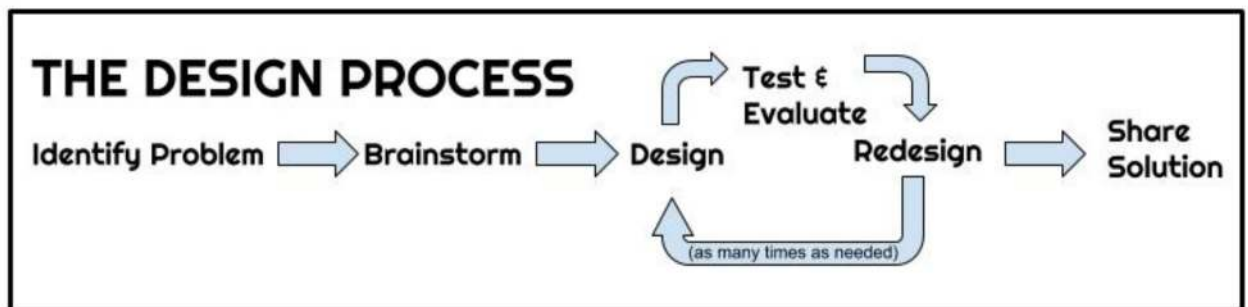




# DESIGN A STORM SHELTER

Are you ready to use the **Engineering Design Process**? Engineers follow this process when they're creating new products or designing solutions to problems. It's a set of steps focused on examining a problem, brainstorming solutions, and testing them out. Engineers don't always follow the steps in perfect order, and they often repeat a step more than once before they reach a solution that works.



## THE GOAL:

Construct a storm shelter prototype that can withstand Vidal Sassoon dryer force winds.

## WHAT YOU NEED:

- Hair dryer or fan
- Ruler
- Scissors
- Empty cereal box or cardboard
- Tape
- Plastic wrap or bubble wrap
- Other building materials of your choice.  
Examples: toothpicks, straws, string, paper clips, etc.
- Pencil and paper

## THE PROBLEM

You live in a community that frequently lies in the path of severe storms. You are tasked with designing a storm shelter so people can be safe from dangerous winds when bad weather strikes.





# DESIGN A STORM SHELTER CONT.

## REQUIREMENTS



**Your storm shelter should meet the following requirements:**

- A 5 x 5 in. base (approximate)
- A door that opens inward (so it can be opened from the inside if it gets blocked by debris)
- An air vent (to make sure oxygen can get into your shelter)
- should withstand 10 seconds of dryer force winds
- **Bonus challenge:** Can you build a successful storm shelter using only 4 kinds of materials?

## BRAINSTORM & DESIGN IT

- Gather your materials and examine them. Brainstorm how you might be able to use them in your design.
- Before you start building, sketch your design on a piece of paper. Architects and engineers start with blueprints of their design to help them during construction.

## BUILD IT

- Use your materials to build the storm shelter you designed in your blueprint.

## TEST IT

- Hold your storm shelter under a hair dryer for 10 seconds. Gradually increase the setting. If you don't have a hair dryer, you can use a fan at a high setting.
- How well did your storm shelter survive the storm?

## REDESIGN

- Think about what you would change if you built a new prototype.
- If you'd like to make improvements and try again, rebuild your storm shelter. How well does it do after testing it a second time?





# DESIGN A STORM SHELTER CONT.

## MORE TO EXPLORE

- Research other structures people have designed to respond to weather-related problems. Can you invent a structure of your own? Examples include something that blocks sun exposure, or something that prevents a certain spot from being flooded.
- Does your family have a plan for what to do in case of severe weather emergencies? Find out where the safest place is in your home and/or neighborhood. Create an emergency plan and put together an emergency kit with items that would be useful to have during severe weather (Find ideas at <https://www.ready.gov/build-a-kit>).

## TORNADO SAFETY TIPS

### READ ALL ABOUT IT!

- **Tornadoes** by Seymour Simon
- **Tornado** by Betsy Cromer Byars
- **Flood** by Alvaro F. Villa

- If you are in a building, go to the lowest level. Go to the basement or cellar if you have one.
- If not, go to an interior room like a bathroom, closet, or hallway. Stay away from windows and outside walls.
- Never try to outrun a tornado. If you are in a car or mobile home, seek shelter in the nearest permanent structure.
- Help protect yourself from flying debris by covering your head with your hands and covering yourself with blankets, pillows, or other cushioning.

**Note: These tips are from the Department of Homeland Security's website. Find more information at [ready.gov](https://www.ready.gov).**





# DESIGN A STORM SHELTER CONT.

## STANDARDS

This activity aligns with the following Oklahoma Academic Standards:

- K-ESS3-2: Natural Hazards
- 3-ESS3-1: Earth and Human Activity
- 4-ESS3-2: Earth and Human Activity
- MS-ESS3-2 Earth & Human Activity

### WATCH VS WARNING: WHAT'S THE DIFFERENCE?

A **tornado watch** is issued when there is potential for a tornado to develop. During a tornado watch you should keep alert and pay attention to changing weather conditions.

A **tornado warning** is issued when a tornado has been sighted or is shown on a weather radar. During a tornado warning, you should seek shelter ASAP and take all necessary safety precautions.

