to process data. <u><b>8.1.8.CS.3:</b></u> Justify design decisions and explain potential system trade-offs. <u><b>8.1.8.CS.4:</b></u> Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.
<b>Learners will be able to...</b>	
<ul style="list-style-type: none"> <li>By the end of 8th grade learners will be able to recommend improvements to computing devices in order to improve the ways users interact with the devices.</li> <li>By the end of 8th grade learners will be able to design a system that combines hardware and software components to process data.</li> </ul>	

- By the end of 8th grade learners will be able to justify design decisions and explain potential system trade-offs.
- By the end of 8th grade learners will be able to systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.

### Assessment Evidence

#### Summative:

ePortfolios  
Project Presentations  
Computed based pre and post tests

#### Formative:

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

#### Alternative Assessment:

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

### Suggested Learning Plan

Students come to the lab 3 times a week for a 60 day cycle period and then rotate to other subjects or elective classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### Suggested Learning Resources

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch  
Code.org

Deal School Curriculum	
Grade 6 - 8 Computer Science and Design Thinking	
Desired Outcomes	
<p><b><u>Networks and the Internet:</u></b> Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.</p>	
Enduring Understandings	Essential Questions
<ul style="list-style-type: none"> <li>• Protocols, packets and addressing are the key components for reliable delivery of information across networks.</li> <li>• The information sent and received across networks can be protected from unauthorized access and modification in a variety of ways.</li> <li>• The evolution of malware leads to understanding the key security measures and best practices needed to proactively address the threat to digital data.</li> </ul>	<ul style="list-style-type: none"> <li>• What is a computer network?</li> <li>• How do computer networks provide greater connectivity in the computing world?</li> <li>• Why is network security important?</li> </ul>
	Learners will know....
	<p><b><u>8.1.8.NI.1:</u></b> Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.</p> <p><b><u>8.1.8.NI.2:</u></b> Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication.</p> <p><b><u>8.1.8.NI.3:</u></b> Explain how network security depends on a combination of hardware, software, and practices that control access to data and systems.</p> <p><b><u>8.1.8.NI.4:</u></b> Explain how new security measures have been created in response to key malware events.</p>
Learners will be able to...	
<ul style="list-style-type: none"> <li>• By the end of 8th grade learners will be able to model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.</li> </ul>	



- By the end of 8th grade learners will be able to model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication.
- By the end of 8th grade learners will be able to explain how network security depends on a combination of hardware, software, and practices that control access to data and systems.
- By the end of 8th grade learners will be able to explain how new security measures have been created in response to key malware events.

### **Assessment Evidence**

#### **Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

#### **Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

#### **Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

### **Suggested Learning Plan**

Students come to the lab 3 times a week for a 60 day cycle period and then rotate to other subjects or elective classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### **Suggested Learning Resources**

SeeSaw  
Brain Pop  
Typing Club  
Google Apps  
Common Sense Education  
Scratch

Code.org  
E-Pals  
Google Hangouts

Deal School Curriculum	
Grade 6 - 8	
Computer and Design Thinking	
<b>Desired Outcomes</b>	
<b><i>Impacts of Computing:</i></b> Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.	
<b>Enduring Understandings</b>	<b>Essential Questions</b>
<ul style="list-style-type: none"><li>• Advancements in computing technology can change individuals' behaviors.</li><li>• Society is faced with trade offs due to the increasing globalization and automation that computing brings.</li></ul>	<ul style="list-style-type: none"><li>• How are computers impacting our society?</li><li>• How can I use technology to solve problems and create innovative solutions?</li><li>• How can technology help people collaborate and communicate effectively?</li></ul>
	<b>Learners will know....</b>  <b>8.1.8.IC.1:</b> Compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options.  <b>8.1.8.IC.2:</b> Describe issues of bias and accessibility in the design of existing technologies.
<b>Learners will be able to...</b> <ul style="list-style-type: none"><li>• By the end of 8th grade learners will be able to compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options.</li><li>• By the end of 8th grade learners will be able to describe issues of bias and accessibility in the design of existing technologies.</li></ul>	
<b>Assessment Evidence</b>	
<b>Summative:</b> ePortfolios Project Presentations	

Computed based pre and post tests

**Formative:**

Daily Journals

Quick Checks

Project Specific Rubrics

Exit Slips

Student Self-Assessment

Peer review

Pre-Assessments

**Alternative Assessment:**

Class Discussion

Teacher Observation

Class Participation

ePortfolios

**Suggested Learning Plan**

Students come to the lab 3 times a week for a 60 day cycle period and then rotate to other subjects or elective classes.

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- 4 minutes – Wrap up/review

**Suggested Learning Resources**

SeeSaw

Brain Pop

Typing Club

Google Apps

Common Sense Education

Scratch

Code.org

**Deal School Curriculum**

**Grade 6 - 8 Computer Science and Design Thinking**

**Desired Outcomes**

**Data & Analysis:** Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

Enduring Understandings	Essential Questions
<ul style="list-style-type: none"> <li>• People use digital devices and tools to automate the collection, use, and transformation of data.</li> <li>• The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.</li> <li>• Data is represented in many formats. Software tools translate the low-level representation of bits into a form understandable by individuals. Data is organized and accessible based on the application used to store it.</li> <li>• The purpose of cleaning data is to remove errors and make it easier for computers to process.</li> <li>• Computer models can be used to simulate events, examine theories and inferences, or make predictions.</li> </ul>	<ul style="list-style-type: none"> <li>• How can technology help people collaborate and communicate effectively?</li> <li>• How does technology help people communicate globally?</li> <li>• How does the automation of data help the human experience?</li> </ul>
	<p><b>Learners will know....</b></p> <p><b>8.1.8.DA.1:</b> Organize and transform data collected using computational tools to make it usable for a specific purpose.</p> <p><b>8.1.8.DA.2:</b> Explain the difference between how the computer stores data as bits and how the data is displayed.</p> <p><b>8.1.8.DA.3:</b> Identify the appropriate tool to access data based on its file format.</p> <p><b>8.1.8.DA.4:</b> Transform data to remove errors and improve the accuracy of the data for analysis.</p> <p><b>8.1.8.DA.5:</b> Test, analyze, and refine computational models.</p> <p><b>8.1.8.DA.6:</b> Analyze climate change computational models and propose refinements.</p>
<p><b>Learners will be able to...</b></p> <ul style="list-style-type: none"> <li>• By the end of 8th grade learners will be able to transform data to remove errors and improve the accuracy of the data for analysis.</li> <li>• By the end of 8th grade learners will be able to test, analyze, and refine computational models.</li> <li>• By the end of 8th grade learners will be able to analyze climate change computational models and propose refinements.</li> </ul>	
<p><b>Assessment Evidence</b></p>	
<p><b>Summative:</b> ePortfolios Project Presentations Computed based pre and post tests</p> <p><b>Formative:</b></p>	

Daily Journals  
 Quick Checks  
 Project Specific Rubrics  
 Exit Slips  
 Student Self-Assessment  
 Peer review  
 Pre-Assessments

**Alternative Assessment:**

Class Discussion  
 Teacher Observation  
 Class Participation  
 ePortfolios

**Suggested Learning Plan**

Students come to the lab 3 times a week for a 60 day cycle period and then rotate to other subjects or elective classes.

The structure of the daily lesson will be in the format of a 44-minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

**Suggested Learning Resources**

SeeSaw  
 Brain Pop  
 Typing Club  
 Google Apps  
 Common Sense Education  
 Scratch  
 Code.org  
 Google Be Internet Awesome  
 Vidcode  
 Khan Academy

**Grade 6 - 8 Computer Science and Design Thinking**

**Desired Outcomes**

**Algorithms & Programming:** An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

**Enduring Understandings**

**Essential Questions**

<ul style="list-style-type: none"> <li>• Individuals design algorithms that are reusable in many situations.</li> <li>• Algorithms that are readable are easier to follow, test, and debug.</li> <li>• Programmers create variables to store data values of different types and perform appropriate operations on their values.</li> <li>• Control structures are selected and combined in programs to solve more complex problems.</li> <li>• Programs use procedures to organize code and hide implementation details. Procedures can be repurposed in new programs. Defining parameters for procedures can generalize behavior and increase reusability.</li> <li>• Individuals design and test solutions to identify problems taking into consideration the diverse needs of the users and the community.</li> </ul>	<ul style="list-style-type: none"> <li>• How does computer programming and computational thinking affect human activity and career life?</li> <li>• What is the difference between a Program and an App?</li> <li>• What is an algorithm?</li> <li>• How is algorithmic thinking developed?</li> </ul> <hr/> <p><b>Learners will know....</b></p> <p><b><u>8.1.8.AP.1:</u></b> Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.</p> <p><b><u>8.1.8.AP.2:</u></b> Create clearly named variables that represent different data types and perform operations on their values.</p> <p><b><u>8.1.8.AP.3:</u></b> Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.</p> <p><b><u>8.1.8.AP.4:</u></b> Decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs.</p> <p><b><u>8.1.8.AP.5:</u></b> Create procedures with parameters to organize code and make it easier to reuse.</p> <p><b><u>8.1.8.AP.6:</u></b> Refine a solution that meets users' needs by incorporating feedback from team members and users.</p> <p><b><u>8.1.8.AP.7:</u></b> Design programs, incorporating existing code, media, and libraries, and give attribution.</p> <p><b><u>8.1.8.AP.8:</u></b> Systematically test and refine programs using a range of test cases and users.</p>
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	<b>8.1.8.AP.9:</b> Document programs in order to make them easier to follow, test, and debug
<b>Learners will be able to...</b> <ul style="list-style-type: none"> <li>• By the end of 8th grade learners will be able to design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.</li> <li>• By the end of 8th grade learners will be able to create clearly named variables that represent different data types and perform operations on their values.</li> <li>• By the end of 8th grade learners will be able to design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.</li> <li>• By the end of 8th grade learners will be able to decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs.</li> <li>• By the end of 8th grade learners will be able to create procedures with parameters to organize code and make it easier to reuse.</li> <li>• By the end of 8th grade learners will be able to refine a solution that meets users' needs by incorporating feedback from team members and users.</li> <li>• By the end of 8th grade learners will be able to design programs, incorporating existing code, media, and libraries, and give attribution.</li> <li>• By the end of 8th grade learners will be able to systematically test and refine programs using a range of test cases and users.</li> <li>• By the end of 8th grade learners will be able to document programs in order to make them easier to follow, test, and debug.</li> </ul>	
<b>Assessment Evidence</b>	
<b>Summative:</b> ePortfolios Project Presentations Computed based pre and post tests  <b>Formative:</b> Daily Journals Quick Checks Project Specific Rubrics Exit Slips Student Self-Assessment Peer review Pre-Assessments  <b>Alternative Assessment:</b> Class Discussion Teacher Observation Class Participation	

ePortfolios
<b>Suggested Learning Plan</b>
<p>Students come to the lab 3 times a week for a 60 day cycle period and then rotate to other subjects or elective classes.</p> <p>The structure of the daily lesson will be in the format of a 44-minute period.</p> <ul style="list-style-type: none"> <li>• 10 minutes – Do/Now summary and whole group instruction</li> <li>• 30 minutes – Independent work with teacher monitoring and guidance</li> <li>• 4 minutes – Wrap up/review</li> </ul>
<b>Suggested Learning Resources</b>
<p>SeeSaw Brain Pop Typing Club Google Apps Common Sense Education Scratch Code.org Vidcode Kahn Academy</p>

<b>Pacing Guide</b>
<a href="#">Grade 6</a>
<a href="#">Grades 7 &amp; 8</a>
<b>21st CENTURY LIFE AND CAREERS</b>
<p><b>Career Awareness, Exploration and Preparation</b></p> <p>9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.</p> <p>9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.</p> <p>9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.</p> <p>9.2.8.CAP.18: Explain how personal behavior, appearance, attitudes, and other choices may impact the job application process.</p>
<b>Accommodations and Modifications</b>
<p><b>Gifted and Talented</b></p> <ul style="list-style-type: none"> <li>• Provide appropriate challenges for wide ranging skills and development</li> </ul>



areas.

- Participate in inquiry and project-based learning units of study.

#### **English Language Learners**

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

#### **Students with IEPs/504**

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

#### **At Risk Learners**

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

#### **LGBTQ+ and Students with Disabilities**

- [Celebrating Pride Month in Tech](#)
- [LGBTQ figures who shaped tech history](#)
- [10 inspiring LGBTQ+ tech leaders](#)
- [Re-Thinking Disability in Tech](#)
- [Queer Spaces: LGBTQ Voices and Resources for Architects and Designers](#)
- [Garden State Equality Education Resources](#)
- [Pride in STEM](#)

#### **Interdisciplinary Connections/Cross Curricular Opportunities**

L.SS.8.1. Demonstrate command of the system and structure of the English language when writing or speaking.

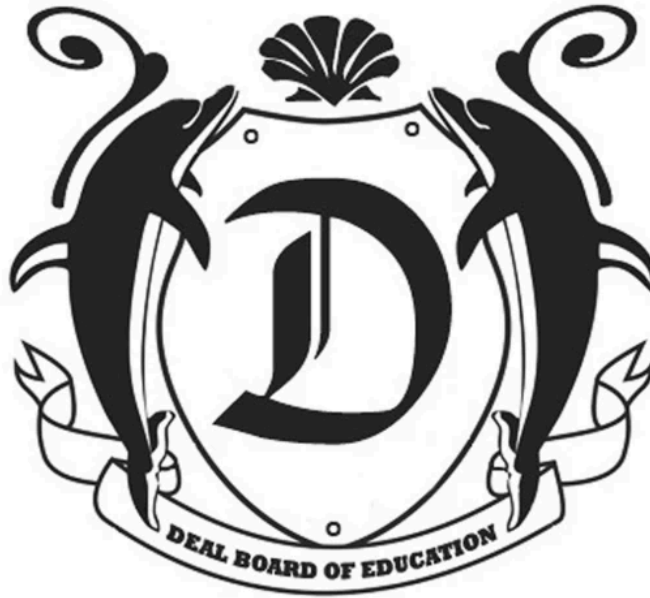
L.KL.8.2. Use knowledge of language and its conventions when writing, speaking, reading, or listening.

SL.II.8.2. Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

SL.UM.8.5. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

#### **Integration of Technology**

Students will use ipads and/or laptops during class.



Deal Elementary School  
Content Area: STEAM  
Grade Span: 6-8  
Revised By: Lindsey Pietrocola

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**Deal School Curriculum  
S.T.E.A.M. (6-8)**

**STATE STANDARDS**

**Interdisciplinary & Cross Curricular Connections and Standards:**

[2020 New Jersey Student Learning Standards – Computer Science and Design Thinking Introduction](#)

[2020 New Jersey Student Learning Standards – Career Readiness, Life Literacies, and Key Skills](#)

[Introduction](#)

[2023 NJSLS-ELA](#)

2023 NJSLS [Mathematics](#)

[2020 New Jersey Student Learning Standards Science Kindergarten through Grade 12](#)

Topic	Cumulative Progress Indicator (CPI)
<b>Computer Science and Design Thinking</b>	<p><i>Engineering Design</i></p> <p>8.2.8.ED.1: Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.</p> <p>8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.</p> <p>8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).</p> <p>8.2.8.ED.4: Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team.</p> <p>8.2.8.ED.5: Explain the need for optimization in a design process.</p> <p>8.2.8.ED.6: Analyze how trade-offs can impact the design of a product.</p> <p>8.2.8.ED.7: Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).</p> <p><i>Interaction of Technology and Humans</i></p> <p>8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues.</p> <p>8.2.8.ITH.2: Compare how technologies have influenced society over time.</p> <p>8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system.</p> <p>8.2.8.ITH.4: Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.</p> <p>8.2.8.ITH.5: Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.</p> <p><i>Nature of Technology</i></p> <p>8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.</p> <p>8.2.8.NT.2: Analyze an existing technological product that has been repurposed for a different function.</p> <p>8.2.8.NT.3: Examine a system, consider how each part relates to other parts, and redesign it for another purpose.</p>

	<p>8.2.8.NT.4: Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.</p> <p><i>Effects of Technology on the Natural World</i></p> <p>8.2.8.ETW.1: Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.</p> <p>8.2.8.ETW.2: Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).</p> <p>8.2.8.ETW.3: Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.</p> <p>8.2.8.ETW.4: Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.</p> <p><i>Ethics and Culture</i></p> <p>8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies.</p> <p>8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.</p>
<p><b>2020 NJSL Science</b></p>	<p><i>Matter and its Interactions</i></p> <p>MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p> <p>MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.</p> <p><i>Motion and Stability: Forces and interactions</i></p> <p>MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p>MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.</p> <p>MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.</p> <p>MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.</p> <p>MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.</p> <p><i>Engineering Design 6-8</i></p> <p>MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p> <p>MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</p> <p>MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>

<b>2024 Career Readiness, Life Literacies and Key Skills</b>	<p>9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.</p> <p>9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.</p> <p>9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.</p> <p>9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.</p> <p>9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).</p> <p>9.4.8.CI.2: Repurpose an existing resource in an innovative way</p> <p>9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas</p> <p>9.4.8.CI.4: Explore the role of creativity and innovation in career pathways and industries.</p> <p>9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).</p> <p>9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</p> <p>9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.</p> <p>9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.</p> <p>9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping.</p> <ul style="list-style-type: none"> <li>• 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.</li> <li>• 9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data.</li> </ul>
<b>2024 NJSLS Mathematics</b>	<p><i>MP.2</i></p> <p><i>MP.4</i></p> <p><i>6.RP.A.3</i></p> <p><i>6.NS.C.5</i></p> <p><i>8.EE.A.3</i></p> <p><i>6.SP.B.4</i></p>

	<i>6.SP.B.5</i>
<b>2024 NJSLs ELA</b>	<i>RST.6-8.1</i> <i>RST.6-8.3</i> <i>RST.6-8.7</i> <i>WHST.6-8.7</i> <i>WHST.6-8.8</i>

**S.T.E.A.M.**  
**Disciplinary Concepts and Core Ideas: Engineering Design (6-8)**

**UNIT DESCRIPTION**

**Engineering Design**

People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

**Enduring Understandings**

**Computer Science and Design Thinking**

- Engineering design is a systematic, creative, and iterative process used to address local and global problems.
- The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes.
- Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.
- Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
- Multiple solutions exist to solve a problem.
- An essential aspect of problem solving is being able to self- reflect on why possible solutions for solving problems that were or were not successful.
- Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

**Science**

- Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.
- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.

- Analyze and interpret data to determine similarities and differences in findings.
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.
- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.
- Models of all kinds are important for testing solutions.
- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.
- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
- The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

### **Career Readiness, Life Literacies and Key Skills**

- An individual's passions, aptitude and skills can affect his/her employment and earning potential.
- Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.
- Curiosity and willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation.
- The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.
- Digital engagement can improve the planning and delivery of climate change actions.
- Culture and geography can shape an individual's experiences and perspectives.
- Digital tools and media resources provide access to vast stores of information, but the information can be biased or inaccurate.
- Digital tools can be used to modify and display data in various ways that can be organized to communicate ideas.
- Accurate and comprehensive information comes in a variety of platforms and formats and is the basis for effective decision-making.
- Specific situations require the use of relevant sources of information.
- Different digital tools have different purposes.
- Collaborating digitally as a team can often develop a better artifact than an individual working alone.

### **Essential Questions**

What does it mean to be creative?  
 What can our imagination be used for?  
 How can our imagination be used to solve a problem?  
 What does it mean to be innovative?  
 How can we come up with new ideas to solve a problem?  
 What does it mean to be a problem- solver?  
 What can we learn from our mistakes?  
 What must you know about a problem before you can develop a solution?  
 How can making mistakes be an important part of learning?  
 Why is it important to know the resources you have to solve a problem?  
 What are some advantages to planning before starting a project?  
 How does technology change thinking?  
 In what ways does technology make life easier?  
 What encourages innovation and technology?  
 How does technology connect people and civilizations?  
 In what ways does technology make life easier?  
 How can innovation help some and hurt others?  
 How does technology improve the human condition?

### **Learners will be able to...**

- By the end of eighth grade students will be able to evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
- By the end of eighth grade students will be able to identify the steps in the design process that could be used to solve a problem.
- By the end of eighth grade students will be able to develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
- By the end of eighth grade students will be able to investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team.
- By the end of eighth grade students will be able to analyze how trade-offs can impact the design of a product.
- By the end of eighth grade students will be able to design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).

### **Assessment Evidence**

**Summative:**  
 ePortfolios



Project Presentations  
Computed based pre and post tests

**Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

**Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
ePortfolios

### Suggested Learning Plan

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
- 30 minutes – Independent work with teacher monitoring and guidance
- 4 minutes – Wrap up/review

### List of Core Instructional and Supplemental Materials

Animationish  
Seesaw  
Google Sketchup  
Google Earth  
Brain Pop  
Code.org  
[Diversity, Equity & Inclusion Educational Resources](#)

**S.T.E.A.M.**  
**Disciplinary Concepts and Core Ideas:**  
**Interaction, Impacts, and Ethics of Technology and Humans(6-8)**

**UNIT DESCRIPTION**

**Interaction, Impacts, and Ethics of Technology and Humans**

Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

**Enduring Understandings**

**Computer Science and Design Thinking**

- Economic, political, social and cultural aspects of society drive development of new technological products, processes, and systems.
- Technology interacts with society, sometimes bringing about changes in a society's economy, politics, and culture, and often leading to the creation of new needs and wants.
- New needs and wants may create strains on local economies and workforces.

Improvements in technology are intended to make the completion of tasks easier, safer, and/or more efficient.

**Science**

- Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.
- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.
- Analyze and interpret data to determine similarities and differences in findings.
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.
- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.

- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.
- Models of all kinds are important for testing solutions.
- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.
- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
- The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

### **Career Readiness, Life Literacies and Key Skills**

- An individual's passions, aptitude and skills can affect his/her employment and earning potential.
- Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.
- Curiosity and willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation.
- The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.
- Digital engagement can improve the planning and delivery of climate change actions.
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- Specific situations require the use of relevant sources of information.
- Different digital tools have different purposes.
- Collaborating digitally as a team can often develop a better artifact than an individual working alone.

### **Essential Questions**

How does technology change thinking?  
 How does technology affect artistic achievement?  
 In what ways does technology make life easier?  
 How does innovation and technological change influence our lives?  
 In what ways does technology make life easier?  
 How does innovation and technological change influence our lives?  
 Why do humans create innovations and advancements in technology?  
 How are computers impacting our society?

**Learners will be able to...**

- By the end of eighth grade students will be able to explain how the development and use of technology influences economic, political, social, and cultural issues.
- By the end of eighth grade students will be able to compare how technologies have influenced society over time.
- By the end of eighth grade students will be able to evaluate the impact of sustainability on the development of a designed product or system.
- By the end of eighth grade students will be able to identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
- By the end of eighth grade students will be able to compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.
- By the end of eighth grade students will be able to explain ethical issues that may arise from the use of new technologies.
- By the end of eighth grade students will be able to examine the effects of ethical and unethical practices in product design and development.

### Assessment Evidence

#### **Summative:**

ePortfolios

Project Presentations

Computed based pre and post tests

#### **Formative:**

Daily Journals

Quick Checks

Project Specific Rubrics

Exit Slips

Student Self-Assessment

Peer review

Pre-Assessments

#### **Alternative Assessment:**

Class Discussion

Teacher Observation

Class Participation

ePortfolios

### Suggested Learning Plan

The structure of the daily lesson will be in the format of a 44 minute period.

- 10 minutes – Do/Now summary and whole group instruction
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### S.T.E.A.M.

#### Disciplinary Concepts and Core Ideas: Nature and Effect of Technology on the World(6-8)

### UNIT DESCRIPTION

#### **Nature and Effect of Technology on the World (6-8)**

Human population patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.

### Enduring Understandings

#### **Computer Science and Design Thinking**

*Nature of Technology*

-Technology advances through the processes of innovation and invention which relies upon the imaginative and inventive nature of people.

- Sometimes a technology developed for one purpose is adapted to serve other purposes.
- Engineers use a systematic process of creating or modifying technologies that is fueled and constrained by physical laws, cultural norms, and economic resources. Scientists use systematic investigation to understand the natural world.

#### *Effects of Technology on the Natural World*

- Resources need to be utilized wisely to have positive effects on the environment and society.
- Some technological decisions involve trade-offs between environmental and economic needs, while others have positive effects for both the economy and environment.

#### **Science**

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- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.
- Analyze and interpret data to determine similarities and differences in findings.
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.
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### Essential Questions

How is survival dependent on innovation/technology?

What are the attributes of design?

In what way can we apply engineering design?

What is the role of troubleshooting research and development, invention and innovation and experimentation in problem solving?

What are the benefits of the design process?

How does the design process help with technology learning and creation?

How can we apply the design process?

How do we use and maintain technological products and systems?

How do we assess the impact of products and systems?

### Learners will be able to...

- By the end of eighth grade students will be able to examine a malfunctioning tool, product, or system and propose solutions to the problem.
- By the end of eighth grade students will be able to analyze an existing technological product that has been repurposed for a different function.
- By the end of eighth grade students will be able to examine a system, consider how each part

relates to other parts, and redesign it for another purpose.

- By the end of eighth grade students will be able to explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.
- By the end of eighth grade students will be able to illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.
- By the end of eighth grade students will be able to analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).
- By the end of eighth grade students will be able to analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.
- By the end of eighth grade students will be able to compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.

### Assessment Evidence

#### **Summative:**

ePortfolios  
Project Presentations  
Computed based pre and post tests

#### **Formative:**

Daily Journals  
Quick Checks  
Project Specific Rubrics  
Exit Slips  
Student Self-Assessment  
Peer review  
Pre-Assessments

#### **Alternative Assessment:**

Class Discussion  
Teacher Observation  
Class Participation  
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Google Earth

Brain Pop

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[Diversity, Equity & Inclusion Educational Resources](#)

## Pacing Guide

[Grades 5 & 6 Pacing Guide - STEAM](#)

[Grades 7 & 8 Pacing Guide - STEAM](#)

[Grade 8 Pacing Guide- STEAM](#)

## Accommodations and Modifications

### Gifted and Talented

- Provide appropriate challenges for wide ranging skills and development areas.
- Participate in inquiry and project-based learning units of study.

### English Language Learners

- Pair visual prompts with verbal presentations
- Provide students with visual models, sentence stems, concrete objects, and hands on materials.

### Students with IEPs/504

- Review student individual educational plan and/or 504 plan
- Establish procedures for accommodations and modifications for assessments as per IEP/504
- Modify classroom environment to support academic and physical needs of the students as per IEP/504

### At Risk Learners:

- Differentiated instruction
- Basic Skills
- Provide instructional interventions in the general education classroom

### LGBTQ+ and Students with Disabilities

- [Celebrating Pride Month in Tech](#)
- [LGBTQ figures who shaped tech history](#)
- [10 inspiring LGBTQ+ tech leaders](#)
- [Queer Spaces: LGBTQ Voices and Resources for Architects and Designers](#)
- [Garden State Equality Education Resources](#)
- [Pride in STEM](#)
- [Re-Thinking Disability in Tech](#)

## Science Connections

SCI.6-8.MS-ETS1- 1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solution using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.

for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

## Integration of Technology

Students will use ipads and/or laptops during class.

### **Circuitry**

MaKey MaKey

Snap Circuits - Electricity and Electronics

### **Computer Graphics**

Doodle 4 Google

Illustrator

Photoshop

Photoshop Elements

Punch Home Design Suite

SketchUp - 3D Modeling

Tinkercad

### **Digital Communications**

ACID Music Studio - Sound Engineering

CrazyTalk

CrazyTalk Animator

Frames - Stop Motion Animation

GarageBand - Sound Engineering

Google Arts & Culture

Google Sites

PowerPoint

STEM Career Exploration

Storyboarding

Video Production

### **Express Challenges**

Digital Communications

Mechanics and Structures

Scientific Data and Analysis

Software Engineering

### **Liftoff Challenges**

Orientation

Circuitry

Computer Graphics

Digital Communications

Mechanics and Structures

Robotics and Control Technology

Scientific Data and Analysis

Software Engineering

Sustainability

### **Mechanics and Structures**

Bridge Designer  
fischertechnik Mechanic + Static  
fischertechnik Mechanic + Static 2  
K'Nex  
Zometool

### **Orientation**

Online ePortfolio  
Orientation Collection

### **Robotics and Control Technology**

Lego Mindstorms EV3 Robotics  
Scientific Data and Analysis  
ArcGIS Online - Geographic Information Systems  
Astronomy with MicroObservatory  
Extreme Weather and Monster Storms  
Geographic Information Systems (GIS) - GIS Websites  
Google Earth  
Lasers  
Vernier Scientific Sensors  
Vernier Structures Tester

### **Software Engineering**

Scratch v2 - Computer Programming  
Stencyl - Game Design  
TouchDevelop

### **Sustainability**

Hydrogen Fuel Cells  
Introduction to Alternative Energy and Other Topics  
Solar Energy