

Tornado Safe House

Tornado Safety and Engineering/STEM

Beth Pierce, Patricia Turner
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Grade Level	2nd – 3rd Grade	**Time Frame**	2 hours
Subject	Science	**Duration**	1 session

Essential Question

How do natural processes, like storms, create natural hazards that can harm people? What can we do to reduce the risks of natural hazards?

Summary

Students will learn how tornadoes form, information about tornado safety, and how engineers use models to create weather safe structures. Students will design, build, and revise a structure that will withstand strong winds simulated by a fan. They will use this information to make connections to their own constructions and then revise their structures.

Snapshot

Engage Students will use the "Tell Me Everything You Know" strategy to list everything they know about tornadoes.

Explore Students will collaborate and use provided materials to construct a model of a tornado safe structure.

Explain Students will learn how tornadoes form, information about tornado safety, and how engineers use models to create weather safe structures. They will use this information to make connections to their own constructions and revise their structures.

Extend - Students will make revisions to their structures in order to protect their paper person from a simulated tornado.

Evaluate - Students will reflect on what they have learned about tornado safety, engineering, and how weather affects the way people live.

Standards

Oklahoma Academic Standards (3rd Grade)

3.PS2.1.2: Objects in contact exert forces on each other.
3.PS2.2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3.ESS3.1 : Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*
3.ESS3.1.1: A variety of natural hazards result from natural processes.
3.ESS3.1.2: Humans cannot eliminate natural hazards but can take steps to reduce their impact.

Attachments

- Tornado-Safe-5E-Lesson-Handouts.docx

Materials

- All items are listed per table group
- 8 plastic cups
- 25 bendable straws
- 1 container of play dough
- 10 index cards
- 1 pair of scissors
- Hole punch
- Oscillating fan
- One paper person from group- (cut out or draw with paper or a sticky note)
- Handouts- structure planning, gallery walk recording sheet, and revision/reflection sheet

10 minutes

Engage

Teacher will guide students through the "Tell Me Everything You Know" strategy to list everything they know about tornadoes.

Ask students to create a list of "everything they know about tornadoes." Give students about 5 minutes to complete their lists. Encourage students to use words, draw pictures, or give examples to help explain all that they know.

After students write down their ideas, have them share their lists with their small group. Encourage students to add to their lists any ideas that they didn't think of

Bring the students together as a class and create a class list of all the things students know about tornados. Students can continue to add to their personal lists.

30 minutes

Explore

Students will work in groups of 4-5 students. Make sure students know what materials are available to them before they start the planning phase. Students may not receive additional materials. They may use scissors and a hole punch.

- Instruct students to plan a structure that will withstand tornado force winds using plastic cups, straws, playdough, and index cards.
- Give students about 10 minutes to use the structured planning sheet to collaborate and plan their structure.
- Give each group 8 plastic cups, 25 bendable straws, 1 container of playdough.
- 30-60 minutes- Groups will build their planned structure using the materials provided.
- Students may request to test their structures with the fan.
- Students should measure and record the height of the structure after completion.

*Note- Monitor students' progress but do not provide solutions to problems. Instead ask questions such as;

- *"How is the roof supported? How can we make it stronger? Is there a material that will make it stronger?*

40 minutes

Explain

Gallery Walk- whole group

1. Teacher will guide groups of students to view each group's structure.
2. Students will use the gallery walk recording sheet to describe each structure.
3. Students will predict whether or not the structure will withstand each fan setting.
4. Teacher will test the each structure's stability at each setting (low, medium, and high)
5. Students will record the results for each structure.

After students have viewed each groups' structures and recorded the results about its stability have students watch and discuss the following videos.

Tornado Facts for Kids

- Students will write three things they learned about tornadoes and one question they have after watching the video. Share and discuss as a whole class making sure to emphasize what they learned about how tornadoes form and how to be safe during a tornado.

The Secret to a Tornado Proof Building

Stop the video after the first test. *Ask students why they believe the model homes did not withstand tornado force winds*. Have students discuss this with a partner. Continue the video then stop after the second test. *Ask students what changes the engineers made to the model homes for the second test that helped strengthen the homes.*

Using the strategy Think, Pair, Share have students discuss the following questions with table groups and/or partners.

- *How do tornadoes impact how, what, and where people build?*
- *What building materials would be best suited for high winds?*
- *Does the height of a structure make a difference in its safety?*
- *Does this change your thinking about your structure?*

Clarify any misconceptions students may still have and have them adjust their "What I know About Tornadoes" list accordingly.

30 minutes

Extend

Have students return to their original construction groups. Tell students that they now have the opportunity to rebuild and/or change their structures based on their new knowledge. The challenge is to have their model structure to protect their paper/sticky note person, Bob, from a tornado like winds.

Parameters for the challenge are:

1. Bob needs to fit inside the building and remain in there with the fan on high.
2. Students use the reflection/revision sheet to revise their original plan.
3. Students make adjustments to their original structure based on observation and constructed knowledge. Students will not have access to additional materials but may test their structure using the fan.
4. Gallery Walk- Teacher will guide students through the room to view and discuss each table's revised structure.
5. Students make predictions about the integrity of the structure.
6. Students discuss changes that were made and predict if the structure will protect Bob.
7. If time allows students redesign their structures and test them based on their observations and results from their tests.

You will need to help test each structure with the fan on all settings. Students' structures will pass "inspection" if it can protect Bob with the fan on high. When all groups have completed the testing have students discuss which structures were successful and why. Don't forget about discussing the failures and have students share ideas for how those could be improved.

Explain to students that the word " failure" in engineering is a key term used for what didn't work and is key to implementing changes and is just as important as the successes.

Have students create an informational graphic or poster to help protect others from a tornado. Students work may suggest, "Pack an emergency bag with water, food, and extra clothes." "Get to the lowest spot in the house and away from windows." "Wear a helmet to protect yourself from falling things.",

20 minutes

Evaluate

Wrap Up Discussion- Students will participate in a wrap up “Tell Me Everything You Know” based on the essential questions:

- **How do natural processes, like storms, create natural hazards that can harm people?**
- **What can we do to reduce the risks of natural hazards?**

Then using the strategy What Did I Learn Today? have student individually reflect using the following reflective questions

- How does making a model help engineers design weather safe buildings?
- How does weather impact the way people live?

More About Tornado safety

Have students watch an additional video clip about tornado safety. What Is the Safest Room in a House During a Tornado?

Students create an informational graphic or poster to help protect others from a tornado.

Students work may suggest:

- The safest room if you don't have a tornado shelter
- Put shoes on
- Pack an emergency bag with water, food, and extra clothes
- Get to the lowest spot in the house and away from windows
- Wear a helmet to protect yourself from falling things

Resources

- Tornado Facts for Kids https://www.youtube.com/watch?v=hLhwcf-NULk
- The Secret to a Tornado Proof Building https://www.youtube.com/watch?v=ga7N-bS4nLU
- What Is the Safest Room in a House During a Tornado?https://strongholdsaferooms.com/2019/08/07/safest-room-during-a-tornado/