

EXTREME TRAMPOLINES

Duration: 20 minutes

Institution: Museum of Science, Boston

Skill level/Age Level: Grades 2-12

Group size: 5-30 Participants

INTRODUCTION

A great deal of science and engineering goes in to building a trampoline. Through this activity, participants explore different materials and how their properties affect a trampoline's ability to make something bounce as high as possible or as low as possible off its surface.

The goal of this challenge is to build a trampoline that can make a golf ball bounce as high or as low as possible off its surface. Work in small teams, participants use a variety of materials to design, build, and test their trampolines in our trampoline testers. Participants think and build like engineers as they experience and design process to make improvements to their trampolines through redesigning and retesting prototypes.



MATERIALS AND TOOLS



Essential Materials:

- Trampoline Testers (system to drip gold balls from a fixed height and give a bounce height read-out for multiple tests)
- Golf balls
- Trampoline bases with attachments posts for different material configurations (can make these bases out of different materials like K'NEX)
- Fabric surfaces with different material properties
- Name tag clips
- Hair ties
- Polyester loops
- Cotton loops

SET UP



HOW TO OR STEP-BY-STEP

Start with a trampoline base—the only rule is that you should use it with its posts pointing upwards so the posts do not scratch the testers and so the trampoline fits on the testing zone in the tester. Use any fabrics, hair ties, loops, and clips you want to design and test your prototype trampoline.

DESIGN CYCLE

Ask/Imagine/Plan

Explore the materials available. Which materials are the stiffest of the most flexible? How can you attach materials to the trampoline base? With your team decide if your goal is to achieve the highest or the lowest bounce. Brainstorm different combinations of materials you could use to design your trampoline. Think of many different possible solutions and discuss them with your team. Pick two ideas you would like to design and test. Determine which materials you will use. How will you attach all of your components to the trampoline base?

Create

Construct your design with the materials you have selected.

Test

Test your design in one of our testing station and observe what happens then read the display to determine your bounce height. Did anything unexpected happen? Did your creation work as you had predicated?

Improve

How could you make a trampoline that makes a ball bounce even higher or lower? Will you change the surface materials or the method of attaching the material to the base? Document your new design on the worksheet and test it. Is your new design better? Why? Be sure to test multiple designs and record your observations on the worksheet. Which design worked best? What did you learn from your tests?

FACILITATION QUESTIONS

- What is a trampoline?
- What factors influence how a ball will bounce off your trampoline?
- What will happen if you have a very tight surface? Loose surface?
- Will adding more elastic materials make a ball bounce higher? Lower?
- What is the Engineering Design Process?
- Why is it important to make one change at a time to your trampoline?

KEYWORDS (STYLE: HEADING 1)

- Outdoor
- Indoor
- Trampolines for Entertainment/sports
- Trampolines for safety
- Design challenge
- Materials engineering
- Elasticity
- Physics