

# Scream Machine

## Amusement rides

There are many types of amusement ride that use different forces and mechanisms.



swing ride



drop tower



pendulum ride



roller coaster



carousel



log flume

## Forces

A force is a push or a pull. To make an object move, such as a roller coaster carriage, a force must be applied to the object. Nothing will move without a force pushing or pulling. Roller coaster carriages don't have engines so they rely on forces to keep them moving.

### Gravity

Gravity is a force that pulls objects toward each other. On Earth, gravity pulls all objects towards its centre. On a roller coaster ride, gravity pulls the carriage faster on a downhill slope and slows the carriage down as it climbs uphill parts of the ride.

### Friction

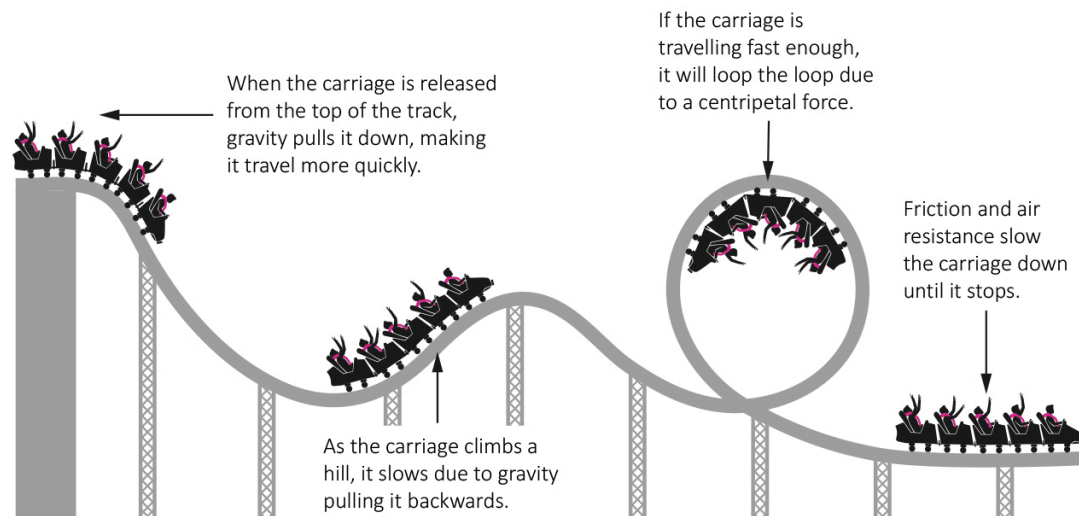
Friction is a force between two surfaces that rub together. Friction slows down a moving object and produces heat. The amount of friction depends on the types of materials that rub together. Using a smooth mat on a helter-skelter slide creates less friction than using a rough mat so the rider would travel faster.

### Water and air resistance

Water and air resistance are types of friction. Water and air push against objects moving through them and slow the objects down. Many roller coaster carriages are streamlined, meaning they are designed to reduce air resistance.

### Centripetal force

Centripetal force keeps an object moving in a circle at a constant speed. On a swing ride, the chains of the swings exert a centripetal force on the swing seat and the rider, keeping them travelling at a constant speed in a circle.



## Roller coaster design timeline

- 1400s** Artificial ice hills are built in Russia and people ride down them on sledges.
- 1700s** Owners of ice hills decide to build hills of wood so they can be used all year round. Customers ride sledges mounted on wheels.
- 1804** The first wheeled roller coaster, known as Russian Mountains, opens in France.
- 1810–40** Russian Mountain roller coasters become popular in France and faster, more exciting roller coasters are designed.
- 1850s** Many roller coasters are dismantled due to accidents and safety concerns.
- 1874** The Mauch Chunk Railway in the United States stops carrying coal from a mountaintop mine. Instead, passengers ride down the mountain.
- 1884** The wooden Switchback Railway ride opens in Coney Island, USA.
- 1895** A looping roller coaster called the Flip-Flap Railway is installed in Coney Island. Safety features like lap bars are introduced to keep riders in their seats.
- 1920s** Roller coaster development peaks, with rides such as the Scenic Railway at Dreamland, UK.
- 1940s** Amusement parks close because of material shortages during the war. Wooden roller coasters fall into disrepair.
- 1959** The Matterhorn Bobsled, a steel roller coaster, opens in Disneyland, California.
- 1970s** Nostalgic, wooden 'megacoasters' such as The Racer and The Beast are built in the USA.
- 1990s** New features like the inverted carriage are developed. Nemesis at Alton Towers is the first inverted roller coaster in Europe.
- 2010** The fastest roller coaster in the world, Formula Rossa, opens in the United Arab Emirates. It travels at 150 miles per hour.

## Mechanisms

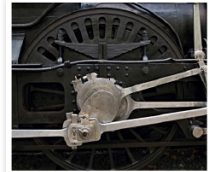
A mechanism is a part of a machine or several parts that work together to create movement.



A lever is a long, rigid arm balanced on a fulcrum. Levers are found in seesaws, wheelbarrows and crowbars.



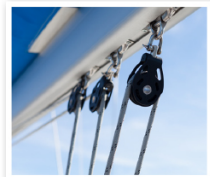
A linkage is made up of several rigid lever arms connected by joints. Linkages are found in extending platforms, extending mirrors and diggers.



A cam mechanism is made up of three parts: a cam, slide and follower. Cams are found in car engines and steam trains.



Gears are wheels with teeth that slot together. Gears are found in wind-up toys, clocks and bicycles.



A pulley is a rope looped around one or more wheels. Pulleys are found in lifts, roller coaster rides and attached to the sails of boats.

## Glossary

- air resistance** A force that acts on an object when it moves through the air, causing it to slow down.
- cam** A mechanism that changes one type of motion into another type of motion.
- force** A push or pull that can change an object's speed, shape or direction of movement.
- gear** A mechanism that is used to change the speed, force or direction of a motion.
- gravity** A force that pulls things towards each other.
- inverted carriage** A roller coaster carriage that sits under the rail.
- linkage** A mechanism that is used to direct force or motion where it is needed.
- lever** A simple mechanism that is used to move a load with less effort.
- machine** A piece of equipment with moving parts that works when given power, such as electricity. Machines help people perform difficult tasks.
- pendulum** A weight on a thread or stick that swings from side to side.
- pulley** A mechanism that is used to lift a load with less effort.
- streamlined** Designed to move more easily through air or water.