MOUSETRAP CAR MIDDLE SCHOOL LEVEL 3

Our STEAM labs are full of materials that can be used to build a great toy car. Build yourself an awesome vehicle that you will power with the spring of a mouse trap.

EDUCATIONAL STANDARDS:

NGSS CONNECTION:

MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

COMMON CORE CONNECTION: ELA/Literacy

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Mathematics

MP.2 Reason abstractly and quantitatively.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. **7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

DOK:

Level 3: Strategic Thinking Level 4: Extended Thinking

MATERIALS NEEDED:

- Wooden mouse trap
- Homemade toy car
- Rubber bands, both large and small
- □ 4 eye hooks
- □ 2 wooden dowels
- String
- Duct tape

DIRECTIONS:

- 1. Use container lids to make wheels, wrap rubber bands around the wheels to add traction
- 2. Use wood dowels as an axle for the wheels
- 3. Thread the axle through eye hooks. Fasten the hooks to the bottom of your vehicle
- 4. Make the body of the car with light wood or other firm material. As long as it's sturdy enough to hold and support the weight of a mousetrap, it will work



Be sure to remove any metal teeth from the mousetrap. After you've built your car, leaving space for the mousetrap, mount it in the vehicle. Leave half an inch on either side of the mousetrap and use duct tape to fasten it to the car. Next, tie a piece of string to the swing arm of the mousetrap. The string should be long enough to reach the rear axle. Now, pull the trap open and wrap the string tight around the rear axle. When the trap arm is released, the string will pull, unwinding the string on the rear axle and propelling the car across the surface. Off to the races!!

OBJECTIVE:

Students will be able to design and carry out a test to determine the velocity of their vehicle.

ESSENTIAL QUESTIONS:

- What problems related to friction did you encounter and how did solve them?
- What is the effect of using large or small wheels?

ENGAGE / EXPLORE:

- 1. Students construct mouse trap cars using materials from 2BCF
 - a. Students are introduced to the materials and objectives that should be met for the build
 - Teacher may provide restrictions on outside materials that may be used (optional)
 - c. Safety considerations should be addressed.

EXPLAIN:

- 1. Students devise an experiment to determine the velocity of their mousetrap cars
 - a. Teacher should oversee their procedures to determine if they are sufficient to collect data
- 2. Students make a prediction about the velocities of their cars
- 3. Students collect data
 - a. Students carry out their procedure and collect displacement and time data to analyze their cars
 - b. Students perform the experiment 2 to 3 times to gather more accurate results
 - Students analyze their data
 - a. Plot their data
 - b. Calculate the velocity values
- 5. Students draw conclusions from their data

ELABORATE:

4.

- 1. Students will prepare lab write up
 - a. Students will present all of their lab from the Explore and Explain sections above in a well-structured lab write up

