Just Hanging Around!

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UNLV HOWARD R. HUGHES COLLEGE OF ENGINEERING

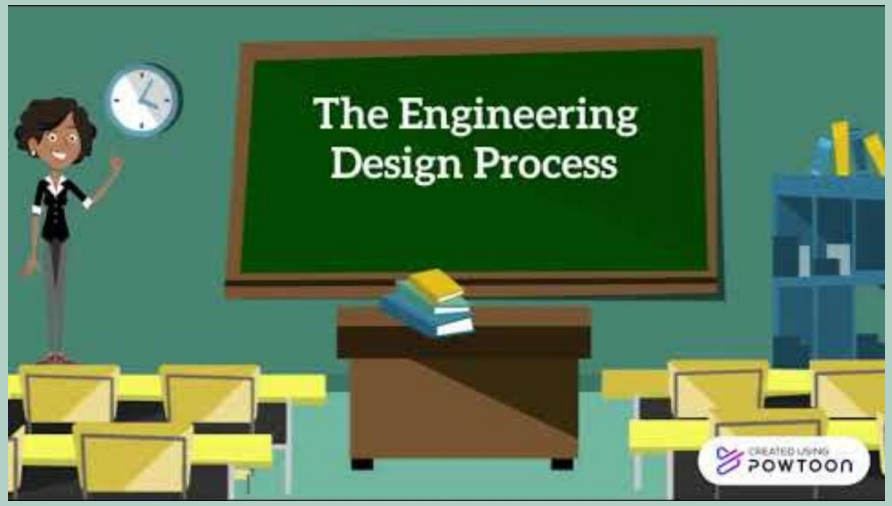
Just Hanging Around Overview

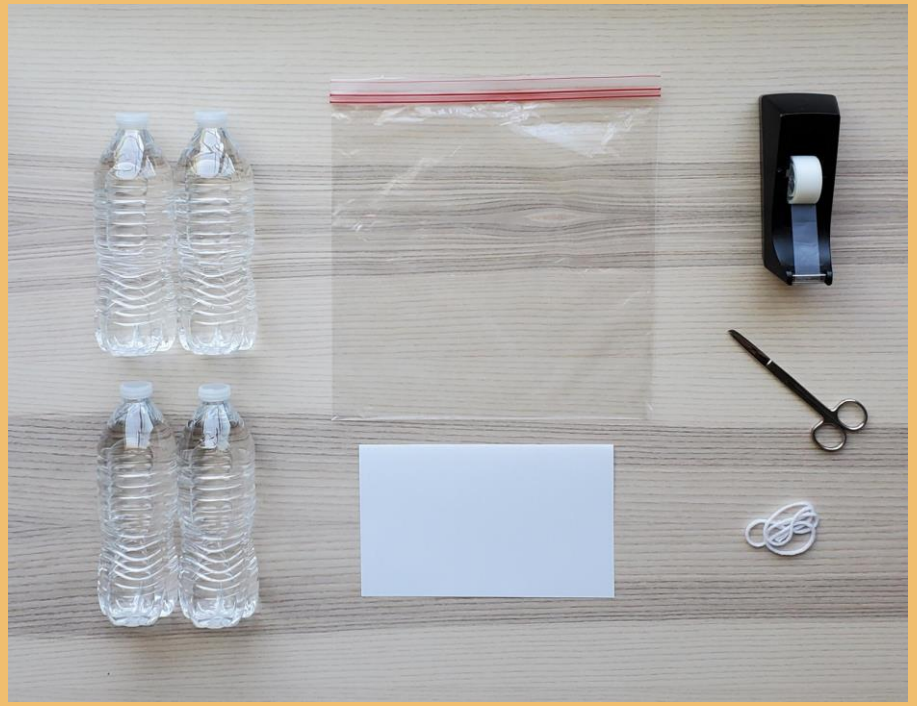
Today you will be following the engineering design process: a process that engineers use to solve real world problems. Follow the path of the worksheet to create the best design for Just Hanging Around!

Click the speaker button located at the top right of each slide to hear more information!

Engineering Design Process

Before you start, watch this video about the engineering design process to get familiar with the steps of this experiment.





Materials Needed

- Weight (water bottles, sandbags, books, etc.)
- Large bag that can hold a lot of weight
- Half sheet of paper
- Tape
- Scissors
- String (if needed)

Step 1: Identify the Problem

Scenario: You are moving into a new apartment and need to get your piano up to your room on the fifth floor. Uh–Oh! The elevator in your building is broken, and you do not have access to any machines.

Your goal: Design a hanging mechanism strong enough to lift your piano up to your floor.

Step 2: Brainstorm

In the "Brainstorm" section, write some ideas on how you can make a hanging mechanism that can hold the most weight. Your pamphlet has some questions for you to think about.

Step 3: Limitations and Constraints

You look around and realize that the only materials you have with you are a half sheet of paper, 5 inches of tape, and a pair of scissors.

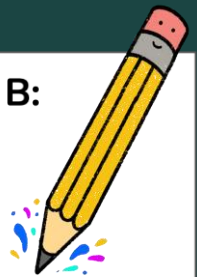
You need to lift the piano 5 stories up, so your design needs to be at least 5 inches long to be effective! Keep in mind these limits and constraints for the following steps.

Step 4: Design

In the "Design" section, sketch 3 different designs of the hanging mechanism you plan to build. Make each design as detailed as possible and remember to keep in mind the limits and constraints.

Design A:

Design B:



Design C:

Set Up

If your bag does not have any holes or straps, you will need to make one. This makes it easier to attach your hanging mechanism to the bag.

- Use the scissors to make a hole at the top of the bag
- Insert a string in the hole

Step 5: Build

Choose the design you think is the best and build it!

Remember your limitations and constraints!

Step 6: Test and Evaluate

Now you have a hanging mechanism to test! Test your mechanism to see how much weight it can hold. Then answer the questions provided in the "Test and Evaluate" section of your worksheet.

Step 7: Share Your Solution

Share to your solutions with your classmates.

Discuss the following:

Why do you think your own design could or could not hold a lot of weight?

What kind of designs did you see from your classmates?

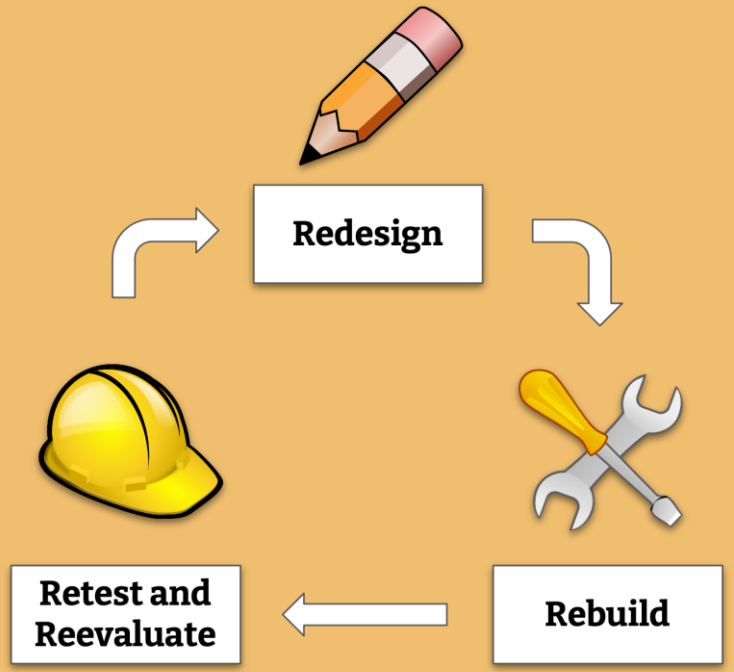
How can you improve your design?

Step 8: Redesign, Rebuild and Retest/Re-evaluate

Repeat the last 3 steps using a new sheet half sheet of paper and tape:

(1) Design
(2) Build
(3) Test and Evaluate

This is your chance to improve your design!



Redesign

In the "Redesign" section of your worksheet, sketch a design for a new and improved hanging mechanism. How can you improve your previous one? Make each design as detailed as possible and keep in mind the limits and constraints.

New and Improved Tower Design:

Rebuild

It's time to build your new hanging mechanism! Using a new half sheet of paper and new piece of tape, build your new mechanism based off your redesign. Remember that you can only use 1 sheet of paper!

Retest and Reevaluate

Using the same steps as before, test your new hanging mechanism to see how much weight it can hold. Then answer the questions provided in the "Retest and Reevaluate" section of your worksheet.

Step 9: Share Your New Solution

Share to your solutions with your classmates.

Discuss the following:

Why do you think your own design could or could not hold a lot of weight?

What did you do differently than before? What did your classmates do differently?

How can you improve your design?

WARNING!

The next slide will provide the explanation (solution) on what makes the best hanging mechanism for this experiment. Make sure you have completed the previous steps before moving on.

Explanation

- In a real–life situation, ropes or chains are some tools often used to lift objects.
- However, because we are limited to paper and tape, a sling is the best hanging mechanism. The single piece of paper can evenly distribute the weight.
- If we were to make paper chains, the chains may rip where they link together.

Straps and Slings in Real Life

Solution Build and Test

Build

coming soon!

Test and Evaluate

Thank You!

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