**3-ESS3-1**

**Science Learning Goal**

Students will learn the engineering process.

**Learning Outcomes**

Given information a Tupper Ware container, sand, Popsicle sticks, tape and rocks students will be able to design a structure to protect a sand castle from a wave. (4-ESS2)

Given a ticket and a pencil, students will be able to fill in the acrostic of the engineering process. (4-ESS2)

**Assessments**

Prior to the elaborate the students will plan out a way to protect a formation from being eroded.

Students will create a structure that will protect a sand castle from a flood.

**Materials**

Teacher Needs

Sand

5 small Tupper ware containers

5 small wooden blocks

Water

25 Tickets to leave

25 science journals

Rocks

Popsicle Sticks

Tape

Student Needs

Pencil

Science journal

Ticket to leave

Rocks

Popsicle Sticks

Tape

Small Tupper ware containers (per group)

Small wooden blocks (per group)

**Procedure**

We will explain to the students that we are going to be Civil Engineers for the day!

1. We will explain that Civil Engineers design and build structures for naturally built environments.
2. We will explain to the students that engineers have a process they have to follow when they are presented with a question.
3. We will explain that engineers are first presented with a question (this is their “ask” stage)
4. We will explain that engineers them imagine how they can effectively answer the question that is being asked.
5. We will explain that the engineers but look at what they need to know to answer the question.
6. We will explain that the engineers then plan out their design on paper.
7. We will explain that the engineers can change their plans if they find a new way to solve the problem.
8. We will explain that the engineers then design and execute their plan.
9. We will explain that the design stage involve actually creating their structure.
10. We will explain that the next stage is to improve on their design.
11. We will explain that the engineer might not like their original design or the design may not have worked.
12. We will also explain that it is OK to go back and change your idea.
13. We will present the students with their engineering question for the day: A sand castle contest is going on at Nantasket Beach. The director wants to make sure that the sand castles are protected from a potential flood from a storm. We want YOU to design a structure to protect everyone’s sand castles. You only have Popsicle sticks, rocks and tape!

Elaborate

1. We will have the students open their science journals to an empty page.
2. We will have the students come up with questions that they would need to have answered before they start their design.
3. We will have the students think and imagine, individually, a way to answer the question being ask.
4. The students will write or draw their ideas in their science journals.
5. We will explain to the students that they are going to work in their groups to build a structure to protect the sand castle.
6. We will explain to the students that they should try to take in account all of the group members ideas for their structures.
7. We will pass out all of the materials to each of the groups.
8. We will explain that they only have 15 minutes to build their structure.
9. We will allow the students to work in their groups for 15 minutes.
10. We will have the students show their design to the whole class and explain why their structure would protect the sand castle.
11. We will have all of the groups show their structure.
12. We will have the students go back to their seats. We will ask each group what they would do to improve their structure if they could do this again.

**Power Point Slide**

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**Ticket to Leave**

Fill in the Engineering Process

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Fill in the Engineering Process

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