

Sustainable Jersey for Schools

Education for Sustainability UNIT Questionnaire

Complete this form to provide information about the unit that you are submitting for points under the Education for Sustainability (EfS) Integrated Unit action. **Be sure to fully answer Question 7 if the unit was delivered remotely and is to be considered for Digital Schools Star recognition.**

1. List the name, position, grade level, and discipline of the educators and staff members involved with developing and delivering the unit.

This Unit for Fourth and Fifth Grade, Earth- Human Impact and Natural Disasters, was created by Project Lead the Way and is included in their curriculum for Fourth Grade. It was adapted to meet the Sustainability Standards by the STEM teachers, Lisa Roesch and Kelly Stone at the George L Catrambone School under the guidance of principal Jessica Alonzo and out Science Supervisor Jena Valdivieso to teacher virtually during the current 2020-21 school year. Both teachers are K-5 STEM teachers and see all fourth-fifth -grade students weekly for 35 minutes. This unit was taught over the course of 13 weeks of school and reached 352 fourth and fifth grade students. Students will be evaluated at the end of the unit with a summative assessment which is included in the documentation. In addition, formative assessments are taken throughout the unit in the form of activities, observations, exit slips, work samples, and other such activities and stored digitally across platforms like, but not limited to google classroom, seesaw, nearpod and jamboards.

2. The unit must have taught about and assessed for at least **one** of the enduring understandings of education for sustainability listed below. Check off the enduring understanding(s) that the unit addressed:

☒ **A Healthy and Sustainable Future Is Possible**

We can learn how to live well within the means of nature. This viewpoint inspires and motivates people to act.

☐ **We Are All In This Together**

We are interdependent on each other and on the natural systems.

☒ **Healthy Systems Have Limits**

Rather than exceeding or ignoring the limits, tap the power of limits. Constraints drive creativity.

☐ **Recognize and Protect The Commons**

The Commons are the creations of nature and society that we inherit jointly and freely, and hold in trust for future generations. We all depend on them and we are all responsible for them.

☐ **Reconcile Individual Rights with Collective Responsibilities**

Responsible and ethical participation and leadership are required in order to make the changes we need to make. We must reconcile the conflicts that exist between our individual rights and our responsibilities as citizens.

☐ **Diversity Makes Our Lives Possible**

Diversity is required to support rich complex systems (like us), to build strength and to develop resilience in living systems. Biological diversity, cultural, gender, political and intergenerational diversity all serve this purpose.

X Create Change at The Source Not the Symptom

Distinguish problems from symptoms. Identify the most upstream problem within your sphere of influence.

Think Far into the Future (1,000 Years)

Envision the kind of future we want and start working towards it. We should not sacrifice our children's future to meet our needs.

X Read the Feedback

We need to pay attention to the results of our behavior on the systems upon which we depend. If we keep our eyes on the feedback, we can adjust our thinking and behavior before we cross detrimental thresholds.

It All Begins With a Change In Thinking

Thinking drives behavior and behavior causes results. As Einstein had observed, the significant problems we face cannot be solved with the same level of thinking we used to create them. Think systems, cycles and out of the box.

X Live By The Natural Laws

We must operate within the natural laws and principles rather than attempt to overcome them. It is nonnegotiable.

X We Are All Responsible

Everything we do and everything we don't do make a difference.

3. Describe the process for integrating sustainability enduring understandings checked off above into the unit plan.

In this module, students learn about the relationship between humans and the environment. Students begin the module by activating background knowledge about natural resources. They learn how to reduce the impact humans have on the environment and use the design process to create an upcycled project. Then, students investigate natural disasters, specifically earthquakes, to determine their frequency, location, and risks of harm to humans. Students demonstrate their understanding of the challenges posed by natural disasters through the design of emergency preparedness kits.

Applying the skills and knowledge gained throughout the module, students follow the design process to generate a plan of action in response to one of the following problems:

- **How do we reduce the human impact on Earth?**
 - **How do we lessen the impact of natural disasters on humans?**
4. **Provide samples of exemplary student work that meet and/or exceed expectations from the summative assessment and the accompanying performance criteria. *(Either provide a link to the sample work on a shared drive or website, paste a picture of the sample into this document, or upload the sample as a separate file on the action submission page.)***

Exemplary work samples are included within the documentation.

5. **Provide copies and explanation of assessment tools.** *(Either provide a link to the assessment tools on a shared drive or website, paste a picture of the tool into this document, or upload the tool as a separate file on the action submission page.)*

Assessment Samples are included within the documentation.

6. **Teacher reflections on the unit's effectiveness:** How did the attributes of education for sustainability that you selected add value to this unit?

The fourth and fifth -grade module Earth- Human Impact and Natural Disasters is packed with lessons ranging learning about natural disasters, natural resources, renewable and nonrenewable resources, to upcycling and preparing for these events. . The unit aligns with the NGSS for fourth and fifth graders and offers multiple opportunities for project-based learning and activities. These projects are encouraging much discussion about the living world and how to maintain the balance. Protecting plants and animals is topics that repeat throughout discussion and learning activities. They natural disaster simulation and projects encouraged understanding of climate change and how scarcity of home, food, protection and space can occur as the result of a natural disaster. These rich activities allow students to see and understand the impact humans have on the world and it is most often negative. They struggled to come up with solutions to help the environment and reduce or stop future damage. This led to much discussion about how they could work together to create a change.

7. **For Remote Digital Units Only:** To apply points for a remotely delivered unit towards *Digital Schools Star* recognition, answer the questions below to describe how your unit was adapted to be most effective for a remote digital or hybrid learning environment:
- a. Describe the timing and sequence of the synchronous and asynchronous elements of the unit and how they are coordinated. *(For example: Did students have opportunities to review learning materials – such as videos, documents, webpages – on-demand on their own time to enhance live class discussions?)*

All learning, lessons, and activities were delivered in a hybrid settings with some students in school and the majority of students at home. During this time we had weeks where all students were on home based learning. All material was presented and discussed each week virtually through synchronous and asynchronous elements. Each week students met virtually to discuss and learn about the environmental changes topics and activities. Assignments were posted on virtual platforms for students to engage in during class an on their own time if necessary. Those students who are not able to engage in virtual meets each week are provided with videos, lesson activities, literature, and other materials electronically through platforms like google classroom, class dojo, and nearpod. Multiple platforms were used to allow students to build comfort and ability through multiple learning experiences and reach all learners and their families. This unique way of presenting allowed families tyo get involved in lessons and participate in the learning process. Students played games that doubled as quizzes and completed assignments demonstrating what they learned through drawings, projects, and problem solving in a virtual atmosphere. While students had the ability to demonstrate and add to

their tech savviness, teacher grew in their pedagogy and ability to present and teaching a diverse engaging, and unique ways.

- b. Describe the interactive elements to engage students in the unit and to give them the opportunity to demonstrate their learning. (For example: Did students have break out rooms for peer to peer discussions? Were chats enabled? Were digital whiteboards shared or other collaborative spaces used?)**

Throughout the module, students participated in lessons that included multiple ways and opportunities to demonstrate their learning. Sessions were offered in zoom weekly, during which students completed assignments through the google classroom using tools like google docs, google slides, and google draw. Students heard virtually read books, sometimes by the author of the story. Digital white boards were used to present and for class discussions and projects. Chats were enabled to ask and answer questions and for feedback. Students engaged in group discussions through platforms like google jamboards. Using the seesaw platform, students were able to participate in and submit assignments practicing what they learned through drawing, typing, writing and recordings. They videoed themselves completing projects, sent digital pictures of their work and showed many unique and exciting ways to demonstrate their understanding of topics and materials presented in addition to speaking and participating during class. The addition of the digital tools made it possible for students not only to participate after class hours and at times conducive to their schedules, but offered our reluctant learners the opportunity to participate in a safe, sheltered, and comfortable environment from their own homes. In addition, they were also able to work with the support of their families.

- c. Describe the methods and tools used to assess student performance.**

With the young age of our students, a large portion of our formative assessment was taken through observation and participation in synchronous and asynchronous activities. Their classwork was submitted and reviewed through Google Classroom and Seesaw for teachers to review and provide written and recorded feedback. Students were assessed through these activities, videos, recordings, photos, work samples, class participation in live sessions and submitted work. Students are assessed through the completion of projects in multiples ways using a rubric that is attached. Their summative assessment was provided virtually for students to complete through a word doc. They were able to add pictures, drawings, recordings, or videos to answer and complete questions. It was also shared in multiple ways so as to reach and offer the broadest range of acceptable ways to complete the assignment.

For the Summative Assessment we were able to complete it through a Google Form Assignment in google classroom as well as providing a paper copy to those who needed to access the assessment that way. All data was collected through grading tools like Flubaroo and available to help with the unit planning for next year. During the unit students presented

learned information from problem solving in group projects through appl like google slides and Google jamboards.

Established Standards/ Goals/Practices		Desired Results (Stage 1)	
<p>For full details, see the Connections to Standards page in the Teacher Guide.</p> <p>Next Generation Science Standards</p> <p><u>Science and Engineering Practices</u></p> <ul style="list-style-type: none">• Asking Questions and Defining Problems• Developing and Using Models• Analyzing and Interpreting Data• Constructing Explanations and Designing Solutions• Engaging in Argument from Evidence• Obtaining, Evaluating, and Communicating Information	<p>Transfers: Students will be able to independently use their learning to...</p> <ul style="list-style-type: none">• T1: Evaluate a problem in a new and novel situation.• T2: Apply a step-by-step design process to solve a problem.• T3: Assess the impact of human activity on Earth's natural resources.• T4: Analyze the impact of natural disasters on human populations.		
	<p>Essential Questions: Students will keep considering...</p> <ul style="list-style-type: none">• EQ1: In what ways do human interactions impact Earth?• EQ2: How do natural hazards impact Earth?• EQ3: How can a step-by-step process help you design or improve a solution to a problem?		
	<p>Meaning</p> <p>Understandings</p> <p>Understandings are long-term takeaways that go beyond factual knowledge into broader and more conceptual comprehensions.</p> <p>"Students will understand that..."</p> <p>U1: Science and Engineering Practices</p> <p>Scientists and engineers use standard practices to explain the world or solve problems.</p>	<p>Learning Objectives</p> <p>Objectives articulate what students need to be able to do. (The learning objectives will become targets of assessment.)</p> <p>"Students will be able to..."</p> <p>O1.1: Follow a step-by-step method to solve a problem.</p>	<p>Acquisition</p> <p>Knowledge and Skills</p> <p>Knowledge and skills include the essential facts and basic concepts that a student should know and be able to do to perform the competency.</p> <p>"It is expected that students will..."</p> <p>KS1.1.1: Define a simple design problem reflecting a need or a want.</p> <p>KS1.1.2: Brainstorm possible solutions to the problem.</p> <p>KS1.1.3: Evaluate a solution through observations and/or measurements and consider what revisions to the initial solution are needed.</p>

Established Standards/ Goals/Practices	Meaning	Acquisition	
Understandings		Learning Objectives	Knowledge and Skills
<u>Disciplinary Core Ideas</u> <ul style="list-style-type: none"> Natural Resources Natural Hazards Engineering Design <u>Crosscutting Concepts</u> <ul style="list-style-type: none"> Cause and Effect <u>Connections</u> <ul style="list-style-type: none"> Interdependence of Science, Engineering, and Technology Influence of Engineering, Technology, and Science on Society and the Natural World 		<p>O1.2: Use scientific reasoning to ask questions, make observations, and investigate ideas to acquire knowledge and solve problems.</p> <p>O1.3: Obtain, evaluate, and communicate information.</p>	<p>KS1.2.1: Ask and identify questions to gain knowledge or solve problems.</p> <p>KS1.2.2: Make observations to draw conclusions of phenomena.</p> <p>KS1.2.3: Analyze data to look for patterns or to test whether data are consistent with an initial prediction.</p> <p>KS1.3.1: Obtain and combine information from books and other reliable media to explain phenomena.</p>
U2: Natural Resources Natural resources are derived from nature, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.		<p>O2.1: Compare the impact of using renewable versus non-renewable natural resources.</p>	<p>KS2.1.1: Develop a basic understanding of how natural resources are formed and how they are obtained.</p> <p>KS2.1.2: Explain how obtaining and using natural resources impacts Earth.</p> <p>KS2.1.3: Identify natural resources as renewable or non-renewable.</p> <p>KS2.1.4: Compare and contrast renewable and non-renewable natural resources.</p>
Common Core English Language Arts <ul style="list-style-type: none"> Reading: Informational Text Writing Speaking and Listening Common Core Mathematics <ul style="list-style-type: none"> Mathematical Practices CSTA K-12 Computer Science Standards		<p>O2.2: Analyze how populations have used natural resources to survive.</p>	<p>KS2.2.1: Identify reasons that human populations live in areas that have ample natural resources.</p> <p>KS2.2.2: Identify examples of natural resources in your community and/or region.</p>

Established Standards/ Goals/Practices	Meaning		Acquisition	
	Understandings	Learning Objectives	Knowledge and Skills	
<ul style="list-style-type: none"> Data and Analysis 	U3: Natural Hazards A variety of hazards result from natural processes, such as earthquakes, tsunamis, or volcanic eruptions. Humans cannot eliminate the hazards but can take steps to reduce their impacts.	O3.1: Understand the impact of natural hazards. O3.2: Understand humans cannot eliminate natural hazards but can take steps to reduce their impact.	KS3.1.1: Identify examples of natural processes. KS3.1.2: Identify locations where specific hazards are most likely to occur. KS3.1.3: Explain how natural hazards can disrupt populations. KS3.2.1: Explore ways to predict when and where natural hazards will occur. KS3.2.2: Identify ways that communities prepare for natural hazards.	
	U4: Earth and Human Activity Natural and human actions are related to environmental challenges.	O4.1: Analyze how human actions impact the environment. O4.2: Analyze how Earth processes impact the environment and our communities.	KS4.1.1: Investigate the impact of human activity on the environment. KS4.1.2: Identify ways to reduce human impact on the environment. KS4.2.1: Explain how natural hazards can impact natural resources. KS4.2.2: Generate solutions that reduce the impact of natural Earth processes.	
	U5: Mathematical Thinking Mathematical thinkers apply complex thinking and reasoning strategies where thinking is intentional and reflected upon.	O5: Apply mathematical thinking to solve problems.	KS5.1: Make sense of problems and persevere in solving them. [CCSS.MATH.PRACTICE.MP1] KS5.2: Reason abstractly and quantitatively. [CCSS.MATH.PRACTICE.MP2]	

Established Standards/ Goals/Practices	Meaning		Acquisition	
	Understandings	Learning Objectives	Knowledge and Skills	
			KS5.3: Model with mathematics. [CCSS.MATH.PRACTICE.MP4]	
			KS5.4: Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea. [CSTA 1B-DA-07]	
	U6: Collaboration Professionals function effectively and efficiently on multidisciplinary teams to be successful.	O6: Collaborate effectively on a diverse and multidisciplinary team.	KS6.1: Generate ideas as a team.	
			KS6.2: Value the contributions of each team member.	
			KS6.3: Demonstrate collaboration through effective communication.	
	U7: Communication Professionals communicate effectively with a variety of audiences using multiple modalities to be successful.	O7: Communicate effectively for specific purposes and settings.	KS7.1: Document work in an organized notebook.	
			KS7.2: Explain findings and justify evidence-based conclusions with others.	
			KS7.3: Present data and information accurately and effectively.	
	U8: Ethics Professionals conduct themselves so as to maximize benefits for society and minimize harm.	O8: Practice ethical behavior in all settings.	KS8.1: Engage in and maintain positive interactions and relationships with other children and adults.	

Evidence (Stage 2)		
Activity, Project, Problem (APB)	Show evidence of the student's ability to...	Assessment opportunities include...
Introduction Story Career Day		<ul style="list-style-type: none"> Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> Discussion
Activity 1 Natural Resources	LO1.2 LO2.1 LO2.2 LO5 LO6 LO7 LO8	<ul style="list-style-type: none"> Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> PLTW Launch Log Discussion Reflecting on essential questions and conclusion questions through guided discussion
Activity 2 Upcycling	LO1.1 LO2.1 LO4.1 LO6 LO7 LO8	<ul style="list-style-type: none"> Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> PLTW Launch Log Discussion With guidance, demonstrate an understanding of the design process Reflecting on essential questions and conclusion questions through guided discussion

Learning Plan (Stage 3)		
APB Description		Knowledge and Skills
Introduction Story The design challenge to create an action plan to reduce human impact on the environment or to lessen the impact of natural disasters on humans is introduced to the students.		
Activity 1 Students learn that natural resources are critical for human survival and success. They explore the differences between renewable and non-renewable resources, use a map to see how access to natural resources relates to human populations, and learn about how human use of natural resources affects Earth.		KS1.2.2 KS5.2 KS1.2.3 KS5.3 KS2.1.1 KS5.4 KS2.1.2 KS6.3 KS2.1.3 KS7.1 KS2.1.4 KS7.2 KS2.2.1 KS7.3 KS2.2.2 KS8.1
Activity 2 Students continue to examine how humans use natural resources and how Earth is affected by waste. Students learn ways to preserve Earth's natural resources to limit the negative human impact on the environment. Students analyze their own resource use and design an upcycled product.		KS1.1.1 KS6.1 KS1.1.2 KS6.2 KS1.1.3 KS6.3 KS2.1.2 KS7.1 KS4.1.2 KS7.2 KS8.1

Evidence (Stage 2)		
Activity, Project, Problem (APB)	Show evidence of the student's ability to...	Assessment opportunities include...
Activity 3 Natural Disasters	LO1.2 LO1.3 LO3.1 LO3.2 LO4.2 LO5 LO6 LO7 LO8	<ul style="list-style-type: none"> • Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> • PLTW Launch Log • Discussion • Reflecting on essential questions and conclusion questions through guided discussion
Project Preparing for Emergencies	LO1.2 LO3.1 LO3.2 LO4.1 LO5 LO6 LO7 LO8	<ul style="list-style-type: none"> • Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> • PLTW Launch Log • Discussion • Reflecting on essential questions and conclusion questions through guided discussion

Learning Plan (Stage 3)		
APB Description		Knowledge and Skills
Activity 3 Students learn natural disasters are major events caused by Earth's natural processes that often cause harm to people and property. Students learn about different types of natural disasters and discover that while natural disasters are not preventable, humans can take steps to help reduce the risk of damage. Students conduct research on the occurrence and impact of earthquakes.		KS1.2.1 KS4.2.1 KS1.2.2 KS5.2 KS1.2.3 KS5.3 KS1.3.1 KS5.4 KS3.1.1 KS6.3 KS3.1.2 KS7.1 KS3.1.3 KS7.2 KS3.2.1 KS7.3 KS3.2.2 KS8.1
Project Students build their understanding of steps humans can take to reduce the impact of natural disasters by examining how to stay safe during and in the days following a natural disaster. Students work in teams to design an emergency preparedness kit with food, water, clothes, and other necessary items that would allow a person to stay safe after a specific natural disaster.		KS1.2.3 KS6.1 KS3.1.3 KS6.2 KS3.2.2 KS6.3 KS4.1.2 KS7.1 KS5.4 KS7.2 KS7.3 KS8.1

Evidence (Stage 2)		
Activity, Project, Problem (APB)	Show evidence of the student's ability to...	Assessment opportunities include...
Problem Make a Change	LO1.1 LO1.2 LO1.3 LO4.1 LO4.2 LO5 LO6 LO7 LO8	<p>Assessment opportunities include...</p> <ul style="list-style-type: none"> • Interpreting essential concepts through formative assessment <ul style="list-style-type: none"> • PLTW Launch Log • Discussion • With guidance, demonstrate an understanding of the design process • Interpreting essential concepts through summative assessment <ul style="list-style-type: none"> • Design an action plan to reduce the human impact on Earth or lessen the impact of natural disasters on humans • Reflecting on essential questions and conclusion questions through guided discussion

Learning Plan (Stage 3)		
APB Description		Knowledge and Skills
Problem Students follow the design process to develop an action plan to either reduce human impact on Earth or lessen the impact of natural disasters on humans. They create a podcast, video blog, or another digital product to present their action plan.		KS1.1.1 KS5.1 KS1.1.2 KS6.1 KS1.1.3 KS6.2 KS1.2.1 KS6.3 KS1.3.1 KS7.1 KS4.1.1 KS7.2 KS4.1.2 KS7.3 KS4.2.1 KS8.1 KS4.2.2

Connections to Standards

PLTW programs are designed to empower students to thrive in an evolving world. As a part of this process, we take connections to standards into account when developing and updating our curriculum. The PLTW Launch modules address standards from the following:

- Next Generation Science Standards (NGSS)
- Common Core State Standards (CCSS) in English/Language Arts (ELA) and Mathematics
- Computer Science Teachers Association (CSTA) K-12 Computer Science Standards

This document lists the standards identified from each of these sources that apply to the Earth: Human Impact and Natural Disasters module.

Next Generation Science Standards

Performance Expectations

- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
- 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.

Science and Engineering Practices

- Asking Questions and Defining Problems. Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.
 - 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.
- Developing and Using Models. Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Analyzing and Interpreting Data. Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting

multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.
- **Constructing Explanations and Designing Solutions.** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
 - Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.
- **Engaging in Argument from Evidence.** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.
 - Use data to evaluate claims about cause and effect.
 - 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.
- **Obtaining, Evaluating, and Communicating Information.** Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.
 - Obtain and combine information from books and other reliable media to explain phenomena.

Disciplinary Core Ideas

- **ESS3.A Natural Resources.** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.
- **ESS3.B Natural Hazards.** A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.
- **ETS1.A Defining and Delimiting Engineering Problems:** 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.
- **ETS1.B Developing Possible Solutions:** Research on a problem 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.

Crosscutting Concepts

- **Cause and Effect.** Cause and effect relationships are routinely identified, tested, and used to explain change.

Connections to Engineering, Technology, and Applications of Science

- **Interdependence of Science, Engineering, and Technology.** Knowledge of relevant scientific concepts and research findings is important in engineering.
- **Influence of Engineering, Technology, and Science on Society and the Natural World.** Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands.
- **Influence of Engineering, Technology, and Science on Society and the Natural World.** Over time, people's needs and wants change, as do their demands for new and improved technologies.

Common Core State Standards ELA and Mathematics

English Language Arts

- **CCSS.ELA-LITERACY.RI.4.1.** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **CCSS.ELA-LITERACY.RI.4.3.** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- **CCSS.ELA-LITERACY.RI.4.4.** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
- **CCSS.ELA-LITERACY.RI.4.9.** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- **CCSS.ELA-LITERACY.W.4.2.** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- **CCSS.ELA-LITERACY.W.4.7.** Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- **CCSS.ELA-LITERACY.W.4.8.** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.
- **CCSS.ELA-LITERACY.W.4.9.** Draw evidence from literary or informational texts to support analysis, reflection, and research.

- CCSS.ELA-LITERACY.SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- CCSS.ELA-LITERACY.SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Mathematics

- CCSS.MATH.PRACTICE.MP1. Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2. Reason abstractly and quantitatively.
- CCSS.MATH.PRACTICE.MP4. Model with mathematics.

CSTA K-12 Computer Science Standards

- 1B-DA-07. Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.

Sources

Computer Science Teachers Association. (2017). *CSTA K-12 computer science standards, revised 2017*. Retrieved from <http://www.csteachers.org/standards>

National Governors Association Center for Best Practices, & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: National Governors Association Center for Best Practices, Council of Chief State School Officers.

NGSS Lead States. (2013). *Next Generation Science Standards: For states by states*. Washington, DC: The National Academies Press.

Earth: Human Impact and Natural Disasters: End-of-Module Summative Assessment
Option 1: Reduce Human Impact on Earth

Criteria	Performance Level		
	Basic	Proficient	Advanced
Science and Engineering Practices O1.1 – Follow a step-by-step method to solve a problem. Earth and Human Activity O4.1 – Analyze how human actions impact the environment.	A student who has reached the <i>highest achievement</i> of the Basic level should be able to do the following: With support, student follows some steps of the design process as they design, create, and evaluate an action plan. With support, student applies knowledge of natural resources to create an action plan that reduces human impact on Earth.	A student who has <i>just reached</i> the Proficient level should be able to do the following: With support, student follows all steps of the design process as they design, create, and evaluate an action plan. Student applies knowledge of natural resources to create an action plan that reduces human impact on Earth. With support, student explains how effective the action plan would be in reducing the human impact.	A student who has <i>just reached</i> the Advanced level should be able to do the following: Student independently follows the design process as they design, create, and evaluate an action plan. Student applies knowledge of natural resources to create an action plan that reduces human impact on Earth. Student independently explains how effective the action plan would be in reducing the human impact.
Collaboration O6 – Collaborate effectively on a diverse and multidisciplinary team.	Student participates the majority of the time and shares ideas with others. Student demonstrates flexibility in thinking and behavior some of the time.	Student fully participates and shares their ideas with their group, valuing the contribution of team members. Student demonstrates flexibility in thinking and behavior most of the time.	Student fully participates and shares their ideas with their group, valuing the contributions of team members. Student models and encourages others to demonstrate flexibility in thinking and behavior.
Communication O7 – Communicate effectively for specific purposes and settings.	With support, student accurately describes findings from the Problem. Student attempts to use the Launch Log to communicate their thinking.	Student accurately and effectively describes findings from the Problem. Student uses the Launch Log to communicate their thinking.	Student justifies findings from the Problem with evidence-based conclusions. Student uses the Launch Log to communicate their thinking.
Ethics O8 – Practice ethical behavior in all settings.	With support, student engages in positive interactions and relationships with other students some of the time.	With support, student engages in and maintains positive interactions and relationships with other students. Student is kind and respectful when they disagree.	Student independently engages in and maintains positive interactions and relationships with other students. Student is kind and respectful when they disagree.

Earth: Human Impact and Natural Disasters: End-of-Module Summative Assessment
Option 2: Lessen the Impact of Natural Disasters on Humans

Criteria	Performance Level		
	Basic	Proficient	Advanced
Science and Engineering Practices O1.1 – Follow a step-by-step method to solve a problem. Earth and Human Activity O4.2 – Analyze how Earth processes impact the environment and our communities.	A student who has reached the <i>highest achievement</i> of the Basic level should be able to do the following: With support, student follows some steps of the design process as they design, create, and evaluate an action plan. With support, student applies knowledge of natural processes to create an action plan that lessens the impact of natural disasters on humans.	A student who has <i>just reached</i> the Proficient level should be able to do the following: With support, student follows all steps of the design process as they design, create, and evaluate an action plan. Student applies knowledge of natural processes to create an action plan that lessens the impact of natural disasters on humans. With support, student explains how effective the action plan would be in lessening the impact of the natural disaster.	A student who has <i>just reached</i> the Advanced level should be able to do the following: Student independently follows the design process as they design, create, and evaluate an action plan. Student applies knowledge of natural processes to create an action plan that lessens the impact of natural disasters on humans. Student independently explains how effective the action plan would be in lessening the impact of the natural disaster.
Collaboration O6 – Collaborate effectively on a diverse and multidisciplinary team.	Student participates the majority of the time and shares ideas with others. Student demonstrates flexibility in thinking and behavior some of the time.	Student fully participates and shares their ideas with their group, valuing the contribution of team members. Student demonstrates flexibility in thinking and behavior most of the time.	Student fully participates and shares their ideas with their group, valuing the contributions of team members. Student models and encourages others to demonstrate flexibility in thinking and behavior.
Communication O7 – Communicate effectively for specific purposes and settings.	With support, student accurately describes findings from the Problem. Student attempts to use the Launch Log to communicate their thinking.	Student accurately and effectively describes findings from the Problem. Student uses the Launch Log to communicate their thinking.	Student justifies findings from the Problem with evidence-based conclusions. Student uses the Launch Log to communicate their thinking.
Ethics O8 – Practice ethical behavior in all settings.	With support, student engages in positive interactions and relationships with other students some of the time.	With support, student engages in and maintains positive interactions and relationships with other students. Student is kind and respectful when they disagree.	Student independently engages in and maintains positive interactions and relationships with other students. Student is kind and respectful when they disagree.



Earth: Human Impact and Natural Disasters

Check for Understanding

1. Explain the difference between a renewable and a non-renewable resource. Provide one example of each.

2. How do people impact Earth? Explain your thinking.

3. How can people reduce their negative impact on Earth?

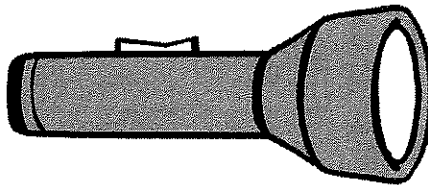
4. How do natural hazards impact Earth?

5. Human activities can increase the risk of a natural hazard. Match the human activity to the potential natural hazard that could cause it.

Scenario 1 People cut into and tunnel under mountains to mine natural resources.	a. Landslides occur more often.
Scenario 2 Large areas of land are paved with cement to create roads and sidewalks.	b. Hurricanes become more intense with stronger winds and more rain.
Scenario 3 People burn fossil fuel for energy, which increases average temperatures in the ocean and the air.	c. Flooding occurs during heavy rainstorms.

6. What can people do to reduce the impact of natural hazards?

7. Look at the image below.



Do you think a flashlight should be included in an emergency preparedness kit? Justify your thinking.

Renewable Resources



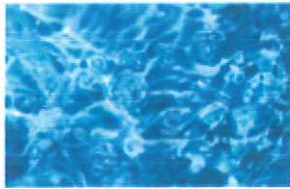
Renewable mean it can be used over and over again.

Non- Renewable Resources



Non-renewable can't be used over and over again.

Renewable Resources



Non-Renewable Resources



Explain here: We can take out trash from the ocean so there is less plastic in the sea, because when it is summer I see at least one or two pieces of trash in the ocean. When

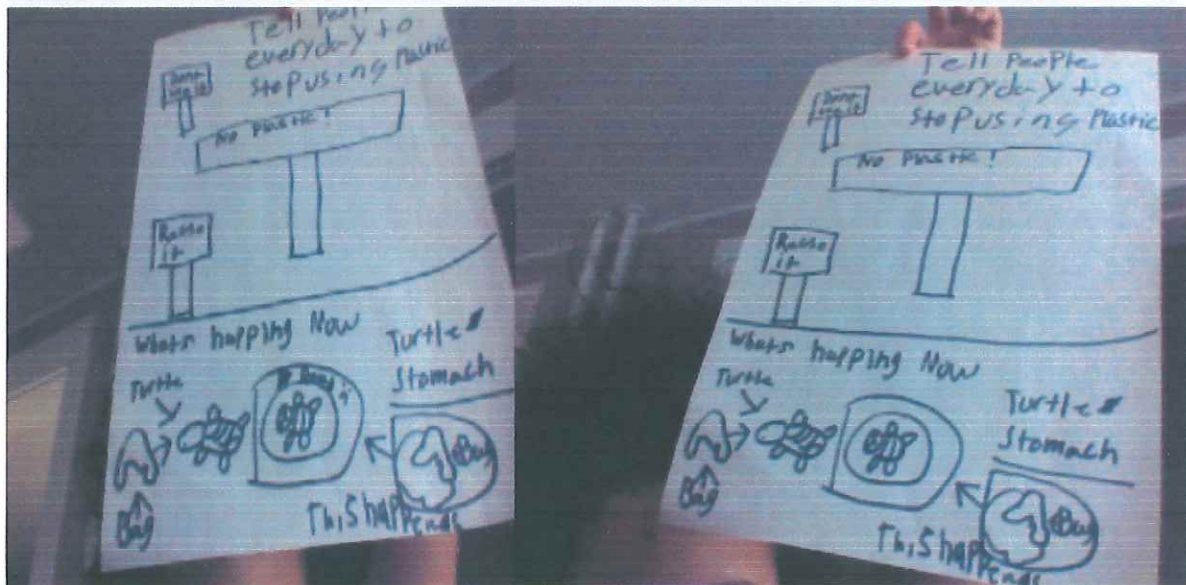
i swim in it but sometimes it is to far for me to reach or maybe since i'm on my boogie board in the ocean it goes under me then it goes to far again. If we take

plastic or trash in the ocean we can make the number of plastic in oceans decrease. If we make the number of plastic in oceans decries we will have more animals than plastic. When i watched a youtube video it was made in 2020 it said

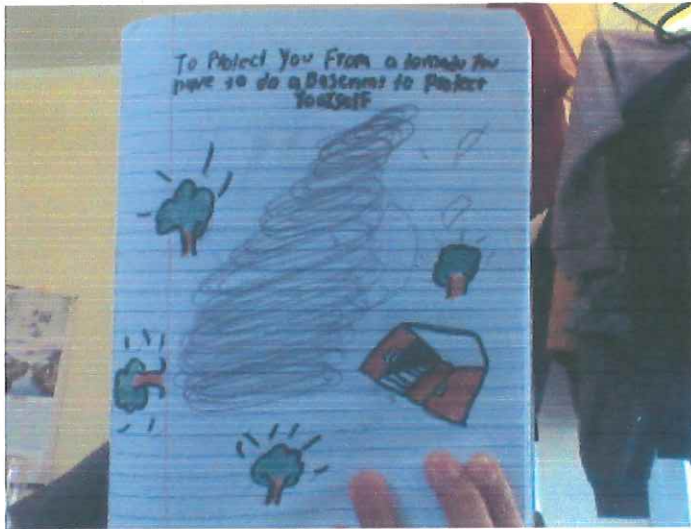
we only have 30 more years to save the environment that's why we need to act fast before it's too late.



Explain here: Basically there will be Plastic and Trash Cans to put in all your trash and plastic before entering anywhere, there will also be cameras to see if your throwing trash or plastic anywhere near the area. Stop Polution!!



Explain here: We could convince people to stop by showing them what happens when a bag gets eaten by a sea turtle. If they aren't convinced show em this drawing. And tell them that they are endangering beautiful sea creatures.



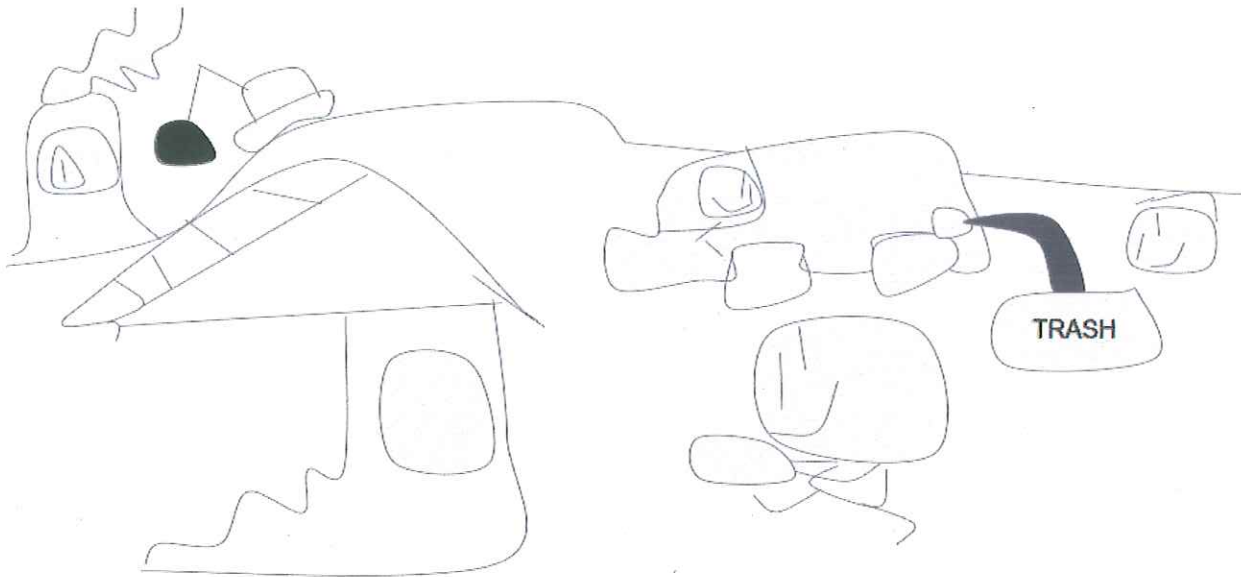
We can
use



Instead
of



Explain here: I can help save the world by writing a letter to most restaurants and tell them to start using reusable straws instead of plastic straws. In addition to that I can also help by sending letters to groceries stores as well. They can start using reusable bags instead of plastic bags



Explain here: some power plants do chase smoe problems. trash i think we sould use power plants less. use trash for stuff we might be able to make house out of trash! And we can use trash . try to make Gas for Cars but we can still use Gas in case we run out of trash



Since there are lots of garbeg in the ocean we could....



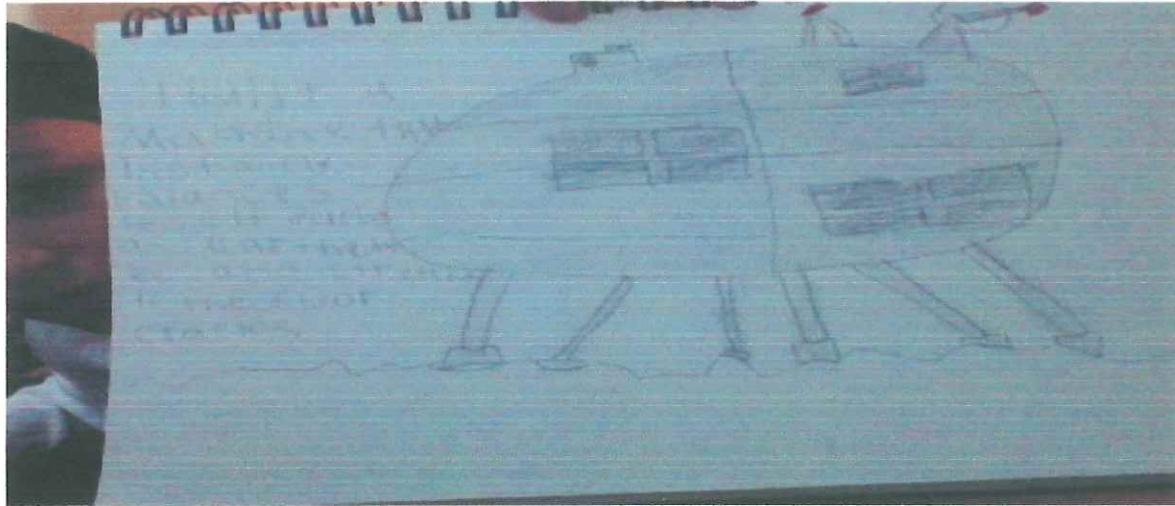
Have friends and people help collect the plastic all around the beach and.....



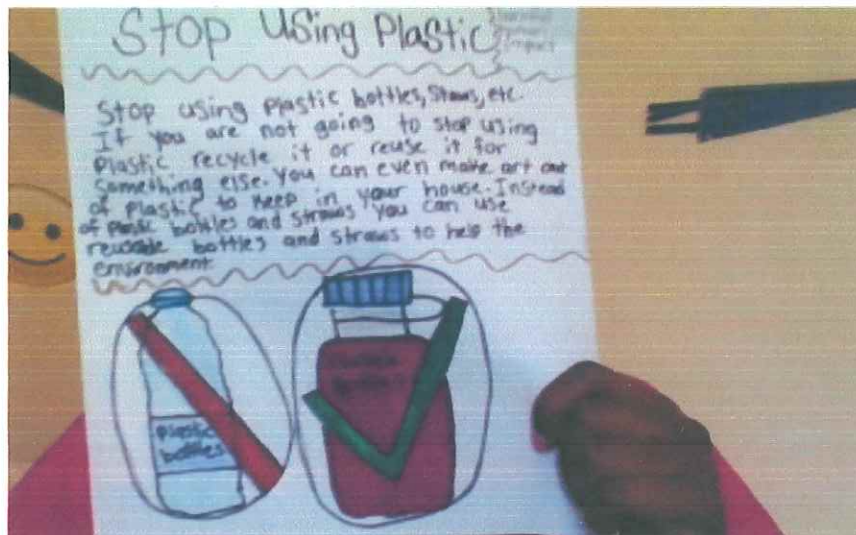
We could pay people for plastic instead of them throwing plastic away and ending up in the ocean.



Next thing you know the ocean would be nice and clean.



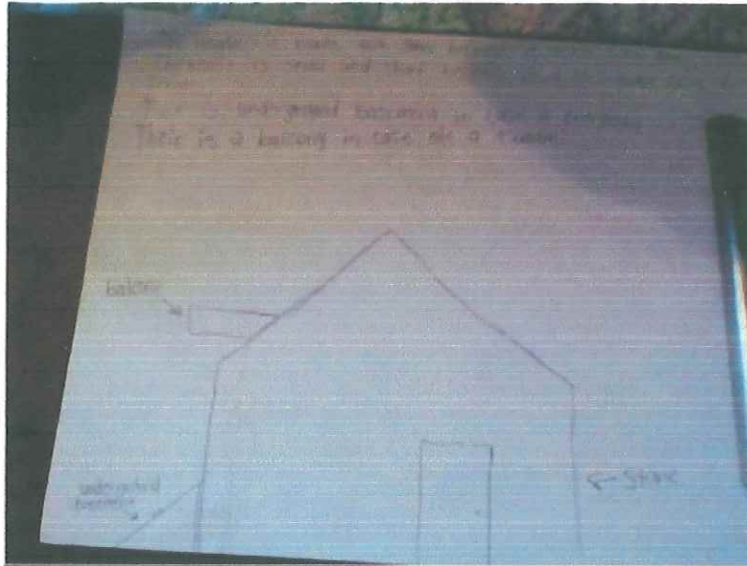
Explain here: I built a machine that instantly balances itself when there's an earthquake. Also if the floor cracks the bottom can stretch so that it doesn't break.



Explain here: These are some things you could do with plastic instead of throwing it out to help stop harmful human impact in the world.

Explain here: Better radar detector that is made for hurricanes or thunderstorms and a thing that you can put on the ground to track earthquakes and warn people. For a tsunami you could track volcanic action and to possibly see if a volcano will erupt. For floods you could make a

system that could automatically open and close drains so then the flood water goes away. For a blizzard make ai cars that will shovel the snow without human interference and not releasing a lot of emissions. For heatwave make a tool that goes around in a electric car sprinkling water to yards and a plane powered by wind that will drop water like if it was a wildfire.



Describe the safety features of your home here: The house is made out of stone because it does not burn easily in case of a fire or a volcano eruption. The house is small and short because if earthquake forms it's sturdy. There is an underground basement in case of any emergency. There is a balcony in case of a tsunami and you need to get to high ground.