Mouse Trap-Powered Car

In this activity, students will design and construct a car powered by a mouse trap.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>9 - 12</th>
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<tbody>
<tr>
<td>Activity Time</td>
<td>2 - 4 hours, depending on level of guidance</td>
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<tr>
<td>Preparation Time</td>
<td>30 minutes</td>
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<tr>
<td>Grouping</td>
<td>Individual or pairs</td>
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Objective

As a result of this activity students will be able to:

- Understand the concept of tension and how it related to stored energy
- Use the engineering design process to solve a problem

Materials

Per Class:

- Wheels (poker chips, cardboard circles, toy wooden wheels, CDs, plastic lids, etc.)
- **Engineering Design Process** handout (from the K’NEX Prosthetic Hand activity)
- Axles (skewers, pencils, etc.)
- Cylinders (drinking straws, thread spools, etc.)
- Body (foam board, cardboard, plastic scraps, craft sticks, etc.)
- Any additional random materials
- Glue guns and glue sticks
- Scotch tape
- Hole punches
- Scissors
- Measuring tape
- Mouse traps
- Thin string
- Duct tape

Directions

1. Explain to students that today they will need to design and construct a car that only uses the power of a mouse trap to propel their car.

2. Constraints:
   - The car can only be powered by 1 mouse trap.
   - The car must travel at least 5 feet.
   - The car may not have any human energy inputs (e.g., pushing).
   - Only the materials provided can be used in the construction of the car.
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- The car must have at least three wheels. Wheels are defined as anything that are round and go around.

3. Use the measuring tape to mark start and end lines that are 5 feet apart.

4. Give students a mouse trap that they will use to power their cars.

5. Help lead your students through the engineering design process by guiding them through a step-by-step approach: Refer to the Engineering Design Process handout.

6. Keep an eye out for groups who are having a difficult time understanding how to get their wheels to turn while maintaining a stable connection with the body of the car. You may need to help students brainstorm ways to solve this problem (such as inserting the axle into a straw).

7. To make this challenge more difficult for older students, eliminate the option of using pre-made wheels (such as the cardboard, fiberboard, and wooden wheels). This will get them to think creatively about using alternative resources (such as CDs or yogurt lids).

8. The trick of this challenge is to tie one end of a piece of string to the mouse trap hammer, and wrap the other end around the axle. When the hammer is released, it will unwind the string and turn the axle. These are suggestions to help your students recognize how to use the energy stored in the mouse trap to power their car:
   - Brainstorm as a class how to transfer the potential energy stored in the mouse trap hammer to kinetic energy used to power the axle.
   - Build in time for research on mouse-trap powered devices.
   - Build a prototype ahead of time to demonstrate how they might use the mousetrap’s hammer as energy.

**Hint:** Wheels need to be glued to the axle and the axle must turn freely inside a cylinder. One end of a piece of string should be wrapped around the axle (not the cylinder) and the other end tied to the mouse trap hammer. When the mouse trap is set off, the hammer will swing and un-wind the string from the axle.

**Discussion Questions**

- What type of energy is stored in the mouse trap before it is released?
- What type of energy is this transferred to when the hammer is released?
- Did you redesign any elements of your car once you tested your first model?