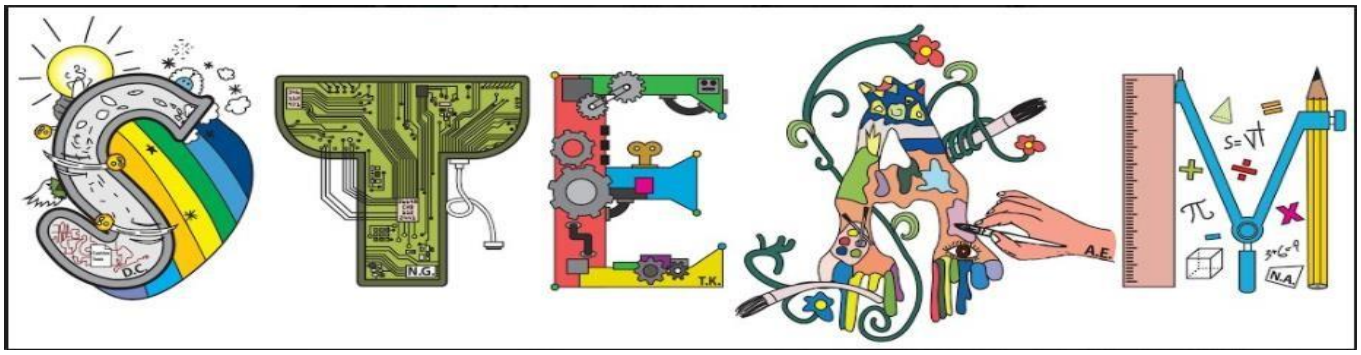
Fairfield Public Schools



S.T.E.A.M. Curriculum

(Science, Technology, Engineering, Arts, and Mathematics)

ACKNOWLEDGEMENTS

Susan Ciccotelli, Superintendent of Schools
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Mission

S.T.E.A.M. refers to the areas of Science, Technology, Engineering, Arts, and Mathematics. The Fairfield Public Schools have integrated S.T.E.A.M. concepts into the curriculum starting in kindergarten and they are continued through all grades in the K-6 district. The S.T.E.A.M. program emphasizes critical thinking, problem-solving, investigation, collaboration, and creativity. Lessons are rooted in identifying problems and creating solutions. Students will work in an environment in which they are encouraged to think, question, collaborate, and make decisions. They will learn that there can be more than one correct answer and that it may be necessary to start over multiple times before finding a final solution. The Fairfield School District teaches students to think outside-of-the-box, take risks, and continue to persevere when solving any type of problem or challenge that pupils may have the opportunity to solve.

Vision

S.T.E.A.M. students will tinker, explore, invent, and design using the principles of science, technology, engineering, art, and mathematics. They will build and rebuild, think and rethink, design and redesign, using both technology and hands on materials. Students will struggle, fail, learn from their mistakes, and work through their problems. Our S.T.E.A.M. curriculum is designed to develop well-rounded students with a passion for lifelong learning who are well-equipped with the tools necessary to be successful citizens in the 21st century.

STEAM - Kindergarten

Grade: Kindergarten Unit 1Theme: Technology Time Frame: First Part of 8-week cycle

Summary: Unit 1 for kindergarten will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

Overarching Goals:
Learners will . . .

- Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
- Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)

Related Standards Covered:

- Identify the basic features of a digital device and explain its purpose. (8.1.2.A.1)
- Create a document using a word processing application. (8.1.2.A.2)
- Demonstrate developmentally appropriate navigation skills in virtual environments. (8.1.2.A.4)
- Use digital tools and online resources to explore a problem or issue. (8.1.2.E.1)
- Use geographic mapping tools to plan and solve problems. (8.1.2.F.1)
- Identify how technology impacts or improves life. (8.2.2.B.1)
- Identify how the ways people live and work has changed because of technology. (8.2.2.B.4)

Desired Results

Enduring Understandings: Students will be able to demonstrate . . . ● Grade level appropriate technology vocabulary	Essential Questions: ● How is technology used in daily life? ● What are the benefits of technology? ● How can I use technology to
● Navigation of a virtual environment ● The ability to input text and data ● Technology is constantly changing and requires continuous learning of new skills ● Appropriate user responsibilities ● Digital responsibility at school and carry over to home use	communicate my ideas? ● Why is it important to be a good digital citizen, both at home and at school? ● How does computer science affect our lives and future careers globally?
Instructional Plan	
Suggested Activities: ● Introduction to technology terminology ● Practicing mouse skills (and trackpad introduction) ● Keyboard awareness and layout (spacebar, backspace, enter key, shift, etc.) ○ Typing name ● Web navigation (ie: open a browser, access a website) ● Computer Science ● Online Safety/Netiquette	Resources: ● Coding (code.org, kodable.com) ● Teacher selected websites for reinforcement (starfall.com, abcya.com, funbrain.com, etc.) ● Teacher websites for mouse practice (abcmouse.com, minimouse.us) ● NetSmartz

STEAM - Kindergarten
Grade: Kindergarten Unit 2 Theme: Science (Motion) Time Frame: 2nd Part of 8-week cycle Summary: Unit 2 for kindergarten will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process.
Assessments

Formal: Informal: ● Performance/project-based ● Teacher assessments using rubrics/checklists ● Class ● Written student self-reflection ● ● Peer evaluation of group ● Anecdotal ● Brainstorming think-sessions ● Entrance/exit slips	observation discussion/participation Classwork notes work/collaboration ● Discussion guide
Established Goals	
Overarching Goals: Learners will . . . ● Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object (K-PS2-1). ● 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 (K-PS2-2).	Related Standards Covered: ● Pushes and pulls can have different strengths and directions. (KPS2-1),(KPS2-2) Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1),(K-PS2-2) ● A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1) ● 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. (secondary to KPS2-2)
Desired Results	
Enduring Understandings: Students will be able to demonstrate . . . ● Following established STEAM Lab rules and procedures ensures that students and faculty remain safe and increases the likelihood that	Essential Questions: ● How do we use the STEAM Lab and its equipment safely for science? ● How do we work together to meet our goals as scientists? ● What are the steps of the scientific

challenges are met successfully. ● Scientists take on specific responsibilities in order to contribute to the success of the overall challenge. ● The Scientific Process involves asking questions, imagining possible solutions, planning a course of action, creating and testing a process or prototype, and analyzing results in order to make design improvements. ● Pushing and pulling on an object can change its speed or direction	process? ● How does friction affect movement? ● What happens if you push or pull an object harder?
Instructional Plan	
Suggested Activities: ● STEAM Lab Safety ● Build A Tower ● Simple Machines ● Ramps ● Slides	Resources: ● Lab Overview ● Challenge materials: toothpicks, marshmallows, plastic cups, blocks, ramps, etc. ● YouTube introduction/background videos

STEAM - Kindergarten		
Grade: Kindergarten	Unit 3 Theme: Engineering	Time Frame: Third Part of 8-week cycle
Summary: Unit 3 for kindergarten will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.		
Assessments		

Formal: ● Performance/project-based assessments using rubrics/checklists ● Written student self-reflection ● Peer evaluation of group work/collaboration	Informal: ● Teacher observation ● Class discussion/participation ● Classwork ● Anecdotal notes ● Discussion guide ● Brainstorming think-sessions ● Entrance/exit slips
Established Goals	
Overarching Goals: Learners will . . . ● Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2ETS1-1) ● Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) ● Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)	Related Standards Covered: ● A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) ● 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. (K-2-ETS1-2)
Desired Results	
Enduring Understandings: Students will be able to demonstrate . . .	Essential Questions: ● How can you use questioning and

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- How to solve a problem through engineering
- The use of questioning, observing, and gathering information to help solve problems
- A clear understanding of the problem is the first step
- Designs can be conveyed through sketches, drawings, or physical models and will aid in communicating with others
- Comparing and testing designs is a useful way to determine the best solution to a problem

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observation to help solve problems?

- How can comparing designs help to find a solution to a problem?
- How do you determine materials and placements to create a strong object or tool?
- Why is it important to test designs before putting into use?

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<td colspan="2">Instructional Plan</td>
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Suggested Activities:

<u>MakerSpace/Engineer Design</u>

- Craft Stick Catapult Activity
- Popsicle Stick Bridge
- Strongest Shapes
- A New Bed for Goldilocks
- Parachute Design
- Simple Machine Winch

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Resources:

- Challenge supplies may include: craft ticks, rubber bands, clothespins, binder clips, construction paper, glue, tape, pipe cleaners, paper towel rolls, coffee filters, etc.
- Websites for reference:
  - www.sciencea-z.com
  - www.education.com
  - www.youtube.com
  - www.science4us.com
  - www.SciShowKids.com
  - https://thekindergartenconnection.com/awesome-engineering-activities-kids/
- Related literature

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STEAM - Grade 1

Grade: **1** Unit 1 Theme: Technology Time Frame: First Part of 8-week cycle

Summary: Unit 1 for Grade 1 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

<table>
<tr>
<td>Overarching Goals:
Learners will . . .
Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)</td>
<td>Related Standards Covered:
Identify the basic features of a digital device and explain its purpose. (8.1.2.A.1)
Create a document using a word processing application. (8.1.2.A.2)
Demonstrate developmentally appropriate navigation skills in virtual environments. (8.1.2.A.4)
Use digital tools and online resources to explore a problem or issue. (8.1.2.E.1)
Use geographic mapping tools to plan and solve problems. (8.1.2.F.1)
Identify how technology impacts or improves life. (8.2.2.B.1)
Identify how the ways people live and work has changed because of technology. (8.2.2.B.4)</td>
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<tr>
<td colspan="2">Desired Results</td>
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<tr>
<td>Enduring Understandings:
Students will be able to demonstrate . . .
Grade level appropriate technology vocabulary
The ability to understand and use the</td>
<td>Essential Questions:
How is technology used in daily life?
What are the benefits of technology?
How can I use technology to communicate my ideas?</td>
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<td>features of an operating system and the ability to input text and data
The ability to use/create grade appropriate documents
The ability to create graphic organizers
The ability to discuss the uses of technology at home and at school</td>
<td>Why is it important to be a good digital citizen, both at home and at school?
How does computer science affect our lives and future careers globally?</td>
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<td colspan="2">Instructional Plan</td>
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Suggested Activities: ● Introduction to Google Suite ○ Username and password login ○ Navigating school website and shortcut to login ○ Drive, Docs, Classroom, Drawing ● Continued development of technology terminology ● Continued keyboard layout awareness (end punctuation, commas, tab key, etc.) ● Web navigation (using shortcuts on school website) ● Computer Science ● Online Safety/Netiquette	Resources: ● Coding (code.org, kodable.com) ○ Ozobots ● Teacher selected websites for reinforcement (starfall.com, abcya.com, funbrain.com, storylineonline.net, etc.) ● NetSmartz ● Other possible creation websites: Blabberize, KidBlog, Voki, FlipGrid

STEAM - Grade 1	
Grade: 1	Unit 2 Theme: Science (Earth) Time Frame: Second Part of 8-week cycle
Summary: Unit 2 for Grade 1 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process.	
Assessments	
Formal: ● Performance/project-based assessments using rubrics/checklists ● Written student self-reflection ● Peer evaluation of group ● Brainstorming think-sessions ● Entrance/exit slips	Informal: ● Teacher observation ● Class discussion/participation ● Classwork ● Anecdotal notes ● work/collaboration ● Discussion guide
Established Goals	

<table>
<tr><td>Overarching Goals:
Learners will . . .
Use observations of the sun, moon, and stars to describe patterns that can be predicted (1-ESS1-1).
Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</td><td>Related Standards Covered:
Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1).
Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1- ESS1-2).</td></tr>
<tr><td colspan="2">Desired Results</td></tr>
<tr><td>Enduring Understandings:
Students will be able to demonstrate . . .
Following established STEAM Lab rules and procedures ensures that students and faculty remain safe and increases the likelihood that challenges are met successfully.
Scientists take on specific responsibilities in order to contribute to the success of the overall challenge.
The Scientific Process involves asking questions, imagining possible solutions, planning a course of action,</td><td>Essential Questions:
How do we use the STEAM Lab and its equipment safely for science?
How do we work together to meet our goals as scientists?
What are the steps of the scientific process?
What predictable, observable patterns occur due to the motion of the sun, moon, and stars?
How is the amount of daylight related to the time of year?</td></tr>
<tr><td>creating and testing a process or prototype, and analyzing results in order to make design improvements.
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.</td><td></td></tr>
<tr><td colspan="2">Instructional Plan</td></tr>
<tr><td>Suggested Activities:
STEAM Lab Safety
Patterns in Space
Observe sky
Moon phase pictures
Shadows - reflecting on the sun’s place in the sky
Sun’s daily path across the sky
The sun’s energy - how it affects temperature of soil, air, and water in a predictable pattern</td><td>Resources:
Lab Overview
YouTube introduction/background videos
Mysteryscience.com
Supporting literature
The sun’s energy lesson</td></tr>
</table>

STEAM - Grade 1

Grade: **1** Unit 3 Theme: Engineering Time Frame: Third Part of 8-week cycle

Summary: Unit 3 for Grade 1 will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

Overarching Goals:
Learners will . . .

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

Related Standards Covered:

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- 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. (K-2-ETS1-2)

Desired Results

Enduring Understandings: Students will be able to demonstrate . . .	Essential Questions: ● How does sketching or creating a
● The shape and stability of structures of natural and designed objects are related to their function(s) ● How to solve a problem through engineering ● The use of questioning, observing, and gathering information to help solve problems ● Designs can be conveyed through sketches, drawings, or physical models and will aid in communicating with others ● Comparing and testing designs is a useful way to determine the best solution to a problem	model to illustrate its shape help solve a given problem? ● How does testing a model determine its strengths and weaknesses in solving a given problem? ● How are asking questions, gathering information, and making observations helpful when thinking about problems?
Instructional Plan	
Suggested Activities: <u>MakerSpace/Engineer Design</u> ● Design a tool or machine to make a task simpler using only the supplies provided ● Create a structure to provide shade ● Explain how engineers solve problems	Resources: ● Challenge supplies may include: craft ticks, rubber bands, clothespins, binder clips, construction paper, glue, tape, pipe cleaners, paper towel rolls, coffee filters, etc. ● Websites for reference: ○ www.sciencea-z.com ○ www.education.com ○ www.youtube.com ○ www.science4us.com ○ www.SciShowKids.com ○ www.betterlesson.com ○ www.thestemlabratory.com ○ www.teachengineering.org ○ http://www.eie.org/ ● Related literature

STEAM - Grade 2

Grade: **2** Unit 1 Theme: Technology Time Frame: First Part of 8-week cycle

Summary: Unit 1 for Grade 2 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

<table>
<tr>
<td>Overarching Goals:
Learners will . . .
Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)</td>
<td>Related Standards Covered:
Create a document using a word processing application (8.1.2.A.2).
Demonstrate developmentally appropriate navigation skills in virtual environments (8.1.2.A.4)
Enter information into a spreadsheet and sort the information (8.1.2.A.5).
Identify the structure and components of a database (8.1.2.A.6).
Enter information into a database or spreadsheet and filter the information (8.1.2.A.7).
Illustrate and communicate original ideas and stories using multiple digital tools and resources (8.1.2.B.1).
Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media (8.1.2.C.1).
Develop an understanding of ownership of print and nonprint information (8.1.2.D.1).</td>
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<td></td>
<td>Use digital tools and online resources to explore a problem or issue (8.1.2.E.1).
Identify how technology impacts or improves life (8.2.2.B.1).
Identify how the ways people live and work has changed because of technology (8.2.2.B.4).</td>
</tr>
<tr>
<td colspan="2">Desired Results</td>
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</table>

Enduring Understandings: Students will be able to demonstrate . . . ● Grade level appropriate technology vocabulary ● The ability to understand and use the features of an operating system and the ability to input text and data ● The ability to use/create grade appropriate documents ● The ability to create graphic organizers ● The ability to discuss the uses of technology at home and at school ● The ability to produce and interpret graphs and charts by entering data into a spreadsheet ● The ability to appropriately use a search engine to facilitate research	Essential Questions: ● How can I use technology to communicate my ideas? ● What can I learn about the global community by sharing ideas with students in other states/countries? ● Why is it important to be a good digital citizen, both at home and at school? ● How does computer science affect our lives and future careers globally?
Instructional Plan	
Suggested Activities: ● Review Google Suite ○ Username and password ○ Login procedures ● Continue introducing Google Suite apps ● Computer Science ● Video Conferencing ● Digital Scrapbook ● Online Safety/Netiquette	Resources: ● Google Drive, Docs, Classroom, Drawing, Slides, Sheets ● Coding (code.org, kodable.com) ● Google Chrome ● Teacher selected websites for content reinforcement (abcya.com, digipuzzle.com, pre-selected websites depending on season and content ● Multimedia creative tools: iMovie, iPhoto, Voki, Blabberize, Voicethread, Photostory, Seesaw, FlipGrid ● NetSmartz.org

STEAM - Grade 2

Grade: 2 Unit 2 Theme: Science (Earth) Time Frame: 2nd Part of 8-week cycle

Summary: Unit 2 for Grade 2 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process.

Assessments

Formal: Informal:

- Performance/project-based ● Teacher assessments using rubrics/checklists ● Class
- Written student self-reflection ●
- Peer evaluation of group ● Anecdotal
- Brainstorming think-sessions
- Entrance/exit slips

observation
discussion/participation
Classwork
notes work/collaboration ● Discussion guide

Established Goals

Overarching Goals:
Learners will . . .

- Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land (2ESS2-1.).
- Develop a model to represent the shapes and kinds of land and bodies of water in an area (2-ESS2-2).
- Obtain information to identify where water is found on Earth and that it can be solid or liquid (2-ESS2-3).

Related Standards Covered:

- Wind and water can change the shape of the land. (2- ESS2-1).
- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2).
- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS23).

Desired Results

Enduring Understandings:
Students will be able to demonstrate . . .

- Following established STEAM Lab rules and procedures ensures that students and faculty remain safe and increases the likelihood that challenges are met successfully.
- Scientists take on specific responsibilities in order to contribute to the success of the overall

Essential Questions:

- How do we use the STEAM Lab and its equipment safely for science?
- How do we work together to meet our goals as scientists?
- What are the steps of the scientific process?
- What are different solutions designed to prevent wind or water changing the shape of land?

challenge. • The Scientific Process involves asking questions, imagining possible solutions, planning a course of action, creating and testing a process or prototype, and analyzing results in order to make design improvements. • Patterns in the natural world can be observed. • Things may change slowly or rapidly such as erosion of rocks, glaciers melting, volcanic explosions, and earthquakes. • Humans have designed multiple solutions to slow or prevent wind or water from changing the shape of the land, such as windbreaks, shrubs, grass and trees.	• How can a map represent the shape and kind of water in a specified area? • Where and why is water on Earth found in both solid and liquid form?
Instructional Plan	
Suggested Activities: • STEAM Lab Safety • If you floated down a river . . .? • Why is there sand at the beach? • What is strong enough to make a canyon? • Preventing Wind Erosion • Effects of Wind and Water	Resources: • Lab Overview • Mysteryscience.com lesson plans • YouTube introduction/background videos • Supporting literature • Wind Erosion lesson plan

STEAM - Grade 2		
Grade: **2**	Unit 3 Theme: Engineering	Time Frame: Third Part of 8-week cycle
Summary: Unit 3 for Grade 2 will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.		

<table>
<tr><th colspan="2">Assessments</th></tr>
<tr><td>Formal:
Performance/project-based assessments using rubrics/checklists
Written student self-reflection
Peer evaluation of group work/collaboration</td><td>Informal:
Teacher observation
Class discussion/participation
Classwork
Anecdotal notes
Discussion guide
Brainstorming think-sessions
Entrance/exit slips</td></tr>
<tr><th colspan="2">Established Goals</th></tr>
<tr><td>Overarching Goals:
Learners will . . .
Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2ETS1-1)
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)</td><td>Related Standards Covered:
A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
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. (K-2-ETS1-2)</td></tr>
<tr><th colspan="2">Desired Results</th></tr>
<tr><td>Enduring Understandings:
Students will be able to demonstrate . . .</td><td>Essential Questions:
How does sketching or creating a</td></tr>
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• The shape and stability of structures of natural and designed objects are related to their function(s) • How to solve a problem through engineering • The use of questioning, observing, and gathering information to help solve problems • Designs can be conveyed through sketches, drawings, or physical models and will aid in communicating with others • Comparing and testing designs is a useful way to determine the best solution to a problem	model to illustrate its shape help solve a given problem? • How does testing a model determine its strengths and weaknesses in solving a given problem? • How are asking questions, gathering information, and making observations helpful when thinking about problems?
Instructional Plan	
Suggested Activities: <u>MakerSpace/Engineer Design</u> • Design a tool or machine to make a task simpler using only the supplies provided • Create a structure to provide shade • Explain how engineers solve problems	Resources: • Challenge supplies may include: craft ticks, rubber bands, clothespins, binder clips, construction paper, glue, tape, pipe cleaners, paper towel rolls, coffee filters, etc. • Websites for reference: ○ www.sciencea-z.com ○ www.education.com ○ www.youtube.com ○ www.science4us.com ○ www.SciShowKids.com ○ www.betterlesson.com ○ www.thestemlabratory.com ○ www.teachengineering.org ○ http://www.eie.org/ • Related literature

STEAM - Grade 3

Grade: **3** Unit 1 Theme: Technology Time Frame: First Part of 8-week cycle

Summary: Unit 1 for Grade 3 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well.

Assessments

Formal:
- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:
- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

Overarching Goals:
Learners will . . .
- Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
- Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)

Related Standards Covered:
- Understand and use technology systems (8.1.5.A.1).
- Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures (8.1.5.A.2).
- Use a graphic organizer to organize information about a problem or issue (8.1.5.A.3).
- Create original works as a means of personal or group expression (8.1.5.B.1).
- Communicate information and ideas to multiple audiences using a variety of media and formats (8.1.5.C.1).
- Advocate and practice safe, legal, and responsible use of information and technology (8.1.5.D.1, 8.1.5.D.2).
- Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information (8.2.5.E.2).
- Using a simple, visual programming language, create a program using

	loops, events and procedures to generate specific output (8.2.5.E.3).
Desired Results	
Enduring Understandings: Students will be able to demonstrate . . . ● Grade level appropriate technology vocabulary ● The ability to understand and use the features of an operating system and the ability to input text and data ● The ability to use/create grade appropriate documents ● The ability to create graphic organizers ● The ability to discuss the uses of technology at home and at school ● The ability to practice safe internet usage ● The ability to understand the impact of technology on society ● The ability to recognize and exhibit ethical behaviors when using technology and understand the consequences of misuse ● Problem solving independently and collaboratively	Essential Questions: ● How can I use technology to communicate my ideas? ● What can I learn about the global community by sharing ideas with students in other states/countries? ● How has the use of digital tools improved opportunities for communication and collaboration? ● Why is the evaluation and appropriate use of accurate information more important than ever in the technological age? ● Why is it important to be a good digital citizen, both at home and at school? ● How does computer science affect our lives and future careers globally?
Instructional Plan	
Suggested Activities: ● Review Google Suite ○ Username and password ○ Login procedures ○ Continue introducing Google Suite apps ● Computer Science ● Video Conferencing ● Class Blog ● Digital Scrapbook ● Online Safety/Netiquette	Resources: ● Google Chrome, Classroom, Drive, Docs, Slides, Sheets, Forms, Drawing ● Coding (code.org, Google CS First, kodable.com. CodeCombat, Tynker) ● Ozobots ● Teacher selected websites for content reinforcement (abcya.com, digipuzzle.com, pre-selected websites depending on season and content ● Multimedia creative tools: iMovie, iPhoto, Voki, Blabberize, Voicethread, Photostory, Seesaw, FlipGrid ● NetSmartz.org

STEAM - Grade 3

Grade: **3** Unit 2 Theme: Science (Earth's Systems) Time Frame: 2nd Part of 8-week cycle

Summary: Unit 2 for Grade 3 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

Overarching Goals:
Learners will . . .

- Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season (3-ESS2-1).
- Obtain and combine information to describe climates in different regions of the world (3-ESS2-2).

Related Standards Covered:

- 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 (3-ESS2-1).
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years (3-ESS2-2).

Desired Results

<table>
<tr>
<td>Enduring Understandings:
Students will be able to demonstrate . . .
Following established STEAM Lab rules and procedures ensures that students and faculty remain safe and increases the likelihood that challenges are met successfully.
Scientists take on specific responsibilities in order to contribute to the success of the overall challenge.
The Scientific Process involves asking questions, imagining possible solutions, planning a course of action, creating and testing a process or prototype, and analyzing results in order to make design improvements.
Meteorologists measure the weather using a variety of scientific tools, collecting data, and analyzing patterns.
Severe weather is weather that is more intense than average and has the ability to cause damage. Examples include hurricanes, tornadoes, flooding, drought, blizzards, and lightening.</td>
<td>Essential Questions:
How do we use the STEAM Lab and its equipment safely for science?
How do we work together to meet our goals as scientists?
What are the steps of the scientific process?
How do meteorologists measure and predict the weather?
What is severe weather?
How can we lessen the impact of severe weather?</td>
</tr>
<tr>
<td colspan="2">Instructional Plan</td>
</tr>
<tr>
<td>Suggested Activities:
STEAM Lab Safety
Measuring Weather
What is Severe Weather?
Hurricane Tower Challenge
Preventing Flooding Challenge</td>
<td>Resources:
Lab Overview
Challenge materials (varied)
YouTube introduction/background videos (brainpop.com)
Supporting literature
Precipitation Measurement Missions (NASA)
Disaster Master Game
Weatherproof Your Home</td>
</tr>
</table>

STEAM - Grade 3

Grade: **3** Unit 3 Theme: Engineering Time Frame: Third Part of 8-week cycle

Summary: Unit 3 for Grade 3 will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.

Assessments

Formal:

- Performance/project-based assessments using rubrics/checklists
- Written student self-reflection
- Peer evaluation of group work/collaboration

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion guide
- Brainstorming think-sessions
- Entrance/exit slips

Established Goals

Overarching Goals:
Learners will . . .

- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost (3-5-ETS1-1).
- 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 (3-5-ETS1-2).
- 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 (3-5-ETS1-3).

Related Standards Covered:

- Possible solutions to a problem are limited by the 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 (3-5- ETS1-1).
- 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 (3-5-ETS1-2).
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints (3-5-ETS1-3).

Desired Results	
Enduring Understandings: Students will be able to demonstrate . . . ● 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. ● How to solve a problem through engineering ● The use of questioning, observing, and gathering information to help solve problems ● Designs can be conveyed through sketches, drawings, or physical models and will aid in communicating with others ● Comparing and testing designs is a useful way to determine the best solution to a problem	Essential Questions: ● How do new and improved technologies meet the needs of people as their demands change? ● How does sketching or creating a model to illustrate its shape help solve a given problem? ● How does testing a model determine its strengths and weaknesses in solving a given problem? ● How are asking questions, gathering information, and making observations helpful when thinking about problems?
Instructional Plan	
Suggested Activities: MakerSpace/Engineer Design ● Swing Set Makeover Challenge ● Straw Towers to the Moon ● Pop Rockets on a Shoestring Budget ● Engineering a Habitat's Humidity ● Magnet Engineering Design Challenge ● Explain how engineers solve problems	Resources: ● Challenge supplies may include: craft ticks, rubber bands, clothespins, binder clips, construction paper, glue, tape, pipe cleaners, paper towel rolls, coffee filters,magnets, etc. ● Websites for reference: ○ www.sciencea-z.com ○ www.education.com ○ www.youtube.com ○ www.science4us.com ○ www.SciShowKids.com ○ www.betterlesson.com ○ www.thestemlabratory.com ○ www.teachengineering.org ○ http://www.eie.org/

	○ PBS.org: Design Squad Activity Guide ● Related literature

STEAM - Grade 4	
Grade: 4 Unit 1 -Theme: Technology Time Frame: First Part of 8-week cycle Summary: Unit 1 for Grade 4 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well. Resources: Typing Club, TinkerCAD, virtual reality equipment, Skype, tynker.com, Google hangouts, Code.org, and Ozobots	
Assessments	
Formal: ● Performance/project-based ● Teacher and ● Class discussion/participation checklist. ● Classwork ● Written student self-reflection. ● ● Peer evaluation of group ● Discussion think sessions ● Assessments (Entrance/Exit Slips)	Informal: observation assessments using rubric Anecdotal notes Guide work/collaboration. ● Brainstorm
Established Goals	

<table>
<tr><td>Overarching Goals:
Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)</td><td>Related Standards Covered:
8.1.5.A.1-Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2-Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3-Use a graphic organizer to organize information about the problem or issue.
8.1.5.A.4-Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.</td></tr>
<tr><td colspan="2">Desired Results</td></tr>
<tr><td>Enduring Understandings:
Use the Internet as a resource for information.
Use technology to solve problems, develop decision-making skills, and</td><td>Essential Questions:
How can I use technology responsibly?
How is VR and Ozbot used in school and crossed-over for use for in the</td></tr>
<tr><td>participate in project-based learning activities that support curriculum objectives.
Follow copyright laws and policies concerning acceptable use.</td><td>global economy?
Why is it important to use technology and engineering in our daily lives?</td></tr>
<tr><td colspan="2">Instructional Plan</td></tr>
<tr><td>Suggested Activities:
Keyboarding-Reinforce home row concepts.
Coding: CS-First ● Video Conferencing:
Multi-Media Creation
3D printer
VR
AR</td><td>Resources
Typing Club
TinkerCAD
virtual reality equipment
Skype
Tynker.com
Google hangouts
Code.org
Ozobots</td></tr>
</table>

STEAM - Grade 4
Grade: 4 Unit 2 Theme: Science-Energy Time Frame: Second Part of 8-week cycle Summary: Unit 2 for Grade 4 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process. Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.
Assessments

Formal: ● Performance/project-based assessments using rubric and checklist. ● Written student self-reflection. ● Peer evaluation of group work/collaboration.	Informal: ● Teacher observation ● Class discussion/participation ● Classwork ● Anecdotal notes ● Discussion Guide ● Brainstorm think sessions ● Assessments (Entrance/Exit Slips)
Established Goals	
Overarching Goals: Learners will... ● Use evidence to construct an explanation relating the speed of an object to the energy of that object (4PS3-1). ● Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents (4-PS3-2. ● Ask questions and predict outcomes about the changes in energy that occur when objects collide (4-PS3-3). ● Apply scientific ideas to design, test, and refine a device that converts energy from one form to another (4PS3-4).	Related Standards Covered: ● The faster a given object is moving, the more energy it possesses. (4-PS3-1). ● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4PS3-2),(4-PS3-3). ● Energy can be transferred in various ways and between objects. (4-PS31),(4- PS3-2),(4-PS3-3),(4-PS3-4). ● Most scientists and engineers work in teams. (4-PS3-4). ● Science affects everyday life. (4-PS3-4).
Desired Results	

Enduring Understandings: Learners will... ● Following established STEAM Lab rules and procedures ensures that students and faculty remain safe and increases the likelihood that challenges are met successfully. ● Scientists take on specific responsibilities in order to contribute to the success of the overall challenge. ● The Scientific Process involves asking questions, imagining possible solutions, planning a course of action, creating and testing a process or prototype, and analyzing results in order to make design improvements.	Essential Questions: ● How do we use the STEAM Lab flexible seating and equipment safely for science? ● How do we work together to meet our goals as scientists? ● What are the steps of the scientific process? ● Why is it critical to use the scientific process when researching, creating or testing anything?
Instructional Plan	
Suggested Activities: ● Hills and Stored Energy The first hill of the roller coaster is always the highest because it creates the stored energy the coaster car requires to progress through the ride. Students will build a roller coaster with hills and compare how the energy of a marble changes at different points of the ride. ● Static Electricity Stations Static electricity is the result of an imbalance between negative and positive charges in an object. Students will create a positive or negative charge on a variety of objects to demonstrate the phenomenon of static electricity.	Resources: ● Hills and Stored Energy Challenge- The first hill of the roller coaster is always the highest because it creates the stored energy the coaster car requires to progress through the ride. ● Students will build a roller coaster with hills and compare how the energy of a marble changes at different points of the ride. ● Criterion referenced PowerPoint Presentation. ● Criterion referenced student activity sheet

STEAM - Grade 4

Grade: 4 Unit 3 Theme: Engineering Time Frame: Third Part of 8-week cycle

Summary: Unit 3 for Grade 4 will focus on engineering. Students will use the **engineering aspect of science** to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.

Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.

Assessments

Formal:

- Performance/project-based assessments using rubric and checklist.
- Written student self-reflection.
- Peer evaluation of group work/collaboration.

Informal:

- Teacher observation
- Class discussion/participation
- Classwork
- Anecdotal notes
- Discussion Guide
- Brainstorm think sessions
- Assessments (Entrance/Exit Slips)

Established Goals

Overarching Goals:
Learners will...

- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost (3-5-ETS1-1).
- 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 (3-5-ETS1-2).
- 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 (3-5-ETS1-3).

Related Standards Covered:

- Asking Questions and Defining Problems (3-5-ETS1-1).
- Planning and Carrying Out Investigations (3-5-ETS1-3).
- ETS1.C: Optimizing the Design Solution Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Desired Results

Enduring Understandings: ● Use the engineering design model to solve problems and reflect for personal growth. ● Use engineering to solve problems, develop decision-making skills, and participate in project-based learning activities that support curriculum objectives. ● Use and follow copyright laws and policies concerning acceptable use for engineering design and notebook.	Essential Questions: ● What is a simple design? ● What is engineering and why is it important to use the engineering design process? ● How do engineers solve problems? ● Why are copyrights important to use in engineering and in the world? ● What are the steps of using an engineer's notebook?
Instructional Plan	
Suggested Activities ● Rube Goldberg Machines (2 sessions) Students will plan a chain reaction machine that will help to carry out a simple task in a complicated way by transferring the energy of one colliding object to another. ● Sound Energy: Cup Telephones Sound energy is caused by vibrations and travels in sound waves. Students will observe how sound can travel through string and cups and work to design a better cup telephone model.	Resources ● Criterion referenced PowerPoint Presentation ● Criterion referenced student activity sheet ● OK Go Music Video (This Too Shall Pass) ● Criterion referenced PowerPoint Presentation ● Mystery Science: How Far Can a Whisper Travel? ● Mystery Science activity sheet

STEAM - Grade 5

Grade: 5 Unit 1 (#)Theme: Technology Time Frame: 1st Part of 8 week cycle.

Summary: Unit 1 for Grade 5 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well.

Resources: Typing Club, TinkerCAD, virtual reality equipment, Skype, tynker.com, Google hangouts, Code.org, and Ozobots

Assessments

Formal:

- Performance/project-based using rubric and ClassworkAnecdotal notes
- Written Guide
- Peer evaluation of group work/collaboration.
- Assessments

Informal:

- Teacher observation assessments
- Class discussion/participation checklist.
- Discussion
- student self-reflection.
- Brainstorm think sessions (Entrance/Exit Slips)

Established Goals

<table>
<tr>
<td>Overarching Goals:
Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)</td>
<td>Related Standards Covered:
8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems
8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3 Use a graphic organizer to organize information about a problem or issue.
8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.5.A.5 Create and use a database to answer basic questions.
8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.</td>
</tr>
<tr>
<td colspan="2">Desired Results</td>
</tr>
<tr>
<td>Enduring Understandings:
We can organize and present information in a multitude of ways.
Formatting multiple documents will have a positive effect on the overall outcome of the publications.
Presentation of publications must help to keep the audience informed and engaged
Use the Internet as a resource for information.
Use technology to solve problems, develop decision-making skills, and participate in project-based learning activities that support curriculum objectives.</td>
<td>Essential Questions:
How do we use the Internet as a resource for information?
How do we use technology to solve problems?
How can the internet help us locate information?
How do we solve problems using the information we find on the internet?</td>
</tr>
<tr>
<td colspan="2">Instructional Plan</td>
</tr>
</table>

Suggested Activities	Resources
● Keyboarding-Hone usage of entire keyboard to use masterfully ● Coding: CS-First ● Video Conferencing: ● Multi-Media Creation ● 3D printer ● VR ● AR	● Typing Club ● TinkerCAD ● virtual reality equipment ● Skype ● Tynker.com ● Google hangouts ● Code.org ● Ozobots

STEAM - Grade 5
Grade: 5 Unit 2 (#) Theme: Science-Earth's Systems: Time Frame: 2nd Part of 8 week cycle Summary: Unit 2 for Grade 5 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process. Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.

<table>
<tr><th colspan="2">Assessments</th></tr>
<tr><td>Formal:
Performance/project-based assessments using rubric and checklist.
Written student self-reflection.
Peer evaluation of group work/collaboration.</td><td>Informal:
Teacher observation
Class discussion/participation
Classwork
Anecdotal notes
Discussion Guide
Brainstorm think sessions
Assessments (Entrance/Exit Slips)</td></tr>
<tr><th colspan="2">Established Goals</th></tr>
<tr><td>Overarching Goals:
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS2-2. Describe and graph the amounts of salt, water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</td><td>Related Standards Covered:
ESS2.A: Earth Materials and Systems Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans) (5-ESS2-1).
ESS2.C: The Roles of Water in Earth’s Surface Processes Nearly all of Earth’s available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5- ESS2-2)</td></tr>
<tr><th colspan="2">Desired Results</th></tr>
<tr><td>Enduring Understandings:
● Less than 1% of Earth’s water is potable and easily accessible. To purify sewage water</td><td>Essential Questions:
● What percentage of Earth’s water is potable?</td></tr>
</table>

for reuse requires several steps. ● Global warming is melting frozen water at Earth's poles, causing sea levels to rise. ● Earth's major systems are the geosphere, hydrosphere, atmosphere, and biosphere. These systems interact in a variety of ways that affect Earth's surface materials and processes. ● Humans must develop new technologies to help counteract and cope with climate change.	● How is water purified in nature? ● What systems do humans use to purify water? ● How does global climate change affect Earth's water resources? ● How do the geosphere, biosphere, hydrosphere, and/or atmosphere interact? ● How do individual communities use science ideas to protect the Earth's resources and environment?
Instructional Plan	
Suggested Activities ● Water Filter Challenge - Students will design and build water filters using plastic water bottles and a variety of filtering materials. ● Using US Weather Data to Draw Conclusions - Students will graph weather data to determine if large bodies of water really do moderate the temperatures of adjacent land masses. ● Sky Floater Challenge - Students will experiment with small weights until they achieve neutral buoyancy for a floating mylar balloon.	Resources: ● JPL Education - NASA Website STEM Labs for Middle Grades by Schyrlet Cameron and Carolyn Craig. ● Summary of Monthly Normals (2010) from www.ncdc.noaa.gov. ● PBS - Design Squad Teacher's Guide, Breezy Blimps.

STEAM - Grade 5

Grade: 5 Unit 3 (#)Theme: Engineering Design Time Frame: 3rd Part of 8 week cycle

Summary: Unit 3 for Grade 4 will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering.

Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.

Assessments

Formal:

- Performance/project-based using rubric and ClassworkAnecdotal notes
- Class discussion/participation checklist.
- Written student self-reflection.
- Peer evaluation of group work/collaboration.
- Discussion
- Assessments

Informal:

- Teacher observation assessments
- Brainstorm think sessions (Entrance/Exit Slips)

Established Goals

<table>
<tr><td>Overarching Goals:
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2. 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.
3-5-ETS1-3. 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.</td><td>Related Standards Covered:
Asking Questions and Defining Problems (3-5-ETS1-1).
Planning and Carrying Out Investigations (3-5-ETS1-3) .
Constructing Explanations and Designing Solutions (3-5-ETS1-2).
ETS1.A: Defining and Delimiting Engineering Problems (3-5- ETS1-1).
ETS1.B: Developing Possible Solutions (3-5-ETS1-2).
ETS1.C: Optimizing the Design Solution (3-5-ETS1-3).
Influence of Engineering, Technology, and Science on Society and the Natural World (3-5-ETS1-1).</td></tr>
<tr><td colspan="2">Desired Results</td></tr>
<tr><td>Enduring Understandings:
● Engineers take on specific responsibilities in order to contribute to the success of the overall challenge.
● Following the steps of the EDP helps engineers to work in an organized fashion to better understand failures and correct them.
● Matter can be identified by its physical and chemical properties. Chemical properties are revealed when the atomic structure of matter changes.
● Models help us to understand the structure of matter although it is made of particles too small to be seen.</td><td>Essential Questions:
● How do we work together to meet our goals?
● How do we apply the EDP to solve problems?
● How do the physical properties of matter help us to identify different kinds of matter?
● What is the difference between chemical and physical changes to matter?
● How can I describe matter when it is made up of particles too small to be seen?</td></tr>
<tr><td colspan="2">Instructional Plan</td></tr>
</table>

Suggested Activities: ● "Gas" Powered Cars - Students will design, build, and race cars that run on the gas expelled from a balloon. ● Engineering Edge Exhibition- Students will design and build an invention of their choice that will help society. Inventions will be showcased at their exhibition. ● The Challenge Build a boat that paddles itself using a rubber band as its power source.	Resources: ● STEM Labs for Middle Grades -Mark Twain Media, page 18 ● NASA at Glenn EDCs-Let it Glide: https://www.nasa.gov/glenn-edcs-letit-glide ● Design Squad PBS Kids:https://pbskids.org/designsquad/pdf/parentseducators/DS_Act_Guide_complete.pdf

STEAM - Grade 6		
Grade: 6	Unit 1 (#)Theme: Technology	Time Frame: First Part of 8-week cycle
Summary: Unit 1 for Grade 6 will focus on technology. Students will use the resources listed below as an introduction to computer science coding. Keyboarding skills will also be reinforced. Virtual reality, augmented reality, and video conferencing will be incorporated during this unit, as well. Resources: Typing Club, TinkerCAD, virtual reality equipment, Skype, tynker.com, Google hangouts, Code.org, and Ozobots.		
Assessments		
Formal: ● Performance/project-based assessments using rubric and checklist. ● Written student self-reflection. ● Peer evaluation of group work/collaboration.	Informal: ● Teacher observation ● Class discussion/participation ● Classwork ● Anecdotal notes ● Discussion Guide ● Brainstorm think sessions ● Assessments (Entrance/Exit Slips)	
Established Goals		

<table>
<tr>
<td>Overarching Goals:
● Use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge (8.1)
● Develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment (8.2)</td>
<td>Related Standards Covered:
● 8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
● 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
● 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.
● 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results 8.1.8.A.5 Create a database query, sort and create a report and describe the process, and explain the report results.</td>
</tr>
<tr>
<td colspan="2">Desired Results</td>
</tr>
<tr>
<td>Enduring Understandings:
Students will understand . . .
● The internet is a resource for information.
● How to build a successful, attractive, and informational website.
● The role of Internet technologies in society and communication.
● That proficient use of computers that supports learning and productivity.
● How to demonstrate and practice safe, legal and responsible use of information and technology.
● How to be a responsible digital citizen in school, at home and in the world.</td>
<td>Essential Questions:
● How can I use technology to communicate my ideas?
● How does technology affect society and communication?
● What are the safe and legal responsibilities of being a good digital citizen?
● What is the Web design process and what are the different site structures? How does graphic design affect website design?
● What are the technologies used to create websites? How does effective page layout and consistent navigation lead to usability?</td>
</tr>
<tr>
<td colspan="2">Instructional Plan</td>
</tr>
</table>

Suggested Activities: ● Keyboarding-Hone usage of entire keyboard to use masterfully ● Coding: CS-First ● Video Conferencing: ● Multi-Media Creation ● 3D printer ● VR ● AR	Resources: ● Typing Club ● TinkerCAD ● virtual reality equipment ● Skype ● Tynker.com ● Google hangouts ● Code.org ● Ozobots

STEAM - Grade 6
Grade: 6 Unit 2 (#)Theme: Science-Earth's Systems Time Frame: 2nd Part of 8-week cycle Summary: Unit 2 for Grade 6 will focus on science. Students will use the resources listed below to use the scientific process for solving using problem based learning. Students will use the science and engineering practices, disciplinary core ideas, and cross cutting concepts to demonstrate their understanding of the scientific process. Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.

<table>
<tr><th colspan="2">Assessments</th></tr>
<tr><td>Formal:
Performance/project-based assessments using rubric and checklist.
Written student self-reflection.
Peer evaluation of group work/collaboration.</td><td>Informal:
Teacher observation
Class discussion/participation
Classwork
Anecdotal notes
Discussion Guide
Brainstorm think sessions
Assessments (Entrance/Exit Slips)</td></tr>
<tr><th colspan="2">Established Goals</th></tr>
<tr><td>Overarching Goals:
HS-ESS2-1. Develop a model to illustrate how Earth’s internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks that cause changes to other Earth systems.
HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</td><td>Related Standards Covered:
What are Earth’s internal surfaces?
Why is it important to understand Earth’s surfaces globally?
Why does the Earth’s surface change over time?
How do people preserve and care for the Earth?
Why do human beings and companies need to think about how to protect the Earth?
What are the Earth’s properties of water and the affect on society and humans?</td></tr>
<tr><th colspan="2">Desired Results</th></tr>
<tr><td>Enduring Understandings:</td><td>Essential Questions:</td></tr>
<tr><td>● Earth’s systems are interconnected. A change in one system can affect another. ● Technology allows scientists, such as meteorologists and geologists, to better understand Earth’s systems and how and when they may change.
● Scientists and engineers are studying the effects of global climate change and developing new technologies for coping with these changes.</td><td>● How do changes in one part of an Earth system affect other parts of the system?
● How does technology extend human senses and understanding of Earth?
● How can mankind cope with global climate change?</td></tr>
</table>

Instructional Plan	
Suggested Activities ● Battling for Oxygen (Simulation) - Using gumdrops and toothpicks, students conduct a large-group, interactive ozone depletion model. ● Global Warming Challenge - Students will design a tool or process for counteracting or coping with climate change. This is a multiple-session project.	Resources: ●teachengineering.org/activities/view/cub_air_lesson 08_activity1 ●http://www.education.noaa.gov/tweather.html

STEAM - Grade 6
Grade: 6 Unit 3 (#)Theme: Engineering Time Frame: Third Part of 8-week cycle Summary: Unit 3 for Grade 6 will focus on engineering. Students will use the engineering aspect of science to think critically, and incorporate mathematics to develop new ideas, products, and technologies, often to make life simpler or more efficient. These Engineering practices will help focus the specialization in one field, such as electrical, aerospace, mechanical, or civil engineering. Resources: Hands-on materials used to problem solve and move through the 3 stages of learning (concrete, pictorial and abstract) to cement understanding. Science labs, inquiry documents, and Google Suite will be utilized throughout the cycle.

Assessments	
Formal: ● Performance/project-based assessments using rubric and checklist. ● Written student self-reflection. ● Peer evaluation of group work/collaboration.	Informal: ● Teacher observation ● Class discussion/participation ● Classwork ● Anecdotal notes ● Discussion Guide ● Brainstorm think sessions ● Assessments (Entrance/Exit Slips)

<table>
<tr><th colspan="2">Established Goals</th></tr>
<tr><td>Overarching Goals:
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 solutions 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</td><td>Related Standards Covered:
Asking Questions and Defining Problems Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. 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. (MSETS1-1)
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict</td></tr>
<tr><td>meet the criteria for success.
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.</td><td>more abstract phenomena and design systems. Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MSETS1-4)
Analyzing and Interpreting Data (MSETS1-3).
Engaging in Argument from Evidence (MS-ETS1-2)
ETS1.A: Defining and Delimiting Engineering Problems (MS-ETS1-1)
ETS1.B: Developing Possible Solutions (MS-ETS1-4)</td></tr>
<tr><th colspan="2">Desired Results</th></tr>
</table>

Enduring Understandings: ● Engineers take on specific responsibilities in order to contribute to the success of the overall challenge. ● Following the steps of the EDP helps engineers to work in an organized fashion to better understand failures and correct them. ● Two main types of waves are mechanical and electromagnetic. ● The understanding of waves has led to technological advancements in areas such as communications, medicine, and military defense systems. ● Knowing how waves interact with different types of matter leads to innovative ways of using wave energy.	Essential Questions: ● How do we work together to meet our goals? ● How do we apply the EDP to solve problems? ● What are the different types of waves? ● How does the knowledge of waves help us to better understand our world and improve our lives? ● What materials absorb sound waves and which materials reflect them?
Instructional Plan	
Activities: ● Signal Transmission Challenge - Students will design a method of transmitting a message using sound or light waves. Sound messages cannot use spoken words. ● Sound-absorbing Headphones - Students will use a variety of materials to create headphones that absorb sound.	Resources: ●http://www.discoveryeducation.com/teachers/free-lesson-plans/the-electromagneticspectrumwaves-of-energy.cfm ●http://sciencenetlinks.com/lessons/light-1-making-light-of-science/ ● http://www.teachengineering.org/activities/view/cub_soundandlight_lesson5_activity1