

AP Physics Mousetrap Racer Project

Planet Holloway Physics

Objective: Design and build a car capable of traveling straight for 30 feet powered only by a small mousetrap. Use your model racer to explain key physics concepts that relate to the motion of the car.

Requirements: The racer must have at least three wheels contacting the ground and be propelled solely by the power of a small mousetrap.

The racer may be up to 24" long, 12" wide and 24" tall, but may be any size under these maxima. The racer can be more than one piece, for example, a small car and a launching device.

Testing: The racer will be allowed three attempts in which to earn points. The best score will stand and extra credit can be earned if the 30 feet requirement is met. The racer will be tested in the long hallway outside the classroom and must be able to travel a relatively straight path. If the car crashes into the wall, that will be the end of the run.

Write up: Included with this project is a graphic report illustrating and explaining how the car is given energy from the spring. Every topic should include a well labeled visual, either a photo or an illustration.

- Identify and discuss in detail how the following concepts effect the motion of the racer: (try to keep each section under a page)
 - **spring energy** (explain spring constant experiment)
 - Determine the torsion spring constant (graph data you collected and discuss how you found the constant.
 - **torque** (show how the wheels are rotated)
 - **kinetic energy** (both translational and rotational)
 - **friction** (discuss both positive and negative effects)
 - **system** - Include a graphic or photograph that shows the entire transition of energy, force or another phenomenon represented on the car. Especially helpful is to include all vectors with labels drawn to scale. Label with numbers and discuss the chain of events chronologically. (This is basically a summary of your four sections above on one single photo or illustration) Try to fill half a page with the illustration and the explanation on the other half of the page.

Each section in the graphic report is worth 20 points (5 sections x 20 pts = 100 pts)

The written information is worth 10 pts and the illustration is worth 10 pts.

Oral examination: an oral question and answer period will occur during the testing of the racer. Answers to questions involving all of the above topics is worth 100 points.

Grading: There are three grades for this project, one for the performance of the racer, one for the oral exam and one for the graphic novel. The performance is worth 50 points and the graphic report and the oral exam are each worth 100. Total score out of 250 points.

Scoring for racer –

Three attempts will be allowed to score performance points. Highest score stands.

Objective	Points
Travel 60 feet	65
Travel 50 feet	60
Travel 40 feet	55
Travel 30 feet	50
Travel 25 feet or more	45
Travel 20 feet or more	40
Travel 15 feet or more	35
Travel 10 feet or more	30
Travel 5 feet or more	25
Moves forward	20
If racers meets 30 feet, can stop at 20 feet (+/- 1 ft)	+ 10 extra credit
If racers meet 30 feet and can stop at 20, stop at 12 feet (+/- 1 ft)	+ 10 extra credit

Mousetrap racer

(Bring this sheet with you to your testing session)

Names: _____ period _____

Grade sheet	Points possible	Points earned
Performance score	50	
Oral examination	100	
Graphic		
- spring energy	20	
- torque	20	
- kinetic energy	20	
- friction	20	
- system	20	
Total	250	