



Paper Roller Coasters

Purpose: To investigate the relationship between potential and kinetic energy.

Background: Roller coasters operate on the principles of potential and kinetic energy. The car is raised to a certain height, giving it gravitational potential energy. Then it is released, and the potential energy is converted into kinetic energy—the energy of motion.

You will build your own roller coaster to investigate the relationship between potential and kinetic energy.

Task. You're a roller coaster manufacturer competing for a bid to build a roller coaster for an amusement park. Your task is to design and build a paper model of the most fun and exciting roller coaster you can using the templates provided (<http://www.paperrollercoasters.com/>). You also need to be able to explain the physics behind it.

Design requirements. The entire roller coaster must fit on the base provided (18" x 24"). The coaster must include at least one curve, loop, and hill. It must also include one other element of your own design; this may be made by modifying the supplied templates or you may make it out of a material of your choice (not pre-made). The end point should be at ground level and free from obstruction.

3. You will be expected to keep an engineering journal of your design/ build process as well as a data sheet that summarizes the physics behind your roller coaster.

4. You will then present your roller coaster to the amusement park manager (teacher) and a panel of roller coaster enthusiasts (fellow students) and explain the design and construction of the roller coaster and why it is the most fun and exciting based on the physics involved.

Names _____

Date _____

Pd _____

Criteria

Roller Coaster	Score	Poss.
Roller coaster is made entirely of paper and tape (ex. for your ride element). Roller coaster is fixed securely to a base 18"x 24". End point is free from obstruction.		4
Sign identifying the roller coaster is prominently displayed. Sign shows the name of the roller coaster, the names of the designers/builders, and their class period. Sign is neat & attractive.		4
Roller coaster includes at least one curve, loop, and hill. Each element adds to the fun & excitement of the roller coaster.		8
Roller coaster includes one ride element of your own design. This element adds to the fun, excitement, and interest of the roller coaster.		3
Marble successfully completes the track 3/3 times. Marble maintains contact with the track throughout each run.		6
Quality & Craftsmanship: Roller coaster is free-standing. Roller coaster can withstand repeated use and movement. Paper is neatly cut and taped together. Decoration is added to create a theme or enhance the design.		7
Roller coaster is original, interesting, and fun.		3
Total		35

Presentation	Score	Poss.
Information: <ul style="list-style-type: none"> • Describe 4 elements you built into your roller coaster. • Explain why you built those elements. • Explanations include the concepts of speed, velocity, acceleration, force, PE, KE, work, and/or Newton's Laws of Motion. 		5
Sales Pitch: <ul style="list-style-type: none"> • Explains why your roller coaster is the best. (1) • Explanations supported by physics concepts. (2) • Physics concepts related to fun, excitement, and safety. (2) 		5
Presentation Delivery <ul style="list-style-type: none"> • Preparedness: All group members know what to do & say, are able to explain w/o reading & talk to the audience, pronounce words correctly, & are able to answer questions. (5) • Poise: Group members stand up straight & face the audience. (2) • Speaking Voice: Loud & clear. Not too fast or slow. (3) 		5
Total		15