

Rollercoaster Physics

Use the words in the word banks to fill in these incomplete sentences.

hill turns do engine throat thrilling stop is playing bought down

use not coaster separating the first safe its wheels you track hour

You've _____ your ticket and boarded the roller coaster. Now you're barreling _____ the track at 60 miles per hour, taking hairpin _____ and completing death-defying loops. Your heart is in your _____ and your stomach _____ somewhere near your shoes. The only thing _____ you from total disaster is a safety harnessbut are you really in danger?

The designers of the roller coaster carefully crafted this _____ ride to be just that, but you're actually in less danger than _____ think. You face a greater threat of injury _____ sports or riding a bike than you _____ on a park ride. Amusement park rides _____ physics laws to simulate danger, while the rides themselves are typically very _____.

How does a roller coaster work?

What you may _____ realize as you're cruising down the track at 60 miles an _____ is that the coaster has no _____. The car is pulled to the top of the _____ hill at the beginning of the ride, but after that the coaster must complete the ride on _____ own. You aren't being propelled around the _____ by a motor or pulled by a hitch. The conversion of potential energy to kinetic energy is what drives _____ roller coaster, and all of the kinetic energy you need for the ride is present once the coaster descends the first _____.

Once you're underway, different types of _____ help keep the ride smooth. Running _____ wheels guide the _____ on the track. A final set of wheels keeps the coaster on the track even if it's inverted. Compressed air brakes _____ the car as the ride ends.

Use the words in the word banks to fill in these incomplete sentences.

at begins advantage weekend speeds friction with are nonlooping steeper

first depending a but comfort can keep for more end parks on of

Wooden or steel coaster: Does it make a difference?

Roller coasters _____ be wooden or steel, and can be looping or _____.

You'll notice a big difference in the ride _____ on the type of material used.

In general, wooden coasters _____ nonlooping. They're also not as tall and not as fast, and they don't feature very steep hills or as long _____ track as steel ones do. Wooden coasters do offer one _____ over steel coasters, assuming you're looking _____ palm-sweating thrills: they sway a lot _____. Tubular steel coasters allow more looping, higher and _____ hills, greater drops and rolls, and faster _____.

Roller Coaster History

In the 1600s in Russia, the forerunners _____ present-day roller coasters were huge blocks of ice that were fashioned into sleds, with straw or fur on the icy seat for passenger _____. Sand was used to help slow down the sled at the _____ of the ride to keep it from crashing, a technique based on the principle of _____. Later, more elaborate wooden sleds were built _____ iron runners to increase the speed and intensity of the ride.

The first American coasters

America's amusement park history _____ on Coney Island in New York City in 1875. Railway companies, in search of ways to _____ passenger usage up _____ the weekends, set up parks here _____ the end of the rail lines and introduced _____ and summer activities. The first rides at these _____ were carousels, _____ in 1884, the first gravity switchback train was introduced. This was the _____ true roller coaster in America. built now Depression before track helped decline feet the steel hour exciting times could physics they by Second the track first would

Rollercoaster History (Continued)

In 1912, the first underfriction roller coaster was introduced _____ John Miller. This design held the coaster train on the _____ and allowed for more speed, steeper hills, and less drag. The 1920s saw _____ building of some of the best roller coasters of all _____. But the 1929 stock market crash, followed by the Great _____ and the _____ World War, caused a _____ in amusement parks.

A new era for roller coaster design

In 1955, the nation's _____ theme park opened: Disneyland. Not only did Disneyland

usher in a new era for amusement parks, it also _____ bring about some radical changes in roller coaster design. Up this time, coasters were _____ out of wood, which limited the way loops _____ be handled. In 1959 Disney introduced _____ Matterhorn, the first tubular steel coaster. The _____ features we expect from today's coasters--loops, a corkscrew _____, and stability--can be traced back to this first _____ coaster.

The first successful inverted coaster was introduced in 1992, and _____ you can find passengers riding in coasters with their _____ dangling freely below them (and occasionally above them) as _____ circumnavigate the track. In 1997, a coaster opened at Six Flags Magic Mountain whose design _____ have been considered impossible even a few years _____ . Superman is 415 feet tall and can reach a speed of 100 miles per _____ . Technology, working with the laws of _____, continues to push what is possible in ride design.

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object slow of riders at balls have parts by their made is

Free Fall

Galileo first introduced the concept _____ free fall. His experiments led to the finding that all objects free fall at the same _____, regardless of their mass. According to legend, Galileo dropped _____ of different mass from the Leaning Tower of Pisa to help support his _____.

A freely falling body is an _____ that is moving under the influence of gravity only. These objects _____ a downward acceleration toward the center of _____ earth. Isaac Newton _____ took Galileo's ideas and formalized _____ into his laws of motion.

How do free-fall rides work?

Free-fall rides, like Superman at Magic Mountain, are really _____ up of three distinct _____: the ride to the top, the momentary suspension and the _____ plunge. In the first part of the ride, force _____ applied to the car to lift it to the _____ of the free-fall tower. This force is applied by motors.

After a brief period in which the _____ are suspended in the air, the car suddenly drops and begins to accelerate _____ the ground under the influence of the earth's gravity. The plunge seems dramatic. Just as Galileo and Newton explain in _____ theories of free fall, the least massive and most massive riders fall to the _____ with the same rate of acceleration. If the riders were allowed to _____ the earth at that speed, coming to a sudden stop at the end of the ride, there would certainly be _____ injuries. Ride designers account for this _____ building an exit track. A stretch of straight track allows the car to _____ down and brake, producing a controlled stop _____ the bottom.