8 Rolling friction

The amount of friction that occurs when something rolls over a surface is far smaller than when it slides.

Friction makes things difficult to move. So how do we reduce friction without using oil?

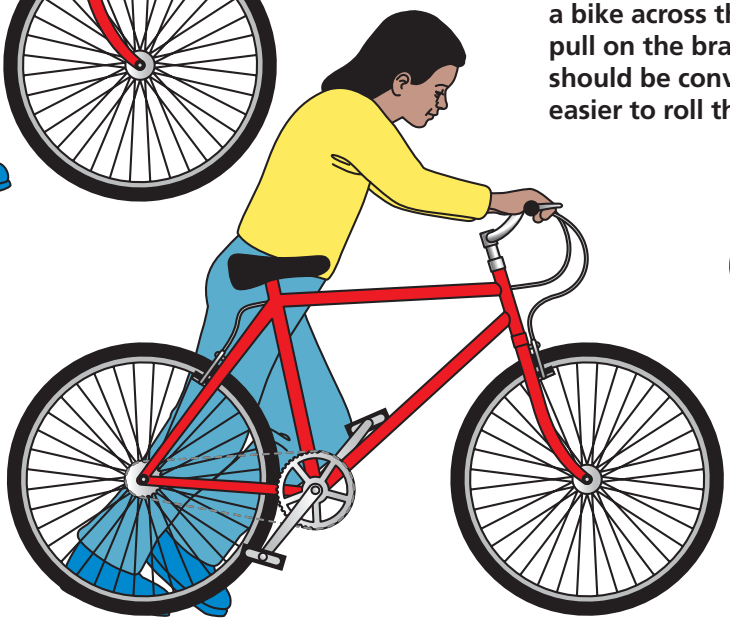
Wheels and rollers

Friction is highest when we drag one thing over the other. A sledge, for example, drags one rough surface over another. But wheels, or rollers, use less friction across the surface. Instead, they roll over it (Picture 1).

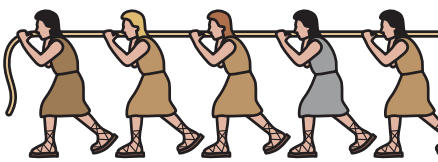
When you use rollers or wheels, you need less than a thousandth as much force to move an object than if you dragged it across the ground. If you compare the effort needed to pull a stone slab on a sledge, and to push it over rollers, you will quickly see how much easier it is to roll something (Picture 2).

Simple rollers

The simplest roller is just a log from a tree. People in ancient times probably moved many of the giant slabs of stone that built monuments such as Stonehenge in England, or the Pyramids in Egypt, using rollers (Picture 3).



◀ **(Picture 1) To see the difference between sliding and rolling, first push a bike across the playground. Now pull on the brakes and try again. You should be convinced that it is much easier to roll than to slide.**



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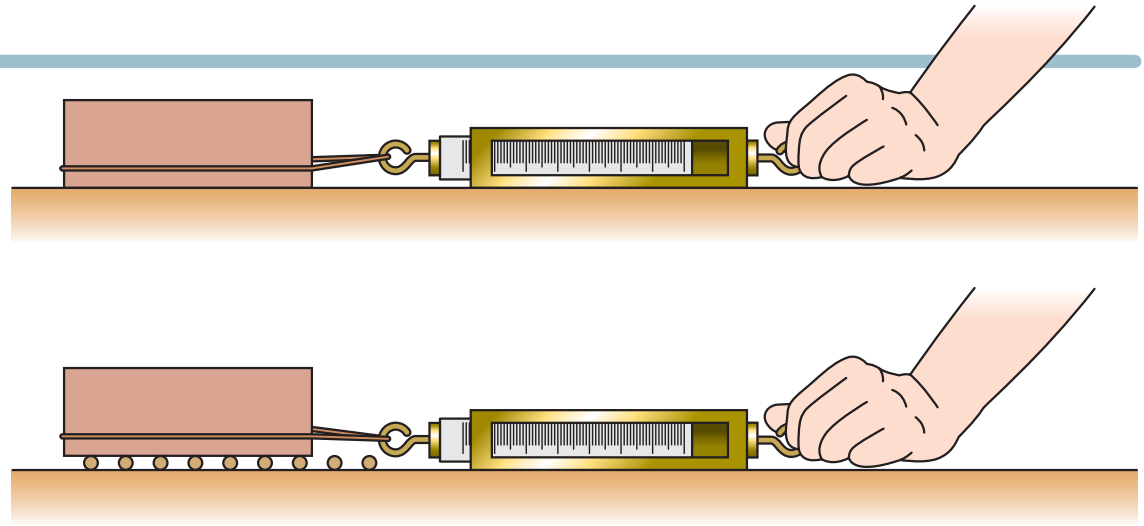

▶ (Picture 2) Use a forcemeter to compare rolling and sliding friction. First drag a brick along a table top and find the force needed to move it. Then put the brick on rollers and measure the force needed to move the brick.

▼▲ (Picture 3) Rollers are like wheels. Instead of sliding over a rough surface, they simply roll over. Rollers were probably used to move the giant blocks for Stonehenge, England, from their starting point in Wales.

Summary

- Rolling friction is up to a thousand times smaller than sliding friction.
- The discovery of the wheel changed the way in which people moved things.