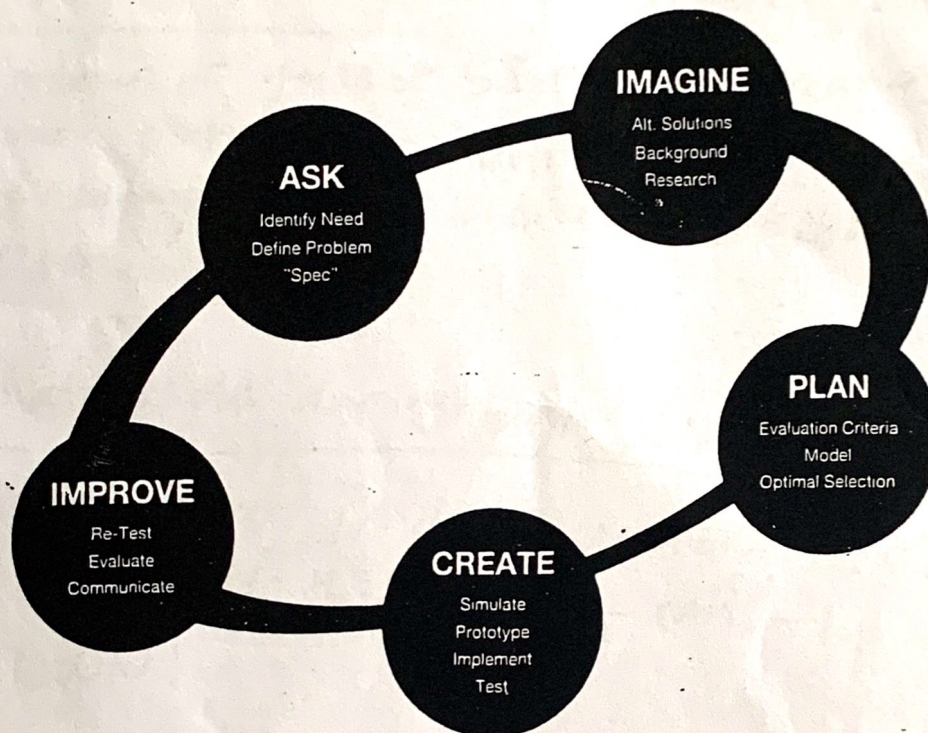


Engineering Design Process

Engineering Notebook

High Wind Design Challenge



Museum of Science (Image creator). (2016). The engineering design process [Diagram].
Retrieved from <http://www.eie.org/overview/engineering-design-process>

Scenario

Imagine

- A wind advisory is sustained winds of 25-39 mph and/or gusts to 57 mph. Downed tree limbs and local power outage are likely (no electricity).
- A high wind warning is sustained winds of 40 mph or greater or gusts of 58 mph or greater. Widespread power outage (no electricity for more people) and many downed branches or whole trees may occur.
- What to do during high winds:
take covers in doors, under a secure shelter.
Put away things that can fly or tie it
DOWN!

Hmb Daniels

12/2/11

ASK

Problem Statement

Problem Statement: To design and build a structure that a family of at least 3 can live in, with at least one adult. The structure must withstand the force of a strong wind (hair dryer) for 10 seconds. You must use the available supplies and stay within your budget of \$20.

Specification Sheet

Justification – The reason why this is a specification based on the engineering design challenge or the customer's needs.

Weight: Number assigned to a specification based on its importance (on a scale of 1 to 5, with 5 being the most important)

#	Specifications	Weight
1	Structure should use only the provided materials.	3
2	Structure can hold 3 or more people (with at least 1 adult).	5
3	Structure can withstand a high wind for 10 seconds.	5
4	Structure is built using supplies \$20 or less.	5

Problem Statement

Problem Statement: To design and build a structure that a family of at least 3 can live in, with at least one adult. The structure must withstand the force of a strong wind (hair dryer) for 10 seconds. You must use the available supplies and stay within your budget of \$20.

Background Research

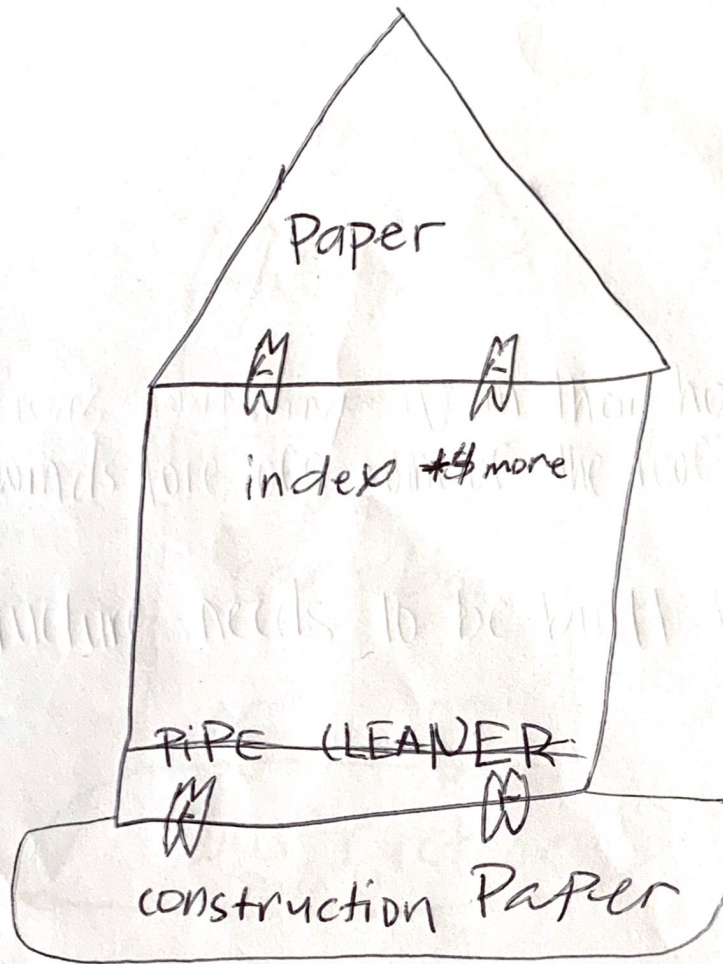
- Summary of information from sources
- Bibliography

A family was watching TV in their house
when high winds tore off some of the roof

A sturdy structure needs to be built for this
family

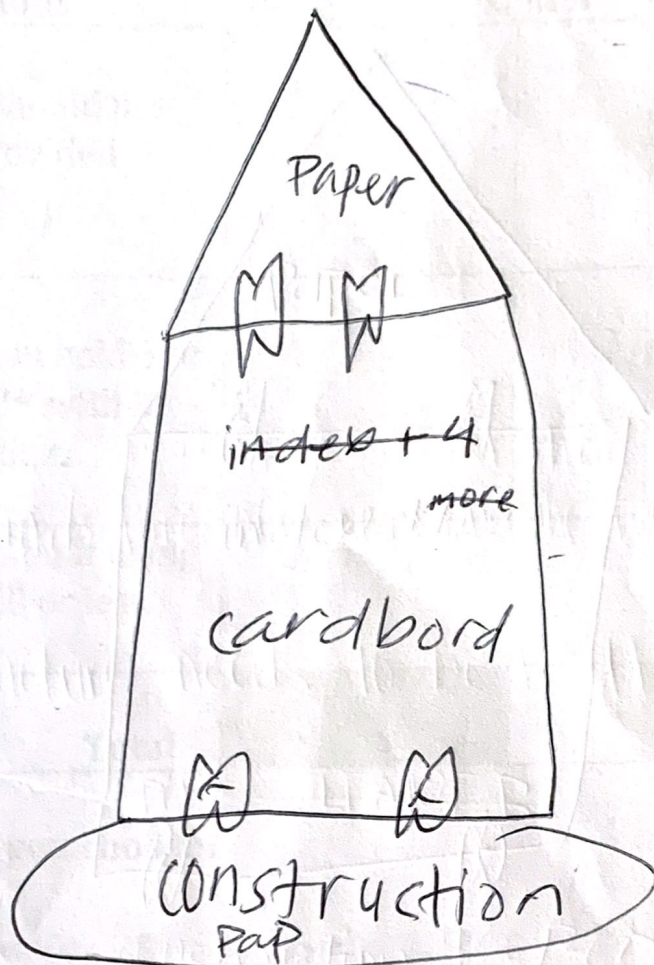
Sketch two ideas (A & B) below. Please make sure to include labels in your design and indicate the science concepts where they apply.

A



Material	Quantity	Material	Quantity
^{\$5} TAPE ✓	5"	^{\$1} PIPE ✓ (cleaner)	1 whole
^{\$2} CONSTRUCTION ✓	whole Paper	Piece of PAPER ✓	1 whole
index ^{\$5} ✓	5 whole		

B



1/4 1/4

Material	Quantity	Material	Quantity
card bord ¹⁰	4	card bord	2 yds
construction	1	Pipe cleaner	1
Paper ²	1	construction	4
Tape	2 yds	Tape	Page 5

Pugh Chart (decision matrix)

Please evaluate specifications.

	Specifications	Weight	Design A		Design B	
1	Structure should use only the provided materials.	3				
2	Structure can hold 3 or more people, with at least one adult.	4				
3	Structure is built using supplies \$20 or less.	4				
	Total					

Which plan did you choose?

A or B

Justification

Clearly Write Out the Steps for Executing the Design

(These instructions should be clear enough to allow someone else to follow them. Use illustrations if necessary to make the instructions clear.)

First, we are going to make the roof with a paper by ~~sharp~~ pinching the middle and making it sharp. Second, we are going to tape the roof with the cardboard as the house. Third, we are going to get ^{cardboard} ~~construction~~ paper and tape that to the cardboard house. Lastly, we are going to get a pipe cleaner and rap it around the house for desine.

List Your Materials

Material	Quantity	Material	Quantity
cardbord ^{\$10}	2 4	Pipe cleaner ^{\$1}	1
Tape \$5	7"	siccons ^{\$0}	1
PIPE CLEANER			

CREATE

Problem Statement

Problem Statement: To design and build a 3 story, two foot tower that will withstand a simulated earthquake for 20 seconds.

Scoring Sheet

Criteria	Exceeds 5	Meets 3	Needs Improvement 1
1. Materials		The tower used only the provided materials.	The tower used other materials than what was provided.
2. Height	The structure can hold a family of 5.	The structure can hold a family of 3.	The structure cannot hold a family of 3.
3. Durability		The structure can withstand a high wind for 10 seconds.	The structure did not withstand a high wind for 10 seconds.
4. Budget		The structure was built within \$20.	The structure was built using more than \$20.

	Specifications	Weight	Score	Weighted Score= Weight x Score
1	Structure should use only the provided materials.	3	3	29
2	Structure can hold a family of 3, with at least one adult.	5	3	+15
3	Structure can withstand a high wind for 10 seconds.	5	3	+15
4	Structure was built using \$20 or less.	5	3	+15
	Total			54

Test Data

Date 12/9/19

Holds at least 3 people ☒ Yes or No

Structure stood for 10 seconds ☒ Yes or No

Time the structure withstood the high winds 10 seconds

Observations

I observed that the tape does not hold well
so I ~~was~~ already ~~had~~ had glue incase
so I built my house again

Student Reflection

(Successes and Challenges: What worked? What didn't work? Why?
How you felt as you were building...happy or frustrated? Why?)

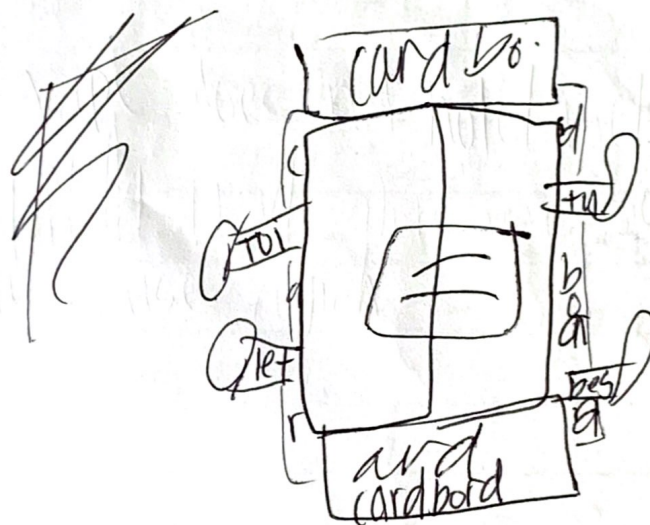
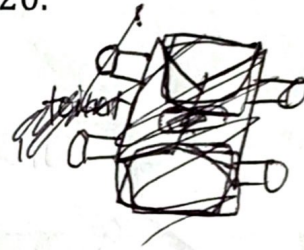
My house ~~only~~ worked because I used glue
and that is more stronger than tape so
that's why it stayed for 10 sec. When I
tested it, I thought it would not stand up
but it did.

IMPROVE - PLAN

Problem Statement

Problem Statement: To design and build a structure that a family of at least 3 can live in, with at least one adult. The structure must withstand the force of a strong wind (hair dryer) for 10 seconds. You must use the available supplies and stay within your budget of \$20.

Sketch your new Design (include labels)



Description of the Design Change and Justification

~~Some of my partner is going to get a cardboard and glue it together.~~

~~Me and my partner are going to~~
get supplies. We are going to get cardboard, glue,
4 toilet paper tubes, 6 pipe cleaners, and
construction.

- We are changing it because I have a new partner and I want to add more things to it to make a floor and to add parts I did not.

Clearly Write Out the Steps for Executing the Design

(These instructions should be clear enough to allow someone else to follow them. Use illustrations if necessary to make the instructions clear.)

First, ~~me~~ me and my partner ~~are~~ are going to get 4 cardboard and glue it together. Next, we are going to put 4 toilet paper tubes and put that on the bottom. Then, we are going to put 4 of the pipe cleaners on the toilet tubes. Finally, we are going to put the construction paper on our roof and put the last ~~2~~ 2 pipe cleaners on the construction paper to hold it down.

List Your Materials

Material	Quantity	Material	Quantity
cardboard ^{\$10} cardboard	1 1	Pipe cleaner ^{\$1}	16 16
glue ^{\$3}	1	Construction paper ^{\$2}	1
Toilet paper tubes ^{\$3}	4		