

# ***Mousetrap Cars***

## Problem

Will a mousetrap, when used as the single source of energy in a vehicle, be able to generate enough force to propel the vehicle at least 1 meter?

## Design Specifications

- The mousetrap may not be substantially altered except through the removal of unnecessary parts and extension of the spring arm. Alterations that are merely cosmetic (painting, streamlining, etc.) and do not affect the mechanical action of the mousetrap are acceptable.
- Cars will be tested for distance by releasing them from the same point and allowing them to run their course. Distance will be measured in a straight line perpendicular to the starting line. Any car that deviates from this line will have its distance measured to the point on the line where a perpendicular from its final position will intersect it.
- Each car will be given 3 trials in separate rounds and the average distance traveled will be used as the final measurement. Order of trials will be determined at random.
- Each car must have a name.
- This project will be counted as a major grade. (See Rubric)

## Materials (possible list; \* given by teacher)

- \* mousetraps
- hot glue
- craft sticks
- balsa wood
- wood dowels
- misc. recycled materials brought by students
- string
- \* 4 CDs
- fishing line
- misc. tools

## Procedures

1. Create a plan of action and sketch design of vehicle.
2. Build vehicle based on design plans.
3. Test vehicle.
4. Modify vehicle as needed.
5. Repeat steps 3 & 4 as time allows or until contest time.
6. Draw labeled diagram of final vehicle.

Data - chart and graph distances traveled including average and compare to other vehicles.

## Conclusions

Write a conclusion (claim, evidence, reasoning) that answers the problem question making sure to include and discuss the scientific laws and principles that explain why your car performed as it did.

# ***Mousetrap Car Rubric***

## **CREATIVITY**

- 20** = Tried several non traditional approaches. Showed willingness to experiment.
- 15** = Showed creativity in design, materials or construction methods.
- 10** = Little creativity expressed in the design. A "safe" approach used.
- 5** = Copied another design. No originality expressed in the design.

## **OPTIMIZATION**

- 10** = Major improvement in the course of the design process. Tried many new ideas.
- 8** = Several improvements made with good deal of success.
- 6** = Few improvements made, but talked a lot about many ideas.
- 4** = Few improvements made. Little involvement in the process of optimization.

## **EFFORT**

- 10** = Extensive rebuilding and testing for the entire term of the project.
- 8** = Some rebuilding outside of class. Tested frequently.
- 6** = Only worked during class time. Tested occasionally.
- 4** = Only built car on the last weekend. Largely untested before the final contest.

## **CRAFTSMANSHIP**

- 10** = Well built. Well aligned. Little friction. No breakdowns.
- 8** = Well aligned, little friction, rare/minor repairs needed.
- 6** = Sloppy alignment, much friction, frequent breakdowns.
- 4** = Poorly built, poor performance, difficulty completing events.

## **PERFORMANCE**

- 10** = Car travels greater than 1 m.
- 8** = Car travels between  $\frac{1}{2}$  and 1 m.
- 6** = Car travels at least 10 cm but less than  $\frac{1}{2}$  m.
- 4** = Car travels less than 10 cm.

## **DIAGRAMS**

- 10** = Have both initial and final designs; both are labeled; final design notes alterations from initial design.
- 8** = Have both initial and final designs; partially labeled or no alterations noted.
- 6** = Have both initial and final designs; no labeling.
- 4** = Have only one labeled diagram.
- 2** = Have only one diagram, not labeled.
- 0** = No diagrams

## **CONCLUSIONS**

- 30** = Has claim, evidence and reasoning. Reasoning is exceptional with ample data throughout.
- 25** = Has claim, evidence and reasoning. Reasoning is grade level appropriate with good amounts of data.
- 20** = Has claim, evidence and reasoning. Reasoning is decent, but lacks data and support.
- 15** = Has claim, evidence and minimal reasoning. Very little attempt at reasoning made.
- 10** = Has claim, evidence and no reasoning.
- 5** = Has claim and some/little evidence
- 0** = No conclusions turned in.