

## Severe Weather Design Challenge

### Objectives

- Students will investigate the impacts of severe weather.
- Students will design and test a barrier to protect a home from flooding that could occur during several types of extreme weather.
- Students will reflect on the effectiveness of their design and plan changes that they would make to their barrier to improve the design.

### Suggested Grade Level

3<sup>rd</sup> Grade

### Subject Areas

Science, Engineering

### Timeline

60-90 minutes

### Standards

3-ESS3-1

### Vocabulary

Hurricane, tornado, thunderstorm, drought, flood, blizzard, design solution

### Background

This lesson is intended to occur at the conclusion of a unit exploring weather and severe weather during the third grade. Students should already understand what weather is, and some of the characteristics of the main types of severe weather.

### Materials

- Small cardboard boxes
- Various materials that could be used to protect a house from flooding:
  - plastic bags, aluminum foil, sand, foam board, plastic wrap, etc.
- Small tubs
- Water

### Lesson

1. Have students watch the Crash Course Kids Severe Weather video. Tell students to pay attention to how the different types of severe weather impact humans.
2. After the video use google jamboard or chart paper to make a chart of the different types of severe weather and what some of the impacts are of them. Students can use sticky notes to add their thoughts to the chart.

3. Tell students that today they are going to complete an engineering design challenge to try and save someone's house from a flood. Their challenge: to use the materials available design a barricade to block the water from entering the house (cardboard box). Demonstrate how when you put the cardboard directly into the water, it almost immediately becomes wet.
4. Split students into teams and handout the engineering design challenge worksheet. Have them start by brainstorming a design. Once the team has decided on a design to try they can collect their materials and start building.
5. To test the design students can put their barricade around a cardboard box house inside of a small tub. Then they can pour water into the bin (but on the outside of the house). Set a timer to see how long it takes for the water to penetrate the barricade and get inside the house and record on the design challenge worksheet.
6. After student's test, they can fill out the reflection section of the worksheet.
7. Hold a whole class discussion about which types of designs worked the best and which didn't. Talk about what some of the design solutions in the world for this problem are.

### **Resources**

Crash Course Kids Severe Weather Video: <https://www.youtube.com/watch?v=QVZExLO0MWA>

Impacts of Severe weather Jamboard (The link will force you to make a copy):

[https://jamboard.google.com/d/1v0nCyBlmLUpt15h0SyMXMI8Mc\\_nkwisTmy8DhEKtLRg/copy](https://jamboard.google.com/d/1v0nCyBlmLUpt15h0SyMXMI8Mc_nkwisTmy8DhEKtLRg/copy)

Examples of Hurricane flooding protection:

Sand Bag Explanation:

<https://www.seattle.gov/documents/Departments/SPU/Services/DrainageSewer/FloodFightHowtoUseSandbags.pdf>

FEMA Protect Your Home from Flooding:

[https://www.fema.gov/sites/default/files/documents/fema\\_protect-your-home-from-flooding-brochure\\_2020.pdf](https://www.fema.gov/sites/default/files/documents/fema_protect-your-home-from-flooding-brochure_2020.pdf)

## Engineering Design Worksheet

**What is the problem we are trying to solve?**

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**Design:** With your team draw and label at least 3 ideas for how you could construct a barrier to protect the home. Then choose one idea to try first.

Idea 1	Idea 2	Idea 3

**Materials:** List the materials you will be using and why you chose those materials to construct the barrier with.

Material	Reason

**Construct:** Build your design using the plan! When you are ready to test get a cardboard house, bin, and water.

**Test:** Record how long it takes for the water to permeate your house after you have dumped all of the water out of the container and into the bin on the outside of the house. Record how long it took.

Time it took for the water to permeate the walls and barrier:  _____ seconds	Observations:
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**Reflect:** What parts of your design worked well?

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What parts of your design would you change to improve its ability to protect the house from water?

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## References

Crash Course Kids. (2015, September 25). *Severe Weather: Crash course Kinsd #28.2*. [Video]. Youtube. <https://www.youtube.com/watch?v=QVZExLOOMWA>

FEMA (n.d.) *Protect Your Home from Flooding: Low Cost Projects You Can Do Yourself*. FEMA. [https://www.fema.gov/sites/default/files/documents/fema\\_protect-your-home-from-flooding-brochure\\_2020.pdf](https://www.fema.gov/sites/default/files/documents/fema_protect-your-home-from-flooding-brochure_2020.pdf)

U.S. Army Corps of Engineers. (2001, March). *Flood Fighting: How to Use Sandbags*. U.S. Army Corps of Engineers. <https://www.seattle.gov/documents/Departments/SPU/Services/DrainageSewer/FloodFightHowtoUseSandbags.pdf>