

## TROPHY TRIATHLON

Duration: 10-30 minutes

Institution: Museum of Science, Boston

Skill level/Age Level: 2<sup>nd</sup> - 12<sup>th</sup> grade

Group size: 5-30 participants

## INTRODUCTION

Think like an engineer and design, build, and test a trophy that can hold up a sports ball.

Students work in teams or independently to build a structure to support a load.

## MATERIALS AND TOOLS



### *Essential Materials:*

- Student Worksheet
- Sports balls (tennis ball, soccer ball, basketball, baseball, bowling ball)
- Tape measure

### *Assorted Materials for Building, some examples include:*

- Plastic cones (from recycle store—allow one per team)
- Making tape (if using tape, limit amount allotted per team. We use 12 inches per team)
- Newspaper
- Wooden dowels
- Craft sticks (small and large)
- Rubber bands

## HOW TO OR STEP-BY-STEP

1. Ask/Imagine/Plan
  - a. Divide students into teams of two or three. Explain the challenge to them from the student worksheet. Make sure students understand the materials restrictions and minimum height requirements.
  - b. Ask each team to choose which ball they will try to hold up. Have teams explore the materials, but not collect any yet. Students should brainstorm

features they think are most important (e.g. a wide base, strong connections/joints, alignment under center of gravity)

2. Create
  - a. Construct your prototype with the materials you have selected.
3. Test
  - a. Ask Design Challenges staff to help you test your design!
4. Improve
  - a. Try to improve your trophy by changing one variable. Test your new prototype. Can it support a heavier ball? What did you learn from your tests? How could you take an even better trophy? Plan your new design like before and then test it again. How did your new design work compare to the old?

### **FACILITATION TIPS**

- Measure out the tape and give each group a piece. Once students have their tape, they may not have more, even if they need to redesign. This requirements encourages planning ahead
- Before testing with a bowling ball, test a trophy with a soccer ball. Since it is about the same size, you can test the trophy's center of gravity without crushing it under the weight of the bowling ball.
- Monitor the balls so that students don't start tossing them around. For younger students, a teacher should place the bowling ball on top of the trophies.
- Ask students to consider the shapes of materials (e.g. rolled up newspaper vs. flat), combining materials, and center of gravity. Is tape necessary or will gravity hold their structures together?
- Emphasize the necessity of sketching a plan for a model. Drafts and drawings are essential in the engineering field, and act as "blueprints" to make sure that team participants are all on the same page.

### **MATERIALS SOURCES**

Craft store (Michael's, AC Moore), sports stores or Target for balls, recycle stores for plastic cones

### **KEYWORDS**

- Structures
- Civil engineering
- Young learners