SKYSCRAPER CHALLENGE

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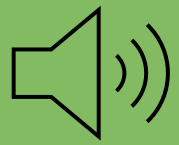
Skyscraper Challenge Overview

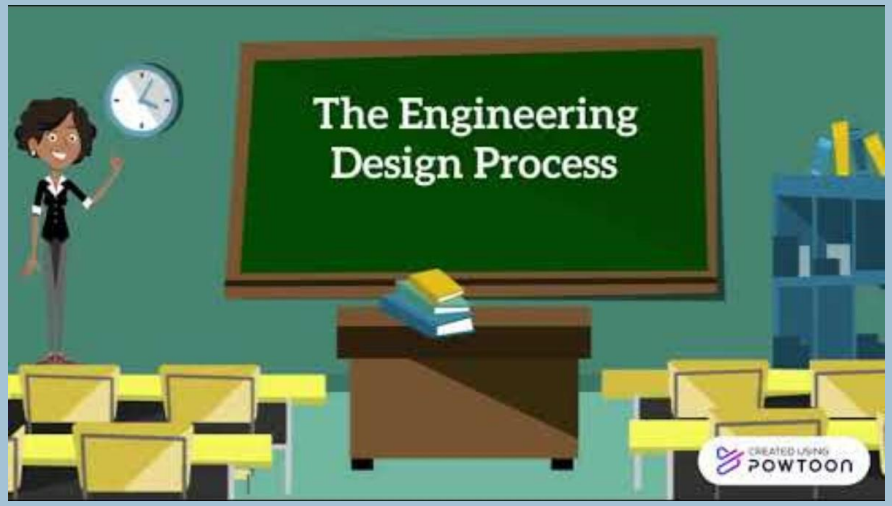
Today you will be following the engineering design process: a process that engineers use to solve real world problems. Follow the path of the pamphlet to create the best design for the Skyscraper Challenge!

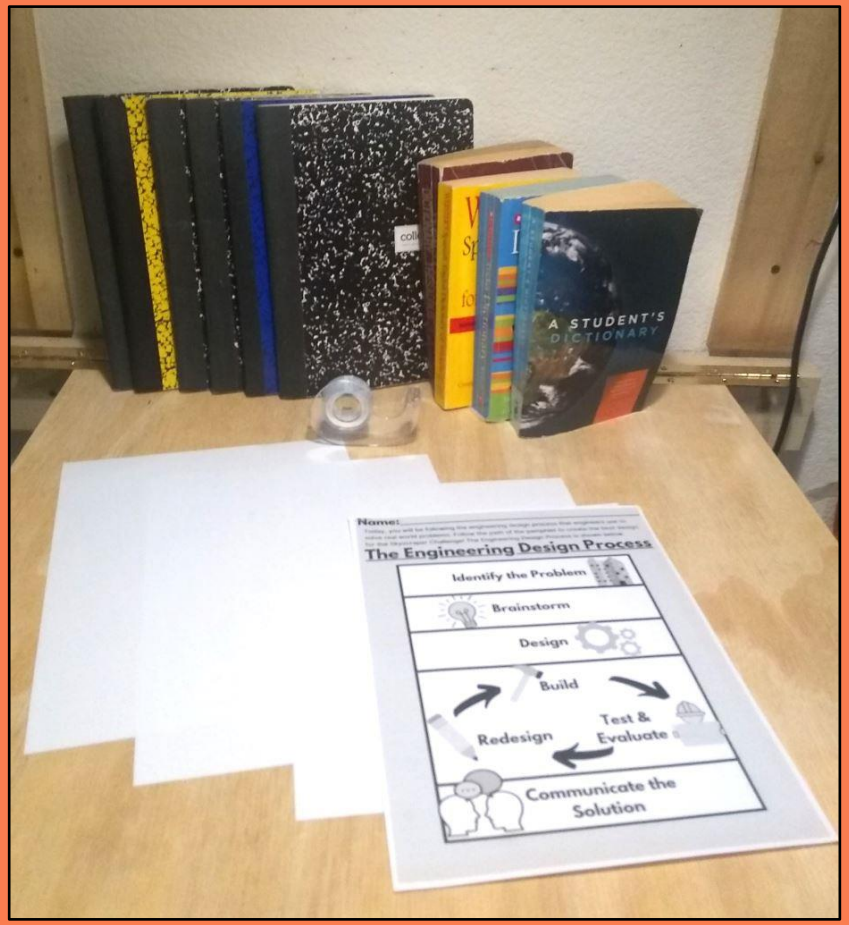
Click the speaker button located at the top right of each slide to hear more information!



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

- Half sheet of paper
- Scotch tape
- Books (or any other item you can use as weights)

Step 1: Identify the Problem

Scenario: You've been contracted to build the strongest skyscraper in Las Vegas. This structure will be very heavy.

Your goal: build a skyscraper strong enough to support the weight of humans and itself!

Step 2: Brainstorm

In the "Brainstorm" section, write some ideas on how you can make the strongest skyscraper you can. Your worksheet has some questions for you to think about.

Step 3: Limitations and Constraints

You get a call from your client. They decided that they want you to use completely new materials for your tower because there is a new budget.

You will need to use a limited amount of supplies: a single half–sheet of paper, tape, and scissors.

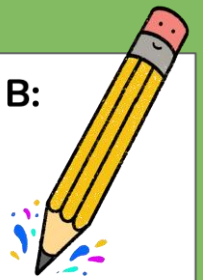
You will need to consider this material restriction when designing your tower.

Step 4: Design

In the "Design" section, sketch 3 different designs of the skyscraper 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:

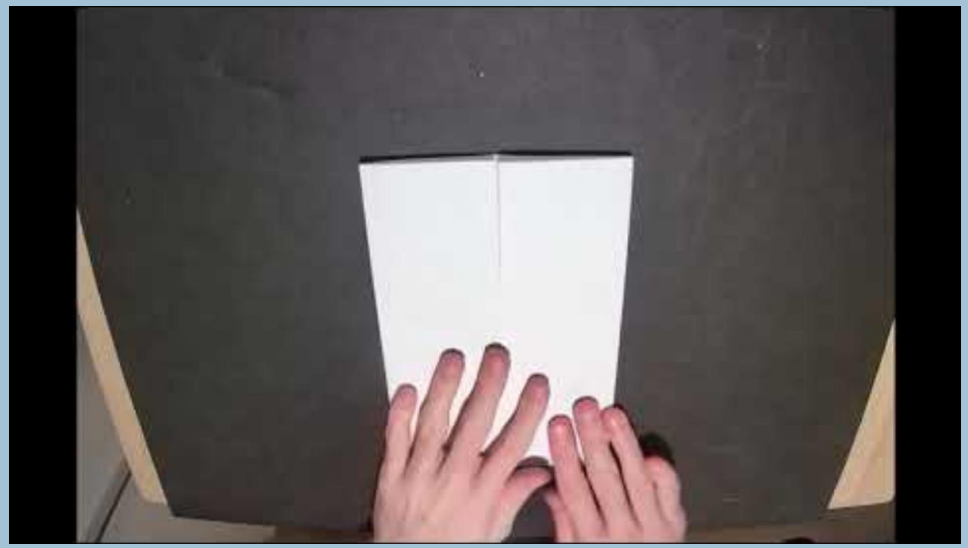


Design C:

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 skyscraper to test! Test your skyscraper 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 hold a lot of weight?

What kind of designs did you see from your classmates?

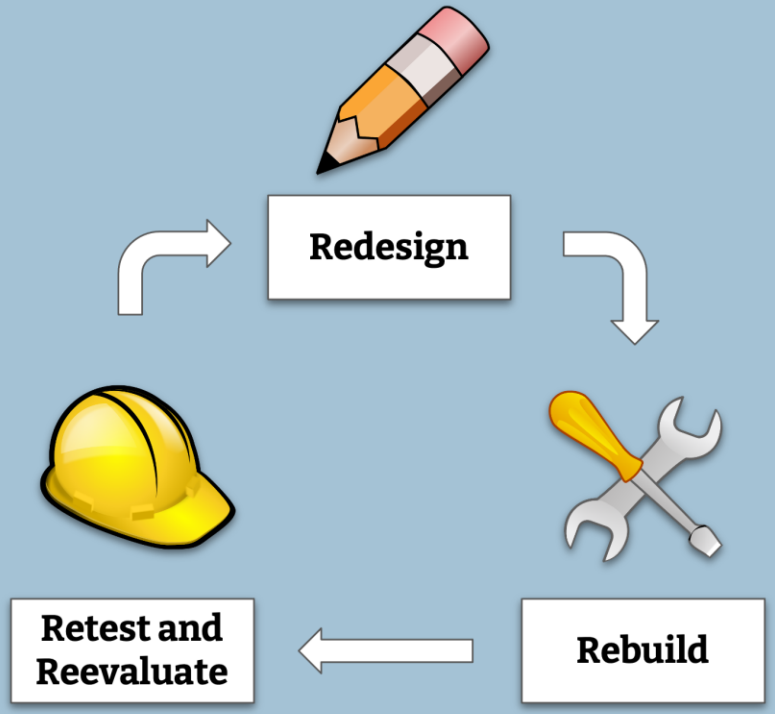
How can you improve your design?

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

Repeat the last 3 steps using new gummies and toothpicks:

(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 skyscraper. 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 skyscraper! Using the same materials as before, build your new tower based off your redesign. Remember that you can only use a single half–sheet of paper, tape, and scissors!

Retest and Reevaluate

Using the same steps as before, test your new skyscraper 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 about your classmates?

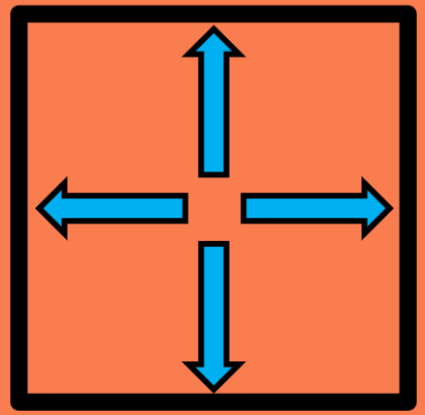
How can you improve your design?

WARNING!

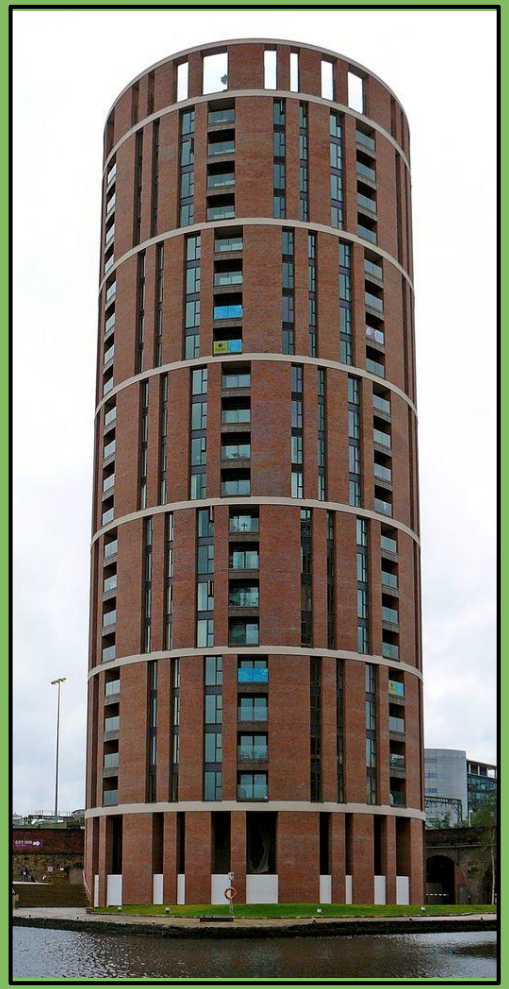
The next slide will provide the explanation (solution) on what makes the best skyscraper for this experiment. Make sure you have completed the previous steps before moving on.

Explanation

- The cylinder can support the most weight because its walls have no edges where force could concentrate and create weak points.
- The force from the weight is evenly distributed along the curved surface, preventing stress from building up in any one area.



Cylinders in Real Life



Solution Build and Test

Build

Test and Evaluate

Thank You!

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