MOUSETRAP CAR PROJECT

Driving Question:

How do we design and measure a mousetrap car to be the fastest in a race?

Essential Skills:

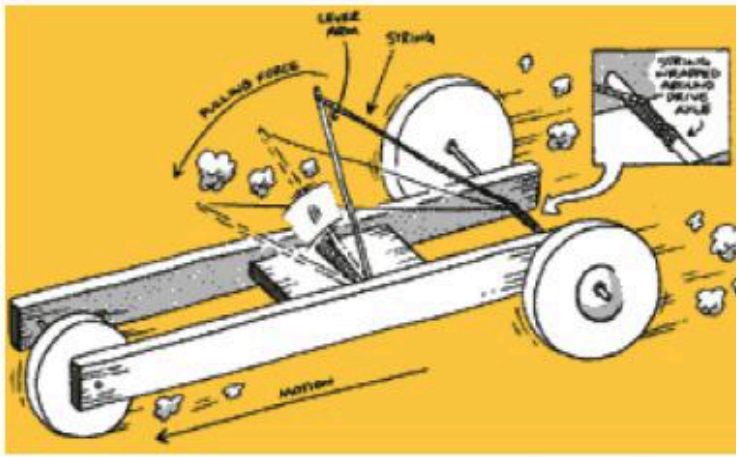
ESK 1.1 I can do multi-step conversions using dimensional analysis.

ESK 1.2 I can estimate and accurately take measurements using the correct units.

ESK 2 I can draw and interpret motion graphs of different moving objects.

Timeline:

9/16	Mousetrap Car Design/Materials Check
9/21-22	Mousetrap Car First Draft Due & Critique
9/28-29	Final Draft of Car Due & Competition
9/30	Mousetrap Car Report



Design Requirements

The vehicle must be powered by a single "Victor" brand mousetrap.

You will not be permitted to "push start" your vehicle i.e. upon release, your vehicle must start moving on its own.

Only the race distance will be measured; "total distance traveled" does not count (ex. the straighter the travel line, the better your grade will be as your race time will be faster).

Your goal is to be the fastest car to 4 meters. All cars entered must achieve a minimum distance of 2 meters to pass the performance part of the grade. Please examine the grading rubric (see below); car performance is a major part of your project grade so test your design, make improvements and then test some more!

Project Details

Mousetrap Car Design and Materials Check

You must have completed your sketched design and gathered/purchased all parts and materials for assembly. You must bring in all component car parts to school for approval. Be prepared to answer any construction questions presented to you (after examining your materials, I might ask questions that apply to your car design. Make sure you can explain what you are going to do with all the parts and construction materials and how your design works). Some car construction may have begun at this point.

Mousetrap Car First and Second Draft

You must bring in the completed car to class. Finished cars can be tested and modified if necessary for performance improvement. Modifications can be made as often as desired up to the day the project is due. For the second draft, there must be significant changes made to the car based on your previous tests and evidence that it has improved your car.

Mousetrap Car Competition

You must bring in the completed car to class. Modifications can be made as often as desired up to the day the project is due. The motion of the cars will be recorded for graphing and analysis purposes. For the second draft, there must be significant changes made to the car based on your previous tests and evidence that it has improved your car.

Mousetrap Car Report

All students will be writing an in class report about their project. This will be an individual report, that must be written in your own words.

1. Explain your group's thought process when creating the design of your car. Why did you pick your shape, materials and size?
2. What is the advantage to using small vs. large wheels in this speed race?
3. Make a position vs. time graph of your mousetrap (there must be at least 4 data points).
4. Explain how you find the average speed of your car from your graph above.
5. Use your graph to determine at what position your car was moving the fastest.
6. Use your position vs. time graph to make a speed vs. time graph.
7. Use this graph to get the average acceleration of your car and explain how you did this.
8. On your position graph, draw and label the following motions and explain how you determined these lines:
   1) car moving at a constant speed faster than your car.
   2) car moving at a constant speed slower than your car.
   3) car that starts off slow and gets faster towards the end.
   4) car that starts off fast and ends slow.
   5) car that only gets to the 2 meter mark, and stays there for 4 seconds.
9. Discuss the major problems encountered in the performance of your vehicle and what did you do to solve them.

Rubric

Quality

Category	4	3	2	1
Car Construction	Neat construction and assembly. Excellent attention to detail.	Good construction and assembly and good attention to detail.	Car holds together, but looks like a last-minute project.	Poor construction and assembly. No attention to detail.
Car Design	Unique theme/name and original design. Excellent level of creativity.	Interesting theme/name. Good level of creativity.	Basic theme/name. Basic level of creativity.	No detectable theme/name. No apparent creativity.
Car Performance	Travels 4 meters in a straight line.	Travels 3-4 m in a straight line. Or 4 meters, but not a straight line.	Travels 2-2.9 m in a straight line. Or less than 4 meters, but not a straight line.	Travels less than 2 m.