

# Design Challenge

## Overview

All design challenges will be a little ambiguous. Unlike answers to mathematical expressions, there are always several "right" answers to any design challenge. The "best" design solution will be the one that most completely fulfills the requirements and can be fully completed and produced with the available resources.

**Student Requirements:** ***TWO Students*** from each school, students will work in a group of two. - Please **have your students bring safety goggles.**

**A group (2 students must be in the group) of students will be provided the design challenge. They will be given:**

Overview of the Challenge

A Time Constraint (1 hour)

Materials

Tools

➤ **Students will need to recognize the heart of the problem before attempting to solve it.**

- Write a paragraph restating what the challenge is
- List the constraints placed upon them. Such as any size, weight, time, or budget limitations?
- Will the structure need to support a fixed amount of weight, or will it need to support a certain object for what specific amount of time?
- Once they know just what they are trying to accomplish, they can continue forward.

## **Brainstorm and Create Thumbnail sketches of the design.**

Students will create 2 thumbnail sketches of various designs or solutions.

No such thing as a bad idea, no matter how crazy it may seem.

## **Design a Solution.**

The team must settle on an idea to develop

The team must prepare a detailed drawing and plan and solicit feedback from the judges.

Once the **design is approved**, it can not be modified to an extreme. (Small changes may be made) but we do not want one team copying the design of another team.

## **Test Ideas.**

Construct the device and test

Students will have time to construct and improve the design until the time is up

## **Evaluate.**

The design must solve the problem or meet the challenge, while fitting the constraints of the problem.

## **The Challenge:**

**Material:** 10 straws, 36" masking tape, 10 Paper Clips, 2 Sheets of 8.5"X 11" paper, mousetrap, (2) Rubber Bands, Ruler (can't cut ruler)

**Tools:** Long Nose Pliers, Scissors, 12" ruler(also can be used in the device), Glue stick (not hot glue)

**Example Challenges –** (1) [How High Can You Go](#) (2) [Out of the way mousetrap](#), (3) [Tech Drawing Challenge](#)

CATEGORY	10 - 9	8.9 - 7	6.9 - 5	0
Defining the Problem	Rephrases the problem/challenge clearly and precisely	Rephrases the problem/challenge clearly	Rephrases the problem/challenge with limited clarity	Does not rephrase the problem/challenge

**Step 1: Problem Statement:** (Explain in your own words what you are being asked to do)

CATEGORY	10 - 9	8.9 - 7	6.9 - 5	0
Identifying Criteria & Constraints	Restates the criteria clearly and precisely and identifies many constraints	Restates the criteria clearly and identifies several constraints	Does not restate the criteria clearly and fails to identify constraints	Doesn't attempt to restate the criteria

**Step 2: List the criteria:**

(What must the device do?)

**Step 3: List the constraints:**

(What are the limitations placed on the design of the device and/or the construction of the device)

**Step 4: Brainstorm 2 Possible Solutions**

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CATEGORY	20 - 19	18.9 - 17	16.9 - 15	14
<b>Selecting an Approach</b>	Selects a promising solution based on a thorough analysis criteria and constraints and has created a the design precisely utilizing drawing tools	Selects a promising solution based on criteria and constraints and has created a design utilizing drawing tools with less than 2 mistakes.	Selection of solution is not based on consideration of criteria and constraints and has created a design utilizing tools.	Selected a solution to build but did not create a design drawing using drawing tools. Instead created a sketch using just a pencil.

**Step 5:** Selected an approach and design a solution  
 Using a scaled measurement on the attached Graph paper (Your final design must match you solution with minimal modifications or you will be disqualified).

**Step 6:** Get your final design signed by a Judge.

**Step 7:** Construct your Design and Test.

Final evaluation will be 1 hour and 15 minutes from the start time

<b>Defining the Problem Points</b>	<u>          </u> / <b>10</b>
<b>Restating Criteria and Constraints Points</b>	<u>          </u> / <b>10</b>
<b>Selection of the Approach Points</b>	<u>          </u> / <b>20</b>
<b><u>Total – Pre-Construction</u></b>	<u>          </u> / <b>40</b>
<b>Results 1<sup>st</sup> place 40 Pts // 2<sup>nd</sup> Place 38 // 3<sup>rd</sup> Place 35 // 4<sup>th</sup> Place 33 5<sup>th</sup> Place // 30 6<sup>th</sup> Place // 28</b>	
<b>7<sup>th</sup> Place 27 ?? 8<sup>th</sup> place 25</b>	
<b><u>Total Overall Points -</u></b>	<u>          </u> / <b>80</b>