Annotated 3 - 5 Science Work Samples

Scoring Criteria

PERFORMANCE INDICATOR	BEGINNING	DEVELOPING	PROFICIENT	EXPANDING
#7 Earth and Space Sciences - Earth Systems and Human Impact: D Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (4-ESS2-1)	Make observations of weathering and/or erosion.	Make observations and/or measurements to provide evidence of weathering and/or erosion.	Make observations and/or measurements to provide evidence of a cause and effect relationship between the rate of weathering/erosion and the environment.	Make observations and/or measurements from multiple forms of weathering and erosion and use them to provide evidence of a cause and effect relationship between weathering/erosion and the environment.
#7 Earth and Space Sciences - Earth Systems and Human Impact: G Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans. (4-ESS3-2)	Generate a solution related to the impacts of natural earth processes on humans.	Generate solutions to reduce the impacts of natural earth processes on humans based on scientific information.	Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans based on scientific information and the constraints and criteria of the design problem.	Generate, compare, and evaluate multiple solutions to reduce the impacts of natural earth processes on humans based on scientific information and the constraints and criteria of the design problem in order to make recommendations for improvement.
Problem Solving and Critical Thinking: 6 Evaluate, justify and defend the relative effectiveness of the plan or process of approach.	Describe the data/information gathered from plan or approach and state whether the plan or process of approach was effective.	Identify relationships in data/information gathered from plan or approach and describe whether the plan or process of approach was effective.	Analyze patterns and trends to identify relationships in data/information gathered from the plan or approach and to evaluate the effectiveness of the plan or approach.	Justify a data collection strategy by analyzing strengths and weaknesses and critiquing the potential effectiveness of a range of solutions with consideration of real-life constraints.

Save our beaches!

1. View the following resources displaying photographs of coastal Rhode Island independently.
2. Make observations to provide evidence of the effects of weathering or rate of erosion by water, ice, wind and vegetation.

	Evidence	Observations
A		• Water went to pillers • Water is underneath the stand • Dip under the piller from water eroding the • Water made soil sand soft
B		• The hill is shaved off • Dirt is piled at the bottom • earth is still crumbling • grass is poking out • grass is holding soil in • Waves ate away at the hill
C		• porch posts are unearthed • Sand is piledup on porch • Dip beneath the posts • The sand was higher • the sand water washed away

D

Frontal Erosion 1939-2012 -
Browning Cottages, Moonstone Beach, RI
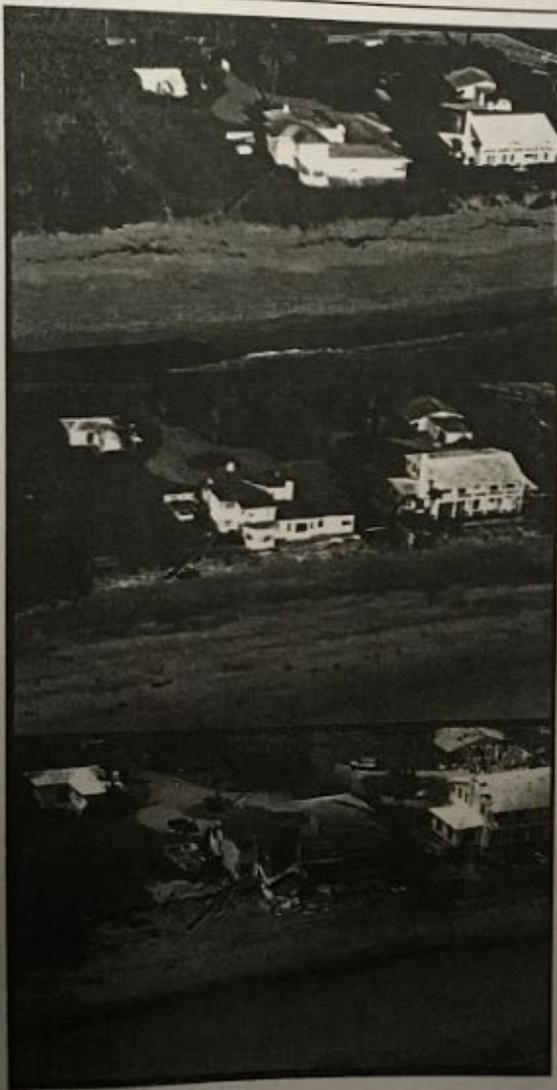

- sand is soft
- shore line is high
- low tide is very low
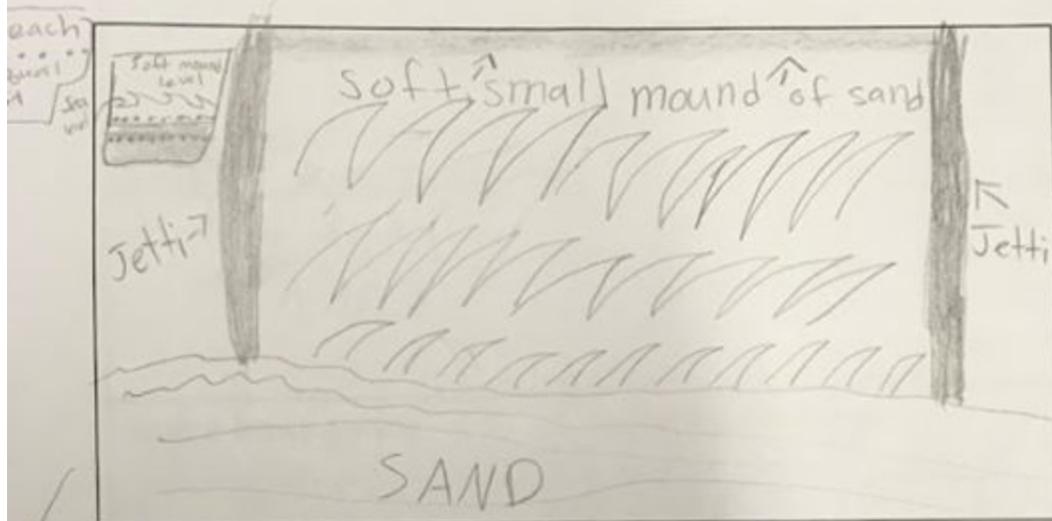- high tide is very high
- the shoreline changes

E

- First, there is distanc between the shore and the house
- less distance
- no distance

Student Work Sample #1 (page 3 of 8)

Rip Rap	Breakwater
• stones, nine — fourin, ⚫ range of rocky mat.	• off shore struture • lessin the force of waves • less force = less erosion • Ugly • Causes more errosion

3. Generate an idea of another way you might be able to reduce the weathering and erosion rates at the beach. Draw and/or describe your plan clearly in the box below.
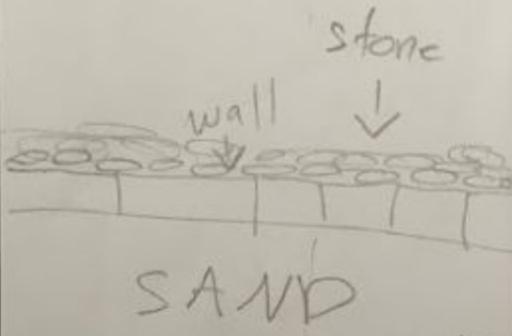

4. Choose two of the methods you researched or generated and construct a model of each using the materials available in the classroom.

5. Conduct a **fair test** of the two models to investigate how well each helps reduce weathering and erosion of the beach. Collect and record observational data of the performance of each of your models. Stream tables are available to help you conduct your fair tests.

This is my solution. There are two jetties paralel to each other, the length of the beach. stretching inbetween them is a soft mound of sand that is 1ft below the sea level. The idea is that the waves come in strong and the soft sand slows it then force down.
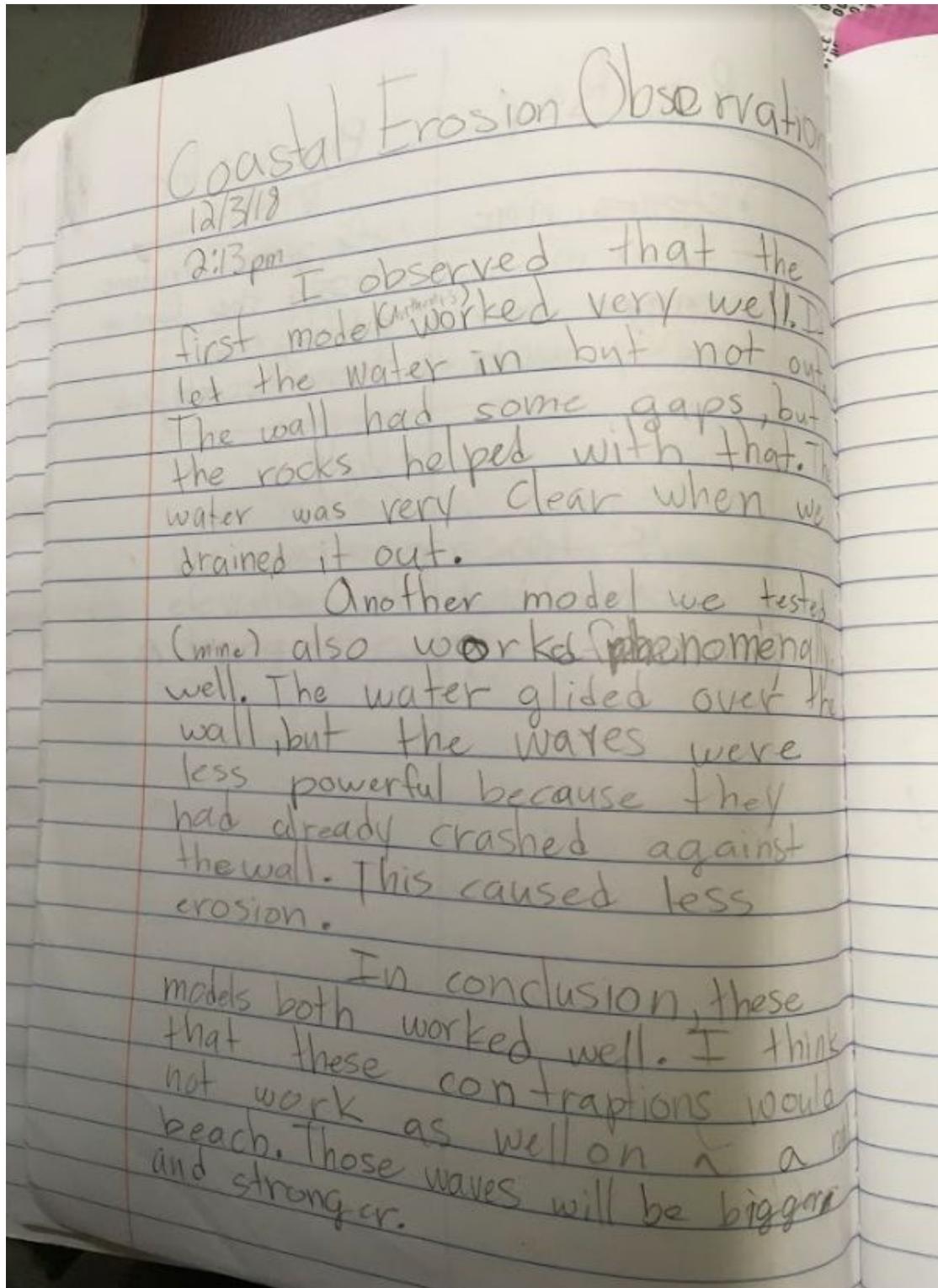
1L water

Model 1 drawing/photo

stone

wall ↓

SAND

Model 1 performance

A   B

16 cm

17 cm

The ladder worked well too. It let the water in but not out.

Jeff

Model 2 drawing/photo
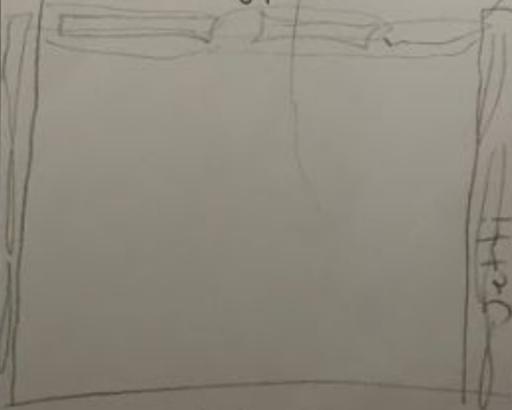
SAND

Model 2 performance

A   B

21 cm

2 cm

The wall worked well. The water came through but did not bring any sand out.

Coastal Erosion Observation

12/3/18

2:13pm   I observed that the first model worked very well. I let the water in but not out. The wall had some gaps, but the rocks helped with that. The water was very clear when we drained it out.

Another model we tested (mine) also worked phenomenally well. The water glided over the wall, but the waves were less powerful because they had already crashed against the wall. This caused less erosion.

In conclusion, these models both worked well. I think that these contraptions would not work as well on a beach. Those waves will be bigger and stronger.

Student Work Sample #1 (page 7 of 8)

TION: What can be done to reduce coastal erosion ?	
CLAIM: Restate and answer the question	Coastal erosion can be reduced by planting grass and making structu
EVIDENCE: State data to support claim from investigation or text. For example I observed... My data showed... In the investigation I... As stated in the text... According to...	I observed in picture B, that when the waves took away part of the hill, there were grass roots holding the rest of the hill in place. My data also showed that the stream table without the a structure got eroded more than
REASONING: Explain your answer (select 2 or more sentence starters) You can start a sentence with... -The evidence links to the claim because. -My data show that -This happened because ✓ -This means that -I believe -This is because	This happened because the structures, or solutions we built stoped the water from taking any sand out. The grass will help because the roots of the grass will act like hands an keep the sand in place.
ENDING: restate your answer in different words -REREAD your first sentence -Write it again in new words Based on this text evidence... In conclusion... As you can see.. Therefore... To summarize... In summary...	There are many ways to solve coastal evosion. We can plant grass and build structures I believe that making these changes with the beach will stop erosion.

Student Work Sample #1 (page 8 of 8)

Dear Gina Raimondo ,

Did you know that in 50 years Rhode Island beaches have lost over 250 feet of sand?! As a beach loving Rhode Islander, I think something needs to be do be done about it. I have brainstormed many solutions to keep these beaches here for many years more.

Some solutions I have thought of are that we can plant grass along the shoreline because studies have shown that grass roots hold the sand in place. The water will not be able to pull away the sand if the grass is planted . We would need to plant about 2 feet of grass each year . Grass seeds are cheap and you can get a lot of them. This would be very helpful and it would be energy efficient because grass is a plant and it does not use any energy.

There is another solution to coastal erosion and it building structures such as rip raps and breakwaters. These structures are made of rock and concrete. A breakwater encloses a beach swimming area with a wall that stops big waves from coming through and taking sand out. A rip rap is rocks that are lined up against the shoreline . It doesn't let any sand come close to the water. If we built more of these structures it would slow down coastal erosion.

So now you know that there are lots of solutions to coastal erosion. There is know reason we should not put these plans into action. This could save our beaches from losing lots more sand . Let's get together and " Save Our Beaches! "

Sincerely,

#7 Earth and Space Sciences - Earth Systems and Human Impact: D - *Expanding* - Student observations provide evidence of a cause and effect relationship in multiple situations from both real-world examples and classroom models. The scoring team considered this enough to reach the Expanding category, but they did question what multiple forms of weathering and erosion meant in the Scoring Criteria. This question prompted the modification noted in the Annotated Teacher and Student Tasks.
#7 Earth and Space Sciences - Earth Systems and Human Impact: G - *Proficient* - The student met the constraints of the design criteria when generating multiple solutions to the design challenge.
Problem Solving and Critical Thinking: 6 - *Expanding* - The student critiques the potential effectiveness of their solutions acknowledging "that these contraptions would not work as well on a a beach. Those waves will be bigger and stronger."

Save our beaches!

1. View the following resources displaying photographs of coastal Rhode Island independently.
2. Make observations to provide evidence of the effects of weathering or rate of erosion by water, ice, wind and vegetation.
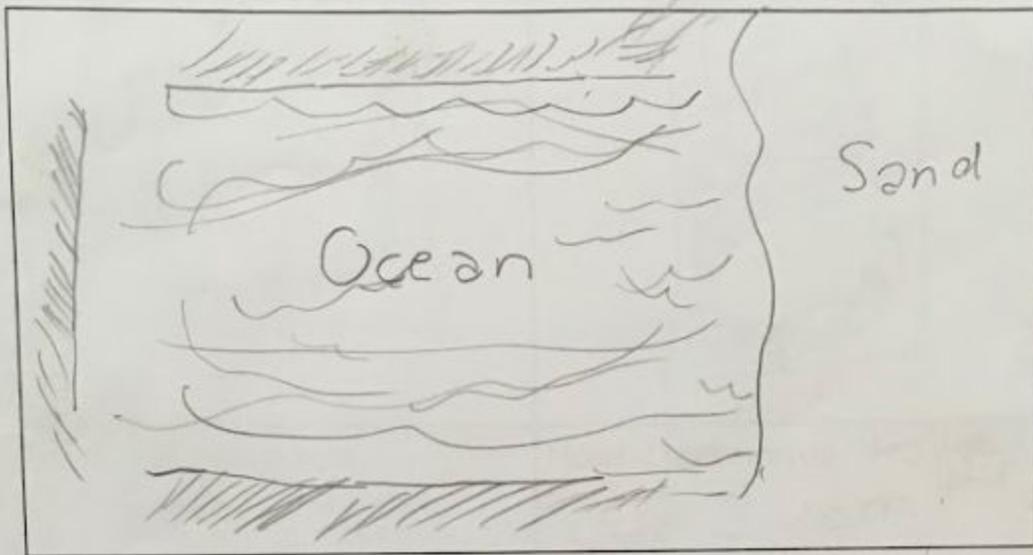
	Evidence	Observations
A		The fence is broken (probably by water from the near by beach)
B		Wind and waves most likely pulled away pieces of this hill.
C		During low tide, sand is pulled back into the water.

Student Work Sample #2 (page 2 of 7)

D

Frontal Erosion 1939-2012 -
Browning Cottages, Moonstone Beach, RI

The house moved up by water.

E

Wind, water, tornados, or other storms broke this house and changed it.

3. Generate an idea of another way you might be able to reduce the weathering and erosion rates at the beach. Draw and/or describe your plan clearly in the box below.
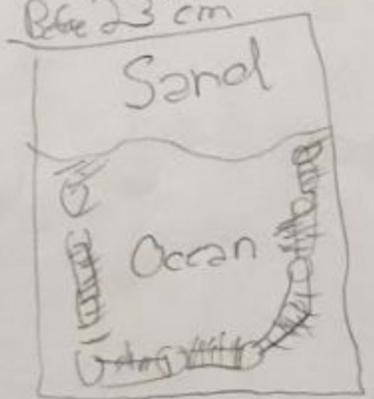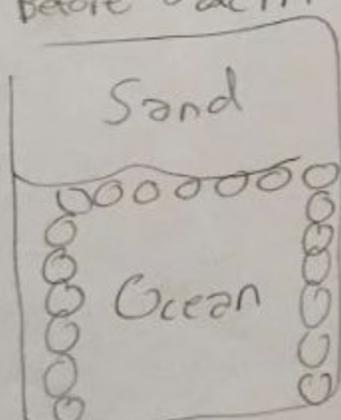

4. Choose two of the methods you researched or generated and construct a model of each using the materials available in the classroom.

5. Conduct a **fair test** of the two models to investigate how well each helps reduce weathering and erosion of the beach. Collect and record observational data of the performance of each of your models. Stream tables are available to help you conduct your fair tests.

I Liter of water tested.

Model 1 drawing/photo	Model 1 performance slightly dirty
Before 23 cm Sand Ocean	After 24 cm Sand

Model 2 drawing/photo	Model 2 performance Very dirty water
Before 22cm Sand Ocean	After 30 cm Sand
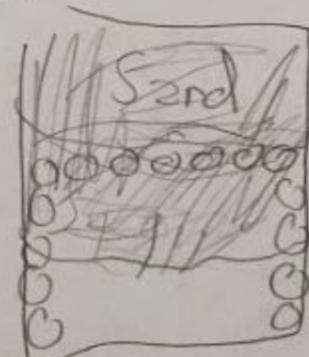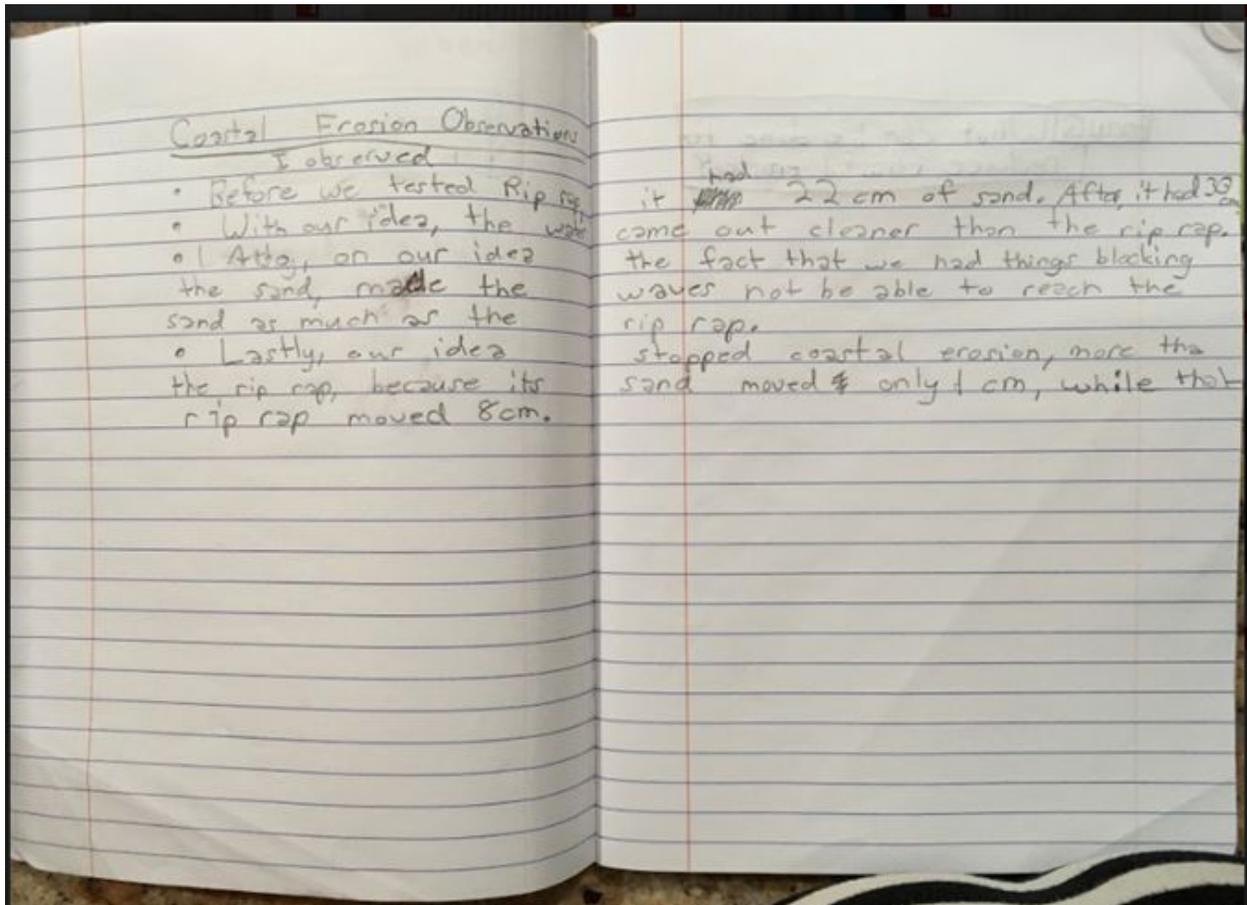
Coastal Erosion Observations
I observed
- Before we tested Rip rap it had 22 cm of sand. After, it had 30. came out cleaner than the rip rap.
- With our idea, the water the fact that we had things blocking
- I After, on our idea waves not be able to reach the the sand, made the rip rap. sand as much as the stopped coastal erosion, more tha
- Lastly, our idea sand moved & only 1 cm, while tha the rip rap, because its rip rap moved 8 cm.

Student Work Sample #2 (page 6 of 7)

QUESTION: What can be done to reduce coastal erosion?

CLAIM: Restate and answer the question	We can reduce coastal erosion by...
EVIDENCE: State data to support claim from investigation or text. For example I observed... My data showed... In the investigation I... As stated in the text... According to...	As an example, we can use Rip Rap. Rip Rap, is a series of rocks lining a beaches wata Another way, we can stop coastal erosion, is by trying to stop this with new ideas, or different ways.
REASONING: Explain your answer (select 2 or more sentence starters) You can start a sentence with... -The evidence links to the claim because. -My data show that -This happened because -This means that -I believe -This is because	I believe Rip Rap could work, because we did an experiment. When we tested Rip Rap, not all of the sand got coverd by water. My reasoning for new ideas, came from the experiment I did with coastal erastion. less of the water got coverd with our idea, than Rip Rap. Plus, the sand moved 6cm with Rip Rap and only 2cm with our experiment.
ENDING: restate your answer in different words -REREAD your first sentence -Write it again in new words Based on this text evidence... In conclusion... As you can see.. Therefore... To summarize... In summary...	Based on my evidence, I can say that there are ways to reduce coastal erosion! We can use methods like Rip Rap, or try to use diffent things!

Student Work Sample #2 (page 7 of 7)

Coastal Erosion Solution

By:

Coastal erosion is a big problem, which keeps getting worse only having a few ways to stop it. There are *enough* ways to help with this problem, but if we could help it, I think humans should try different ways. I came up with two ways while doing an experiment. I've researched the problem. I've thought about this a lot. I would love to see all of the worn down beaches fixed. But how? I happen to have some ideas.

We already have some ways to stop coastal erosion, like Rip Rap, but how, or what could be another way to save our beaches? I think a system where rocks, grass, clay and other earth materials could be a solution. Picture a beach with rocks aligning its sand, and rocks also surrounding some of its water. With my idea, the rocks would be stuck together with clay, or cement, but leaving areas where water can be brought in, or pushed away from the beach. Grass, and other leafy materials will cover the top of the rocks. I have tested both my idea, and Rip Rap. The results, my beach had less coastal erosion. I think the idea I came up with might help a lot, because the sand lever barely moved at all.

Thus, I think my idea might be a great solution to coastal erosion. It might take *years* to solve this problem. I don't really think there is a way to stop coastal erosion but what's the harm in trying?

#7 Earth and Space Sciences - Earth Systems and Human Impact: D - *Proficient* - The student makes observations/measurements to provide evidence of a cause and effect relationship.
#7 Earth and Space Sciences - Earth Systems and Human Impact: G - *Expanding* - The student evaluates the effectiveness of their solution and the Rip Rap. ("With our idea the water came out cleaner . . .our idea stopped coastal erosion, more than the rip rap because its sand moved only 1 cm, while that rip rap moved 8 cm."
Problem Solving and Critical Thinking: 6 - *Proficient*

Save our beaches!

1. View the following resources displaying photographs of coastal Rhode Island Independently.
2. Make observations to provide evidence of the effects of weathering or rate of erosion by water, ice, wind and vegetation.

Evidence	Observations
A	The food cort is almost covered in water. Because its on the coast
B	The waves are pushing scond to make a sand doom. they broke
C	The waves eroded the sand to uncover the poles. So they Broke

show
winter   Jungle   party
          summer   summer   tay room

D	Frontal Erosion 1939-2012 - Browning Cottages, Moonstone Beach, RI House moved to Upland 1951	In this image the waves erodad the sand so the House Had to move.
E		the wind made the waves Big so thay travled to the House. Because the wind moved them.

Break water
off shore struten lessin the force
of waves. They cause less
evocion.

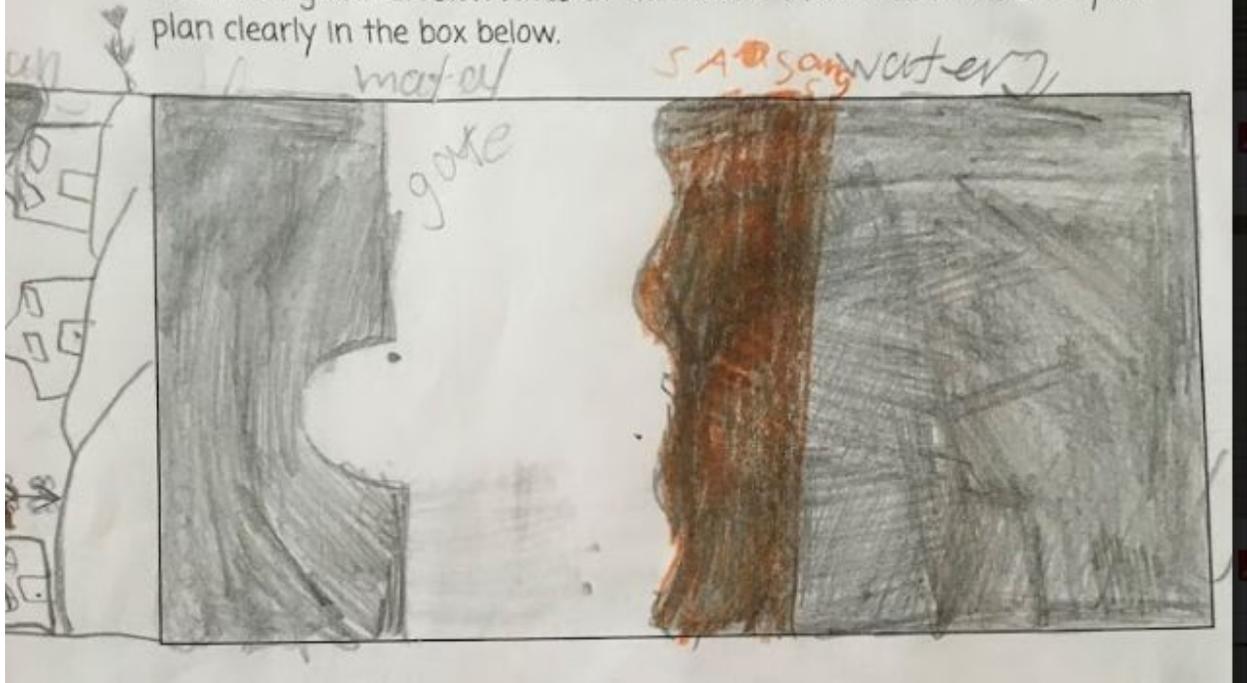## Coastal Erosion Observations

- I obsened that the water got recelly muddy.

- I obgervved that the vvaves puslecl the sund up shore.
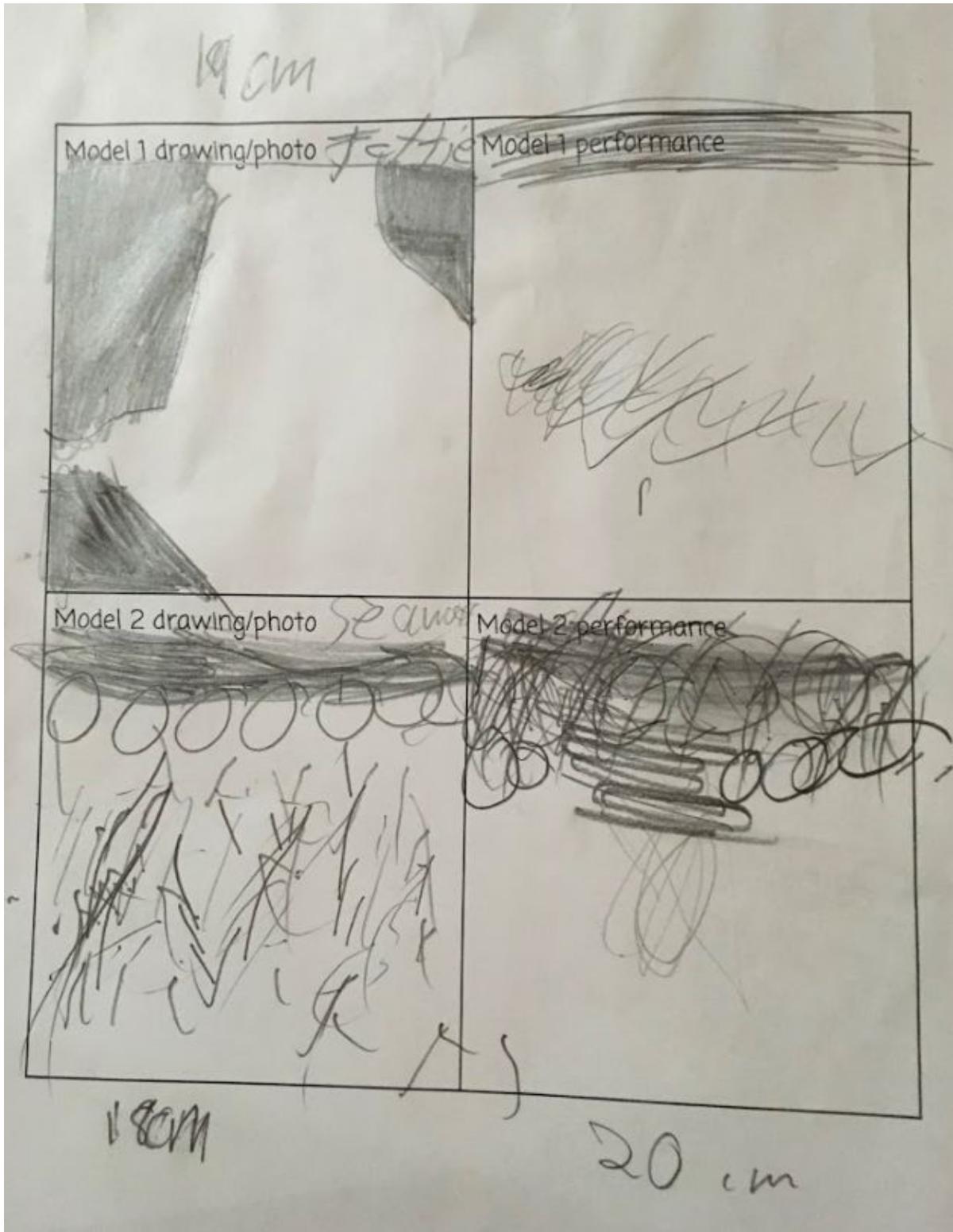
- I oberved that the water moved the sea weed.

Rip Rap
There rocks that Help the sh
These if does not go out
of place.

Student Work Sample #3 (page 5 of 8)

3. Generate an idea of another way you might be able to reduce the weathering and erosion rates at the beach. Draw and/or describe your plan clearly in the box below.

mater

gose

sa@sanwater

19 cm

Model 1 drawing/photo	Model 1 performance
Model 2 drawing/photo	Model 2 performance

18cm

20 cm

Student Work Sample #3 (page 7 of 8)

QUESTION: what can be done to reduce coast leerosi

CLAIM: Restate and answer the question	to reduce coast leerosion you can use
EVIDENCE: State data to support claim from investigation or text. For example I observed... My data showed... In the investigation I... As stated in the text... According to...	My eviaance is we experiencing many thing. rirap and it showed us wow to reduce ce
REASONING: Explain your answer (select 2 or more sentence starters) You can start a sentence with... -The evidence links to the claim because. -My data show that -This happened because -This means that I believe -This is because	In my exparament It showed that when we tested our rip is for rap model, The rocks stopped The water from getting upshore. The breakwater model worked even better.
ENDING: restate your answer in different words -REREAD your first sentence -Write it again in new words Based on this text evidence... In conclusion... As you can see.. Therefore... To summarize...	As you can see, there are ways to prevent coastal erocion

Student Work Sample #3 (page 8 of 8)

12/18/18

Dear Gina Raimondo,

Did you know that over the last 50 years, 250 feet of coastline has disappeared? This is a problem that we need to stop!

To reduce coastal erosion you can use many things. In school, we tested different models and solutions. My evidence is we made a model of rip raps and it showed us how to reduce coastal erosion. In my experiment it showed that when we tested our rip rap model, the rocks stops the water from getting upshore. The breakwater model worked even better.

As you can see there are ways to prevent coastal erosion. If we save our beaches children can go for years to come!

Sincerely,

#7 Earth and Space Sciences - Earth Systems and Human Impact: D - *Developing* - Observations made to provide evidence of erosion.
#7 Earth and Space Sciences - Earth Systems and Human Impact: G - *Developing* - Used observations/scientific information to generate a solution to reduce the impact of beach erosion.
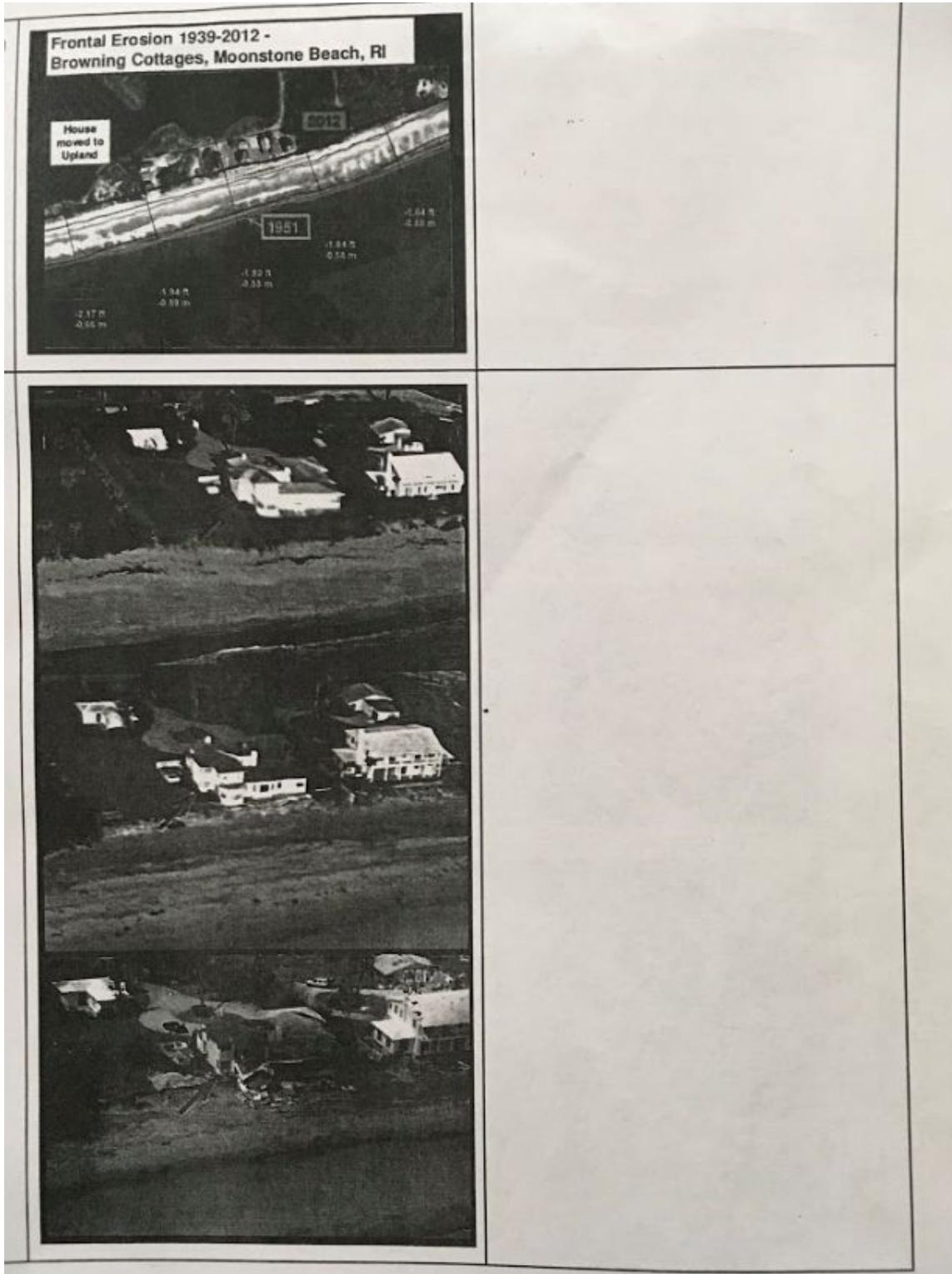**Problem Solving and Critical Thinking: 6** - *Beginning*
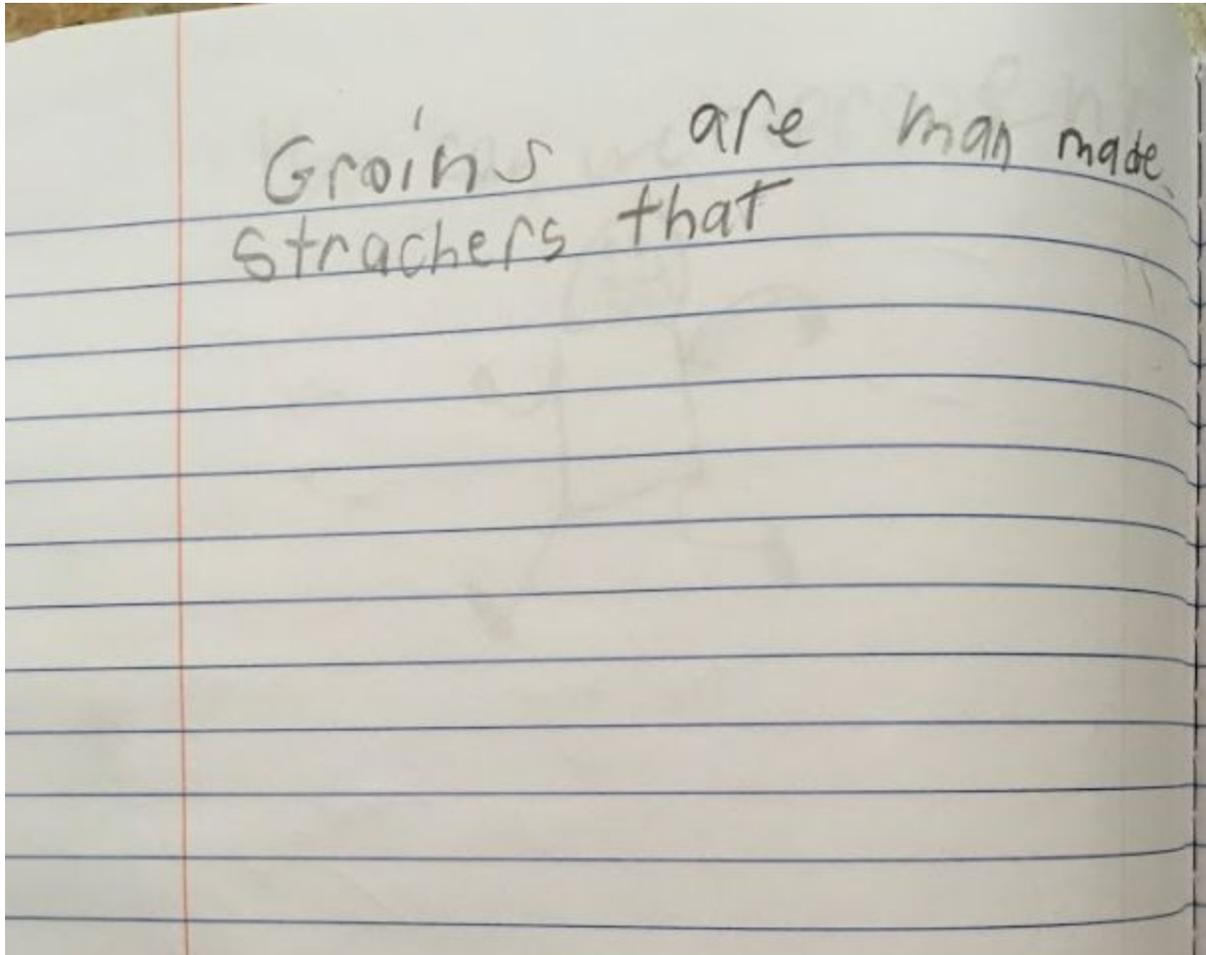
Save our beaches!

1. View the following resources displaying photographs of coastal Rhode Island independently.
2. Make observations to provide evidence of the effects of weathering or rate of erosion by water, ice, wind and vegetation.

	Evidence	Observations
A		• the Eshore line is under this house
B		• the wares crashd into a hill and it
C		

Frontal Erosion 1939-2012 - Browning Cottages, Moonstone Beach, RI

Groins are man made
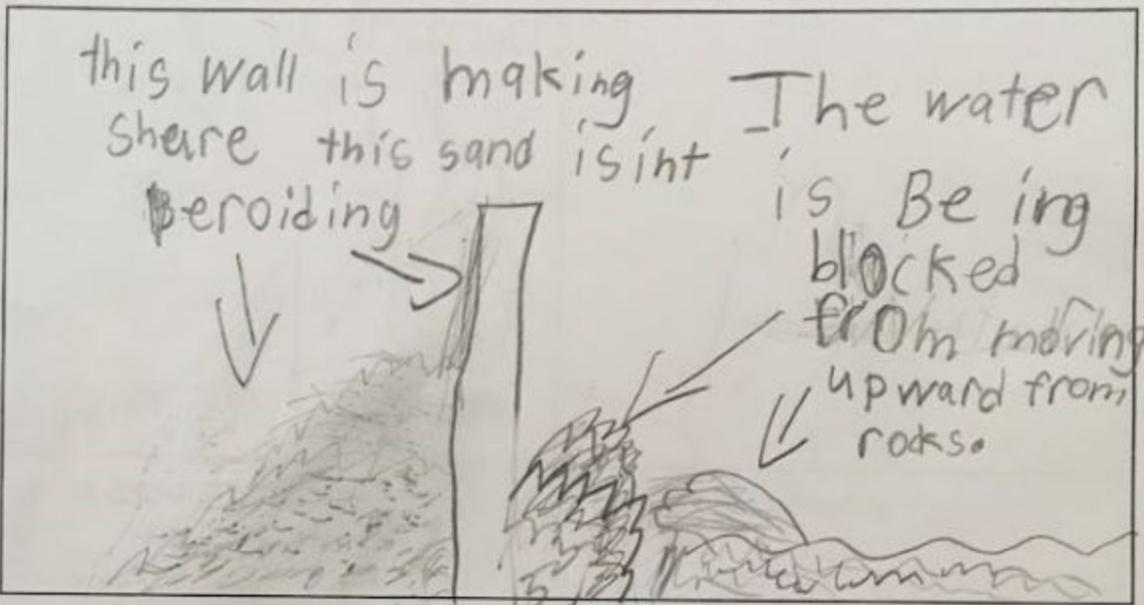Strachers that

Student Work Sample #4 (page 4 of 6)

3. Generate an idea of another way you might be able to reduce the weathering and erosion rates at the beach. Draw and/or describe your plan clearly in the box below.
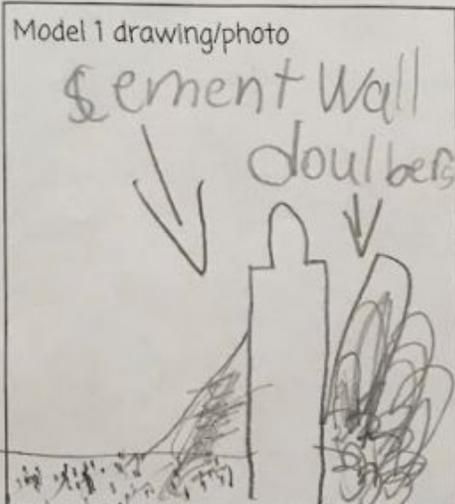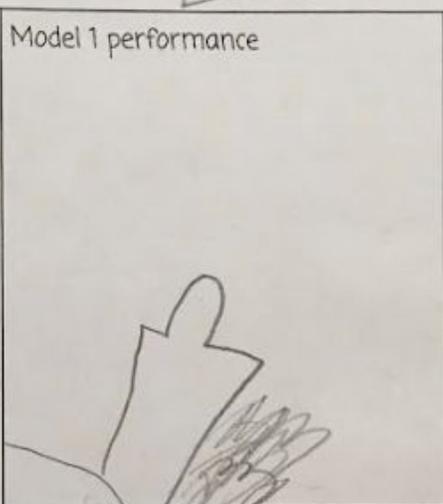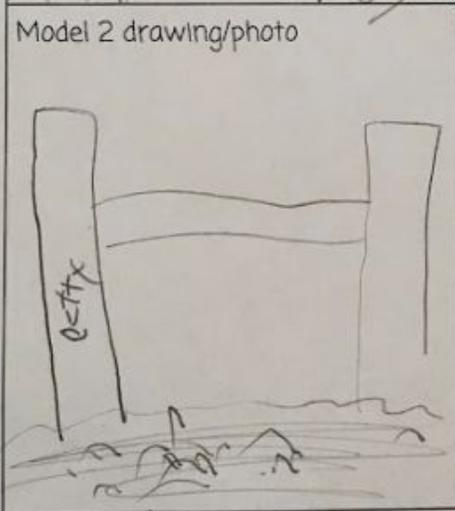
this wall is making
share this sand isint
Beroiding

The water
is Be ing
blocked
from moving
upward from
rocks.

1 liter water

Before 2 l

after .20

Model 1 drawing/photo	Model 1 performance
$ement Wall ↓ doulberg ↓	
Model 2 drawing/photo	Model 2 performance
lettx	

B 16

A

8 of 10

Student Work Sample #4 (page 6 of 6)

12/18/18

Dear Gina Raimondo,

We need to protect our beaches. The Rhode Island coastline lost more than 250 feet in the last 50 years.

One solution that can be done is add more groins in the water. A groin is a rigid structure perpendicular to the shoreline. This structure interrupts water flow and stops movement of sand and sediment.

If we can do this, then the shoreline can't move toward the roads. So save our beaches!

From,

#7 Earth and Space Sciences - Earth Systems and Human Impact: D - *Beginning* - Student made observations of erosion. ("The waves crashed into a hill and it . . .")
#7 Earth and Space Sciences - Earth Systems and Human Impact: G -*Beginning* - Student generated a solution to reduce beach erosion.
Problem Solving and Critical Thinking: 6 - *Beginning*