

# Bike Gears

## Key words

**gears, machine, force, friction,**

*gears = system of toothed wheels and chains used to move a bike*

*machine = an invention which multiplies the effect of human effort to make work easier*

*force = a push or pull that acts on an object due to the interaction with another object*

*friction = a force between 2 surfaces that are sliding across each other*



- A typical bicycle has anything from 3 to 30 different **gears** (wheels with teeth), linked by a chain, which make the machine faster or easier to pedal (going uphill). The largest gear is by the pedals and the smaller ones on the rear wheel.
- Gears are an example of a **simple machine**, they can make an incredible difference to your speed. Say the gear ratio on a racing bike is 5:1. This means a single spin of the pedals will move you about 10 metres.
- The **force** used by pedalling enables the gears to **spin** the back wheel. As the back wheel rotates, the tyre uses **friction** to grip the surface and move the bike.
- How much energy are we talking about? You can generate about 10 watts of energy with a hand-cranked electricity generator (though you can't use one of those for very long without getting tired)! This tells us that it's much easier to generate large amounts of power for longer time periods by using your big leg muscles than by using your arms and hands.

## How To Take it Further

Now you have made your gears you can start to think about how they can be used for different purposes when cycling for example going uphill vs cycling along a flat road.

Watch this video [https://www.youtube.com/watch?v=oauDylu\\_swM](https://www.youtube.com/watch?v=oauDylu_swM)

Using your gears how could you:

Make a gear chain to create a low gear for cycling up hills.

Make a gear chain to create a high gear for cycling down hills.

Which gear would you choose for cycling on the flat and why?

## Fun Facts and Information

- In 1885 John Kemp Starley designed a bicycle driven by a chain from the rear wheel – The 'Safety Bicycle'. They were an incredibly simple version of the bicycles we use today.
- In 1895 a Frenchman called Jean Loubeyre designed the **derailleur**. A gearing system consisting of a chain, multiple sprockets of different sizes, and a mechanism to move the chain from one sprocket to another (you might have a version of this on your bike).
- Bigger wheels also help you go faster (on the straight), but there are not great for hills. That's one of the reasons why mountain bikes and BMX bikes have smaller wheels than racing bicycles.

