Avoiding Disaster

NAtural Disasters Unit – Earth & Environmental Science

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Fall 2015

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# Overview:

Students will research, design, and construct various structures with the intention of creating a “disaster-proof” structure that can withstand a variety of natural disasters including **tornadoes / hurricanes, landslides, earthquakes, and a tsunami**. We will also take the opportunity to study the real-world effects on people and the geological and climatological phenomena that create them.

# Learning Goals:

### Guiding Questions:

* Is it possible to build a structure that can withstand any natural disaster?
* What are the causes and effects of various natural disasters environmentally, socially, and architecturally?

### Curriculum

* EEn.2.1.1: Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere.
* EEn2.1.4: Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data.
* EEn2.2.1: Explain the consequences of human activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing, urbanization, and land use) past and present.
* EEn2.5.3: Explain how cyclonic storms form based on the interaction of air masses.
* EEn2.6.1: Differentiate between weather and climate.
* EEn2.6.4: Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.).

### 21st Century Skills

**Critical Thinking**: Mass devastation often occurs when natural disasters strike. Solve this problem using creative and innovative engineering techniques.

**Communication**: Work on teams to solve problems, then design & present interesting research.

**Collaboration**: Work effectively with a group to brainstorm, plan, and implement a design and solution.

**Create**: Use the engineering process to test new designs that your group creates.

# Benchmarks& Due Dates

|  |  |  |
| --- | --- | --- |
| **Benchmark** | **Due Date** | **Explanation** |
| Toothpick / Marshmallow House | 8/20/15 | **Design & construct** an earthquake-proof house made of only marshmallows and toothpicks. |
| Design research & paper | 9/1/15 | **Research** disaster-proof structure design and **write** a one page (single-spaced, 12-point TNR font) essay about design concepts you find. Your Essay should address the following questions:* What are structural features that can help a building withstand a tsunami, earthquake, landslide, and hurricane / tornado?
* Examples of how / where each feature has been used in the real world.
* Do some features prepare a building for all 4 types of disaster?
* What parts of the world are most affected by each of the natural disasters listed above and what geological, climatological, or geographical features make them so vulnerable to these disasters?
 |
| Blue prints for structure | 9/8/15 | The final blue prints should contain scale drawings of 4 elevations (front, back, side, top). The structure should meet the following criteria:* 2-Story Residential Home
* 1-2 Cubic Feet (Min-Max)
* Wood, Cardboard, Glue, Nails, Screws
* Attached to 1-2 sq ft surface
 |
| Paper / Cardboard Prototype | 9/8/15 | Used to **test** the idea for the scale model. |
| Disaster Test | 9/22/15 | Will be AWESOME and my disaster simulation methods will remain a mystery until this day. |
| REAL Natural disaster presentations / fictional essays | 10/8/15 | Teams will **research** the causes and effects of one of the following natural disasters:* Hurricane Katrina
* Chile vs. Haiti earthquakes (2010): What happened to cause tragedy vs. minor issues?
* Tsunami (2004) in the Indian Ocean
* Tri-State Tornado (1925)

Teams will create a **prezi** with the following information:* Where did it happen?
* The science behind the disaster – how did the weather or geological event happen?
* What was the human impact? (fatalities, injuries, damage, long term consequences)
* One real survivor’s story about what it was like and how it affected their life
* What strategies & innovations could have kept the natural disaster from being so devastating

Each student will write a **historically accurate fictional essay** or perform a **dramatic interpretation** about a person who went through one of the natural disasters listed above. The essay should meet the following criteria:* One page (single-spaced, 12-point TNR font)
* Reflections on their lives before, during, and after the disaster struck
* Should include some accurate information about the setting and social context of the area and time period

The dramatic interpretation has to meet the following criteria:* 5-8 minutes in length
* Written transcript of your story
* Memorized lines
* Reflections on their lives before, during, and after the disaster struck
* Historically accurate costume
* Should include some accurate information about the setting and social context of the area and time period
 |

# Timeline

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **August** |  |  |  |  |
| Monday | Tuesday | Wednesday | Thursday | Friday |
| 17 | 18: Intro to engineering process; toothpick / marshmallow house planning & building | 19 | 20: Marshmallow house tests / redesign | 21 |
| 24 | 25: Intro to disaster project; Begin Research phase | 26 | 27: Research & Design | 28 |
| **September** |  |  |  |  |
| Monday | Tuesday | Wednesday | Thursday | Friday |
|  August 31 | 1: Research Papers due; Begin Prototypes | 2 | 3: Prototypes | 4 |
| 7: Labor Day | 8: Prototype Tests; Final Blueprints due | 9 | 10: Begin Full scale models | 11 |
| 14 | 15: Full Scale Models | 16 | 17: Full Scale Models | 18 |
| 21 | 22: Disaster Day | 23 | 24: Gallery Walk  | 25 |
| **October** |  |  |  |  |
| September 28 | September 29: Research real natural disasters | September 30 | 1: Research | 2 |
| 5 | 6: Research & Writing | 7 | 8: Essay + Presentations due | 9 |

# Groups

Block 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 |
| Trevon | Luke | Cesar | Taylor | Barron |
| Haley | Chance | Jase | Phillip | Rebecca |
| Allen | Brenda | Wayde | Khalah | Seth |
| Karra |  | Miranda | Mack |  |

Block 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 |
| Nathaniel | Haizlee | Beth | Magnus | Will |
| Madison | AC | Juan | Jake | River |
| Stephen | Valen | Drake | Haley | Zach |
| Caleb |  | Chloe | Samuel |  |