Gravity-Driven Roller Coasters

(These rides use a lift hill right at the beginning of the ride to give the coaster its initial energy.)

Featured Rides: Grizzly, Demon, Vortex, Flight Deck, Loggers Run, Whitewater Rapids

Materials Needed: Protractor, stopwatch, horizontal and vertical accelerometers, calculator

Hints:

According to the Law of Conservation of Energy, the potential energy of the train at the top of the lift hill should be equal to the kinetic energy of the train as it reaches the bottom of the first downhill track section.

Questions to Be Answered:

Intermediate:

1) What is the potential energy of the train at the top of the first hill (the lift hill)?

2) What is the kinetic energy of the train at the bottom of the first downhill?

Advanced:

3) Compare the theoretical (calculated) velocity for the train with its measured velocity at the bottom of the first downhill.

4) Calculate the acceleration of the car as it goes down the lift hill.

Investigative Steps: Describe your procedure here.

Data and Observations: Record and organize your results here.

Calculations and Conclusions: Explain your answers to the questions here.

Going Further: The efficiency of a mechanical system is the ratio of its output energy to its input energy. What could cause one roller coaster to be more efficient than another? Design and conduct an experiment that compares the efficiencies of two different roller coasters between the top and bottom of their respective lift hills, and explain any observed difference.

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