



Description:

During this ELA focused unit, students will design a solution to the environmental issue of coastal erosion. People enjoy the beauty of beachfront living, yet the effects of building houses along the coast can have detrimental effects on the environment. Students will make a claim and cite evidence to support their argument in favor of saving the house or saving the beach. Students will also recognize and record causes and effects of coastal erosion to prepare for an oral debate. Finally, students will present their arguments and evidence during the debate.

<p>Grade Levels: 6-8</p>	<p>Objectives: Students will:</p> <ul style="list-style-type: none"> • construct a claim • research and cite evidence • identify causes and effects • formulate a proposal that is supported by evidence
<p>Duration: Five 60-Minute Sessions</p>	<p>Standards Connections: <i>California English Language Arts Content Standards</i> CCSS.ELA-Literacy.W.6-8.1: Write arguments to support claims with clear reasons and relevant evidence.</p> <p>NGSS Science and Engineering Practices (SEP): 7, 6-8 Engaging in Argument from Evidence:</p> <ul style="list-style-type: none"> • Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. <p>NGSS Cross Cutting Concepts (CCC): 2, 6-8 Cause and Effect: Mechanism & Prediction</p> <ul style="list-style-type: none"> • Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Materials:

Below are categories of building materials for students to use. Look around your classroom and school, or ask students to bring in materials you can all use during the design challenge. Material quantities are for a class of 32 students.

Structural pieces (100 total)	Connectors (250 total)
<ul style="list-style-type: none"> • Popsicle sticks • Knitting needles • Cardboard tubes • Cardboard pieces • Corrugated plastic 	<ul style="list-style-type: none"> • Binder clips • Chenille stems • Rubber bands (bag) • Corks • Clothespins

This lesson is part of:
The Tech Academies of Innovation

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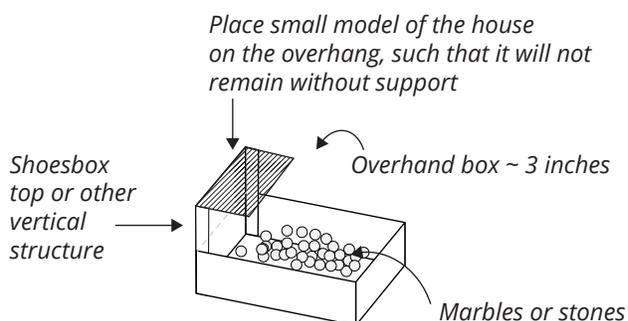
Rig Materials	Other Building Materials (100 total)
<ul style="list-style-type: none"> • 2' x 1½' box (2 total) • shoe box (1 total) • beans, marbles, sand, small rocks, or beads to simulate sand (enough to fill 1" deep of bottom of both boxes) • cardboard- one rectangle to create overhang of cliff • foam pieces - enough to create a pile along one short wall • glue sticks • hot glue gun • house (1) - 3" x 6" Lego built, or toy house, or dollhouse • Optional: blue fabric for ocean, figurines of small trees and people to decorate cliff areas • Optional: Wind-maker - a fan or a balloon air pump 	<ul style="list-style-type: none"> • Straws • Plastic ribbon spools • Styrofoam • Dixie bath cups

Student Work Area Materials:

- Scissors (for modifying Design Challenge Materials) - **20 total**
- Rulers (for checking solution criteria) - **10 total**

Saving The House Testing Rig

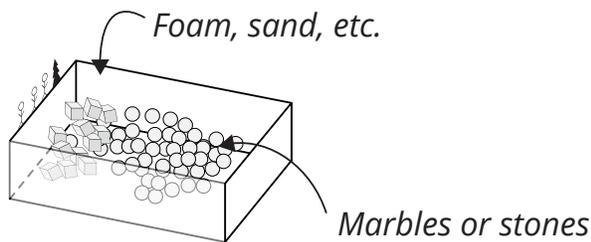
- Use a 2' x 1½' box to create the Saving the House testing rig. Cut the flaps off.
- This rig will require a small model of a house. A few possibilities for a house include a Lego house, a toy house, or a doll house. Suggested sizing for the house is 3" x 6".
- To create a cliff use a box, such as a shoe box. The box should be taller than the height of the rig box to simulate a cliff side. Hot glue the box along the back short wall of the rig to secure it in place.
- On top of the shoebox (cliff), create an overhang using cardboard on which to place the model house. The overhang should be large enough to extend at least 3 inches beyond the end of the cliff (shoebox). To make the testing rig more realistic, small toy people and trees can be added to this platform.
- Fill the bottom of the rig (the beach) one inch deep with a material to simulate sand and water for erosion. Material suggestions include, marbles, small rocks, beans, or beads.
- During testing the house should be placed on the overhang in a such a way that it will fall when unsupported by a device.





Saving The Beach Testing Rig

- Use a 2' x 1½' box to create the Saving the Beach testing rig. Cut the flaps off. One short wall of the box will need to be cut lower than the remaining three walls. The height of this wall should be lower to allow for an opening during testing.
- To create the cliff, pile a large mound of foam pieces against the back short wall of the box up to the height of the wall to represent sand and cliff material.
- Fill the bottom of the rig (the beach), one inch deep, with a material to simulate sand and water for erosion. Material suggestions include sand, marbles, small rocks, beans, and beads. Blue fabric can be added to represent the ocean.



Prep:

- Two testing rigs will need to be prepared before the lesson.

Tech Tips:

These one-page guides provide tips and best practices for facilitating design challenges

- What is Engineering
- Defining Criteria & Constraints
- Fostering Engineering Mindsets
- Assessing Design Challenge Learning
- The Language of Engineering

Lesson

A. Introduction (15-20 Minutes)

1. Introduce students to the environmental issue of coastal erosion by showing them videos.

Suggestions for videos include:

a. [House falls into the Sea](#)

Nurlina, Dinda. "House Falls into the Sea". Online video clip. YouTube. YouTube, 15 April 2015. Web. 26 July 2018.

b. [WATCH: Pacifica Coastal Erosion Caught on Drone Video](#)

Sinfield, Duncan. "WATCH: Pacifica Coastal Erosion Caught on Drone Video." Online video clip. YouTube. Sinfiel LLC, 23 January 2016. Web. 26 July 2018

c. [Weathering and Erosion: Crash Course Kids #10.2](#)

Crash Course Kids. "Weathering and Erosion: Crash Course Kids #10.2" Online video clip. YouTube. Executive Producers John and Hank Green, Producer & Editor Nicholas Jenkins, 15 May 2015. Web. 26 July 2018

2. Use the videos to lead a classroom brainstorm on possible causes and effects of coastal erosion. Consider creating a Mind map as a class ([see Appendix C: Resources for Mind maps](#)).

- What did you see happen in the videos?
- What might be some reasons or causes for why these events happened?
- What might happen or what is the effect of coastal erosion?



3. Introduce the real-world environmental issue to the students:

The park service wants to protect the beloved visitor center from coastal erosion so they can continue to share the beautiful views from the cliffside center and the lovely sand beach below with anyone who comes to visit. You and your team of engineers have been asked to explore how to preserve the visitor center structure with as few visible changes to the landscape as possible. In the design challenge your team is going to explore different ways to protect the coastline and a structure on the cliff. As a team, what solution can you come up with that will help the park service enhance the visitor experience while minimizing the impact on the environment?

4. Tell the students that they will be engineers tasked with creating a design or planning a possible solution to help minimize or bypass the effects of coastal erosion. From here on out, refer to students as engineers throughout the course of this unit. For more information on engineering, see Tech Tip: What is Engineering.

B. Engineering Challenge (60 Minutes)

1. Introduce the engineering concepts of criteria and constraints. Explain to students that criteria are design requirements and the must-haves, whereas constraints are the limitations. Constraints often include time, budget, and materials. For more information on criteria and constraints, see Tech Tip: Defining Criteria & Constraints.
2. Discuss the real-life criteria and constraints of being environmentally friendly engineers working with a coastal parks department. Consider using the Think-Pair-Share model to engage the engineers as they develop criteria and constraints for this design challenge.
 - a. *What would the park service's best solution include?*
 - b. *What would the best solution to protect the environment look like?*
 - c. *Are there specific types of materials we may want to use or not want to use? Why?*
 - d. *What limitations might we want to consider?*
3. Re-introduce the real-world environmental issue with students:

The park service wants to protect the beloved visitor center from coastal erosion so they can continue to share the beautiful views from the cliffside center and the lovely sand beach below with anyone who comes to visit. You and your team of engineers have been asked to explore how to preserve the visitor center structure with as few visible changes to the landscape as possible. In the design challenge your team is going to explore different ways to protect the coastline and a structure on the cliff. As a team, what solution can you come up with that will help the park service enhance the visitor experience while minimizing the impact on the environment?

4. Introduce the engineering design challenges. Students will have a choice between experimenting with ways to protect a structure on an eroding cliff or experimenting with ways to protect the shoreline from erosion.

Design Problem:

Set the scene for real life application:

- **Scenario 1:** *Save the Structure*

Your engineering team is in charge of saving a beachfront visitor center. Use your knowledge of erosion to solve this problem with minimal intrusion to the beach.



Criteria (Design Requirements/Desired Features):

- Structure must be able to withstand weight of house.
- Structure must extend 6 inches beyond edge of cliff.
- Structure must withstand simulated erosion.
- Each team must use a minimum of 5 different materials.

Constraints (Design Limitations):

- Schedule: 15 minutes to build.
- Budget: Use only materials provided.
- Structure must stand on its own without human support.

Testing:

- Test structure on the appropriate testing rig.
- Design must withstand wind, earthquake and wave simulation.

- Facilitate a class discussion to establish testing parameters. Chart suggestions and have the class decide on one simulation for each cause of erosion. Some facilitative questions include:
 - We are going to create and test designs. What types of situations cause erosion or could damage a house that we might want to model?*
(Possible Solutions: Big waves with rock or sand, earthquakes, heavy winds.)
 - What are some ways we can **simulate**, model, or replicate wind?*
(Possible Solution: a fan or a hand pump.)
 - What are some ways we can simulate waves?*
(Possible Solution: throwing several marbles at the shore.)
 - What are some ways we can simulate an earthquake?*
(Possible Solution: shaking the rig to simulate an earthquake.)
- Tell students that they will be thinking like engineers about different ways they might be able to solve the problem either by working on the visitor center structure or with the coastline. It is important that they act boldly as engineers; taking risks to try surprising ideas as they explore options that can address different aspects of the problem. To see more about engineering mindsets and how to teach them to students, see Tech Tip: Engineering Mindsets.
- Form engineering teams of 3-4 students or allow students to form their own teams. You may either assign a design scenario or allow teams to choose the area of focus they want to explore.
- Give students 15 minutes to discuss their ideas, brainstorm, play with materials, or draw their design for the scenario they are addressing. While students are brainstorming, ask some facilitative questions to guide them.
 - What are some ideas you would like to try out?*
 - How do you think this idea will work within the criteria and constraints of the challenge?*
 - What would success look like for this design problem?*
 - What do you predict will happen when you test your structure?*
 - When you test out your idea, how will you know if it works or where it could work better?*
- Introduce the data collection sheet. Explain that teams will be using the data collection sheet to gather evidence on how their design works and that they will use this evidence later in the unit. ([See Appendix D: Handouts for Data Collection Sheet](#)).
- Allow teams 15 minutes to **prototype** their ideas and record the information. Encourage teams to test as they build.



- a. *Explain how your design meets the criteria and constraints. What evidence do you have?*
- b. *What do you see working in your design? What do you see not being effective? What changes can you make based on your observations?*
- c. *How did the materials you chose affect the outcome? How do you know they had this effect?*
- d. *Which material most contributed to the success of your design? How do you know?*

11. After the 15 minute build time, have the class regroup at the test rigs and do a final test for the whole class to observe. Have teams share out about their designs and reflect on what they learned. Encourage students to contribute to share out by giving specific constructive feedback to other teams. Consider modeling this process with sentence starters ([see Appendix D: English and Spanish Sentence Starters](#)).

12. After share out, have teams return to their tables to:
- a. Finish recording data on the data collection sheet.
 - b. Analyze their data chart to identify any patterns.
 - c. Identify areas for iterating their solutions

C. Content Learning (60 Minutes)

1. Have students think-pair-share about what causes and effects they saw during the testing period. Consider having students record their ideas.
2. Have students, as a class, share out the different notes they took on their cause and effect discussion. Use this time to model and encourage every student to share their ideas.
 - a. *What were the effects of erosion on the test rig itself?*
 - b. *What cause of erosion in the engineering challenge was the most devastating to your design solution? How do you know?*
 - c. *Imagine yourself at the same size as your design, would your solution allow you an unblocked view of the ocean? Could you access the water from the beach?*
(It might help students to imagine the feasibility of their design by placing a miniature figure in their designs.).

3. Tell students that they have done a good job as engineers to think of bold ways to solve the problem by looking at the coastal environment and the structure on the cliff. Next they will research existing engineering solutions to investigate possible solutions they may want to present to the parks department. Provide students with the source handout and go over how they will use it as they research ([See Appendix D: Resources for Source Card](#)).

If students need some guidance, some possible research subtopics include:

- a. Environmental Approaches: coastal groins/groynes, breakwaters, seawalls, composite systems, headland breakwaters.
- b. Structural Approaches: coastal house building materials, constructing coastal foundations, methods for building on a cliff, methods for building on a slope

4. Tell students they need to find 2 sources and 3 pieces of evidence from each source. They will have 40 minutes to research their topic and record the information they find on their source handout.
5. Have students partner up with students studying the same approach or subtopic. Have them share what they learned and have the team do the following with every student recording their answers on an index card:
 - a. Reflect on how their design challenge results match or do not match their research.
 - b. Develop a claim on why the method they chose would be a good option for the parks department.
 - c. Develop at least 1 reason why this method might not be a good option for the parks department.



6. Have students do a rapid share out with their classmates where they get no more than 1 minute to exchange their answers for the questions before changing partners. Do the rapid share out 3-5 times with different classmates to expose students to a range of ideas.
7. Have students write a reflection of what method or methods they think might be best to solve this problem and why.

D. Iterate Solution (30-45 Minutes)

1. Use previously made class charts to revisit causes and effects of coastal erosion already discussed and re-searched by the class.
2. Have students use their data collection sheet and source handouts to **iterate** their designs with a focus on how to improve the view from the structure and access to the beach. Some questions to help students consider iteration include:
 - a. *What changes will you make based on the information you learned during research? Why?*
 - b. *What changes will you make based on your previous tests? Why?*
 - c. *What is remaining the same in your design? Why did it work?*
 - d. For students who feel their device was successful and don't want to iterate, some suggestions for further reflection include:
 - e. *What if there was a backup in shipping or manufacturing and you couldn't use one of your materials? What will you use instead?*
 - f. *What is the fewest amount of materials that you can use to save money for the parks department and preserve the view?*
3. Remind students of the original engineering design challenge they are working to solve and how they are iterating to protect beach access and view.
4. Decide as a class if any of the testing parameters will change or if they want to add any criteria or constraints to the second design challenge.

Design Problem:

Introduce the two engineering design challenges. Students will have a choice between saving a structure or saving the beach from an eroding cliff.

Set the scene for real life application:

- **Scenario 1: Save the Structure**

Your engineering team is in charge of saving a visitor center. Use your knowledge of erosion to solve this problem with minimal intrusion to the beach.

Criteria (Design Requirements/Desired Features):

- Structure must be able to withstand weight of house.
- Structure must extend 6 inches beyond edge of cliff.
- Structure must withstand simulated erosion.*
- Use a minimum of 1 different material from your original design.
- Protect as much of the view and beach access as possible.

Constraints (Design Limitations):

- Schedule: 15 minutes to build
- Budget: Use only materials provided
- Structure must stand on its own without your support/

Testing:

- Test your device on the appropriate testing rig
- Design must withstand wind, earthquake and wave simulation.



5. Have students design, build, test, and iterate for 15 minutes. Remind students to record their data on a new classroom data chart as they test. Ask facilitative questions to help students determine if their iterations improved the success rate of their designs. Some examples include:
 - a. *Were there any specific materials that you found crucial to your design? Explain.*
 - b. *Did you observe any patterns in your recorded data?*
 - c. *What **trade-offs** did you make between the view/access and creating a solution that achieves the goal?*
6. Gather the class together to have each team test for the rest of the class. Have students explain their iterative design and reflect upon their designs and those of other teams by asking these facilitative questions:
 - a. *How did the changes you made affect the outcome of your test?*
 - b. *What part of your iteration affected the outcome the most? What evidence do you have?*
7. Have students evaluate their designs and justify, based on data and research, why their device may work in the real world.

E. Evaluation (120 Minutes)

1. *As a class, you have experimented and researched many options to help the parks department protect the structure and the beach. Now as a firm of engineers we need to figure out one or two options that are the best for us to recommend to our customers. To do this, we will have four different debates over the methods we have explored through research and our design challenges. Once we have heard the formal debate, we will join recommendation committees that will put forth their advice on this project.*
For additional guidance on facilitating authentic assessments, see Tech Tip: Assessing Design Challenge Learning.
2. Break the classroom into four debate teams. Each debate pair should have two sides: one representing a subtopic to save the structure and one representing a subtopic for saving the beach. That will allow for two classroom debates looking at saving the beach or saving the structure from different research perspectives. Use the format you prefer for the debate in your classroom. For more ideas on organizing a debate, see [Appendix C: Resources for Debate Strategies](#).
 - a. Each team gets 30 minutes to prepare their claim, evidence, and explanation for why this evidence supports their claim.
3. Run the debates in the classroom and have students take notes, so they can remember all of the options they will consider with the recommendation committee.
4. Form students into new groups for the recommendation committees (4-8 committees). Try to form these committees with students that studied each of the different subtopics during the research time. Students will be given 30 minutes in the recommendation committee to reflect and discuss what they learned from the debate portion of the assessment.
 - a. Students are welcome to discuss any topic or ideas brought up during the debate phase.
 - b. Students can ask each other follow-up questions.
5. Each student will be required to provide their top two votes for methods to propose to the parks department with an explanation of why they think these are the best options.
6. Share the resulting recommendations from the class. Notice and reflect on any solutions that were more popular with the class. Celebrate the learning successes from the unit



Appendix A – Grade Level Modifications

Grade	Standard	Modifications
4	<p>CCSS.ELA-LITERACY.W.4.1, 5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</p> <p>CCSS.ELA-LITERACY.W.4.1.B Provide reasons that are supported by facts and details.</p>	<p><u>Evaluation</u>: Students will write a paragraph expressing their opinion about the best way to solve the problem and they will support this view with at least two reasons.</p>
5	<p>CCSS.ELA-LITERACY.W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.</p> <p>CCSS.ELA-LITERACY.W.5.1.B Provide logically ordered reasons that are supported by facts and details</p>	<p><u>Evaluation</u>: Students will write a letter to the editor explaining what solution they think the engineering company should use. They will support their point of view with two reasons from their research. Students will use transition words to logically link reasons to facts.</p>

Appendix B – Vocabulary

The following is the start of a suggested list of words to discuss as your progress through this unit with students. For more in depth information about vocabulary and teaching information, visit [Tech Tip: The Language of Engineering](#).

Term	Student-friendly definition
cause & effect	A relationship between events or things, where one is the result of the other or others. This is a combination of action and reaction.
coastal erosion	The wearing away of material from a coast including the removal of beach, sand dunes, or sediment by crashing waves, high winds, and earthquakes.
constraint	The limitations of a design problem which typically include budget and schedule limitations but may also include other limitations such as maximum size restrictions.
criteria	The requirements or desired features of a design problem often describing the purpose and standards that a system or machine must meet.
iterate	When you try different solutions (create, test, reflect, imagine) over and over.
prototype	The model(s) that you build to test before you get to your final solution.
simulate	To imitate the appearance, character, or action of something.
trade-off	A situation in which you must choose between or balance two things that are opposite or cannot be had at the same time.



Appendix C - Resources

Coastal Erosion

Articles	Fears, Darryl. "California Will Face a Terrible Choice: Save Cliff-Side Homes or Public Beaches from Rising Seas." The Washington Post, WP Company, 11 July 2018. Web. 28 July 2018. www.washingtonpost.com/news/speaking-of-science/wp/2018/07/11/california-will-have-a-terrible-choice-save-cliff-side-homes-or-public-beaches-from-rising-seas/?noredirect=on&utm_term=.aac6ef9b89c0 .
	"What Causes Beach Erosion?" Scientific American. Web. 28 July 2018. www.scientificamerican.com/article/what-causes-beach-erosion/ .
Computer Simulation	"Coastal Erosion." – Interactive Simulations, Video – EduMedia. Web. 28 July 2018. www.edumedia-sciences.com/en/media/167-coastal-erosion

Debate Strategies

Conducting a debate	Kelly, Melissa. "What Are the Benefits of Holding Debates in Middle School Classes?" ThoughtCo, ThoughtCo, www.thoughtco.com/holding-debates-in-middle-school-classes-8012
	Verner, Susan. "Essential Tips for Conducting a Class Debate." Busy Teacher, 6 Oct. 2011. Web. 6 August 2018. www.busyteacher.org/7245-conducting-class-debate-essential-tips.html

Mind Maps

What is Mind mapping?	"What Is a Mind Map?" Theory Behind Mind Maps Mind Mapping Theory. Web. 28 July 2018. www.mindmapping.com/mind-map.php
Methods	"Thinking Maps: Tools for Learning". Wappingers Schools. Web. 28 July 2018. https://www.wappingersschools.org/cms/lib/NY01001463/Centricity/Domain/96/Multi-Flow_Map.pdf
	"T-Chart - ReadWriteThink." Readwritethink.org. Web. 28 July 2018. www.readwritethink.org/classroom-resources/printouts/chart-30225.html



Appendix D - Lesson Handouts

Handout	Page
Data Collection Sheet - Student Handout	12
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English and Spanish Sentence Starters	14
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Final Assessment Handout - Man vs. Land Designing Solutions for Coastal Erosion	16
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Coastal Erosion: Data Collection

Draw a diagram of your [device](#). Include labels for:

- a. all materials and measurements
- b. any remaining failure points observed during testing

Date:	Prototype #:	Name:	
Quantitative Data: <i>Did the device withstand wind, earthquake, wave, or other test?</i>			
Test #1 Yes or No	Test #2 Yes or No	Test #3 Yes or No	Test #4 Yes or No
Note any cause and effect relationships that you observe:			
Criteria and constraints this solution DOES meet:		Criteria and constraints this solution DOES NOT meet:	
To improve on our prototype, some improvements we can make are:			



Coastal Erosion: Sample Data Collection

Draw a diagram of your [device](#). Include labels for:

- a. all materials and measurements
- b. any remaining failure points observed during testing

Date:	Optimal Prototype #:	Name:	
<div style="border: 1px solid #ccc; background-color: #f0f0f0; width: 100%; height: 100%; margin: 5px;"> </div>			
Quantitative Data: <i>Did the device withstand wind, earthquake, wave, or other test?</i>			
Test #1 Yes or No	Test #2 Yes or No	Test #3 Yes or No	Test #4 Yes or No
Note any cause and effect relationships that you observe:			
Criteria and constraints this solution DOES meet:		Criteria and constraints this solution DOES NOT meet:	
To improve on our prototype, some improvements we can make are:			



Sentence Starters | Iniciadores de Oraciones

English	Spanish
I agree because...	Estoy de acuerdo, porque...
I do not agree because...	No estoy de acuerdo, porque...
In my opinion...	En mi opinión...
This reminds me of...	Esto me recuerda de/cuando...
I was confused when...	Yo estaba confundido/a cuando...
I did not like...	No me gustó/a...
I like that...	Me gusta que...
I think that...	Yo pienso que...
I like...	Me gusta...
I discovered that...	Descubrí que...
I predict that...	Mi predicción es...
Can you show me?	¿Me puedes enseñar?
Why do you think that?	¿Por qué piensas eso?



Source Card

Approach (circle one): Environmental or Structural

Subtopic: _____

Source Title:		
URL:		
Evidence from this source:		
1.	2.	3.
How could this information help with the parks department proposal?		
One reason this might not serve the parks department:		

Source Title:		
URL:		
Evidence from this source:		
1.	2.	3.
How could this information help with the parks department proposal?		
One reason this might not serve the parks department:		



Debate: Man vs. Land - Designing Solutions for Coastal Erosion

Learning Targets:

1. Construct a claim
2. Research and cite evidence
3. Identify causes and effects
4. Formulate a proposal that is supported by evidence

Instructions:

You will be taking part in a debate where you will be voicing your stance on the issue of coastal erosion solutions. Over this unit you have either designed and researched a topic to modify the environment to protect the beach or modify a structure. You will be put on a team to debate the merits of your plan versus another.

The park service wants to protect the beloved visitor center from coastal erosion so they can continue to share the beautiful views from the cliffside center and the lovely sand beach below with anyone who comes to visit. You and your team of engineers have been asked to explore how to preserve the visitor center structure with as few visible changes to the landscape as possible. In the design challenge your team is going to explore different ways to protect the coastline and a structure on the cliff. As a team, what solution can you come up with that will help the park service enhance the visitor experience, while minimizing the impact on the environment?

Prepare for the debate by assembling the following:

- A clear claim to introduce your stance on the argument.
- Three pieces of appropriate evidence from at least two sources to support your claim.
- Reasoning to make evidence relevant/effective.
- The cause and effect relationship of nature onto humans and society, and opposingly, the cause and effect relationship of human and societal effects onto the environment.

Come to class with the following items:

- All reflections and notes you have written
- Source Cards (source info w/ evidence)

During the Debate:

Each student is expected to:

- Speak twice during the debate to:
 - Provide a claim with appropriate evidence.
 - Rebut an opponent with appropriate evidence.
 - Ask a question to clarify a point from opponent.
- Follow all debate rules as discussed and agreed upon by the class.

Final Recommendation:

After researching, testing your own designs and hearing perspectives from others, what is your final recommendation to the Parks Department?

Include in your explanation:

- Your top two recommendations to the Parks Department with:
 - A clear explanation as to why you think this is the best choice.
 - Evidence from research, what you learned from the debates and/or your design challenge results.
 - Explain at least one effect of each recommendation on the coast or the structure.

RUBRIC: Catch It If You Can!



	Below Standard	Approaching Standard	Meeting Standard	Above Standard
<p>ELA Arguments with Evidence CCSS.ELA-LITERACY.W.6.1 Write arguments to support claims with clear reasons and relevant evidence.</p>	<ul style="list-style-type: none"> Student provides a claim, a reason, or evidence. <p><i>Areas that individual students may need one-on-one support with:</i></p> <ul style="list-style-type: none"> Student needs support in constructing a clear claim based on their stance of the argument. Student needs additional support in using and citing appropriate evidence to support their claim. Student needs support in constructing and using appropriate reasoning and justification to make their evidence effective. 	<ul style="list-style-type: none"> In the student's final recommendation, the student writes about 1 idea they want to propose to the parks department. This includes: <ul style="list-style-type: none"> Either 1 reason why they think this is the best proposal or 1 type of evidence to backup their claim (from the design challenge, their research, or something they learn through the debates). 	<ul style="list-style-type: none"> In the student's final recommendation, the student writes about 2 ideas they want to propose to the parks department. This includes: <ul style="list-style-type: none"> At least 1 reason why they think this is the best proposal. At least 1 type of evidence to backup their claim (from the design challenge, their research, or something they learn through the debates). 	<p>In the student's final recommendation, the student writes about 2 ideas they want to propose to the parks department. This includes:</p> <ul style="list-style-type: none"> 2 or more reasons why they think this is the best proposal. 2 or more pieces of evidence to backup their claim (from the design challenge, their research, or something they learn through the debates). <p><i>Ideas for next steps for growth:</i></p> <ul style="list-style-type: none"> Have student research how a professional report is written and create one for this project.
<p>NGSS Engaging in Argument from evidence: (SEP 7, 6-8)</p> <p>Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.</p>	<ul style="list-style-type: none"> Student speaks at least once during the debate, but does not provide evidence or ask a relevant question. <p><i>Areas that individual students may need one-on-one support with:</i></p> <ul style="list-style-type: none"> Student needs support with public speaking. Student needs support with following debate format and style. Student needs support backing up claims with evidence. Student needs support with note-taking. 	<ul style="list-style-type: none"> During the debate student shares 1-2 pieces of evidence from at least 1 source to support their claim. During the debate, student speaks at least 1 time to: <ul style="list-style-type: none"> Provide a claim with appropriate evidence. Rebut an opponent with appropriate evidence, or Ask a question to clarify a point from opponent. 	<ul style="list-style-type: none"> During the debate student shares 3 pieces of evidence from at least 2 sources to support their claim. During the debate, student speaks at least 2 times to: <ul style="list-style-type: none"> Provide a claim with appropriate evidence. Rebut an opponent with appropriate evidence, or Ask a question to clarify a point from opponent. 	<ul style="list-style-type: none"> During the debate student shares more than 3 pieces of evidence from at least 2 sources to support their claim. During the debate, student speaks at least 3 times: <ul style="list-style-type: none"> Provide a claim with appropriate evidence. Rebut an opponent with appropriate evidence. Ask a question to clarify a point from opponent. <p><i>Ideas for next steps for growth:</i></p> <ul style="list-style-type: none"> Research and use advance rhetorical techniques to develop their arguments.
<p>NGSS Cause and Effect (CCC 2, 6-8)</p> <p>Cause and effect relationships may be used to predict phenomena in natural or designed systems.</p>	<ul style="list-style-type: none"> Student can identify a cause or effect. <p><i>Areas that individual students may need one-on-one support with:</i></p> <ul style="list-style-type: none"> Student needs support in order to demonstrate understanding of cause and effect. 	<ul style="list-style-type: none"> In the student's final recommendation, the student explains at least 1 effect of only 1 solution that they propose. 	<ul style="list-style-type: none"> In the student's final recommendation, the student explains at least 1 effect of each solution that they propose. 	<ul style="list-style-type: none"> In the student's final recommendation, the student explains at least 2 effects of each solution that they propose. <p><i>Ideas for next steps for growth:</i></p> <ul style="list-style-type: none"> Develop models or visual aids to show the cause and effect relationship of their design choices.