FRICTION

Friction is a force that opposes the movement between two surfaces in contact.

We can feel the effect of friction

- While riding a bicycle



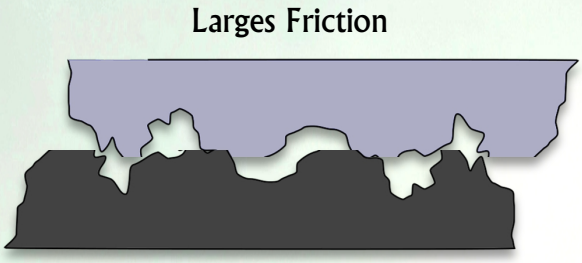
- While walking



- When we sit on sofa



The magnitude of the frictional force depends on the types of surfaces in contact.

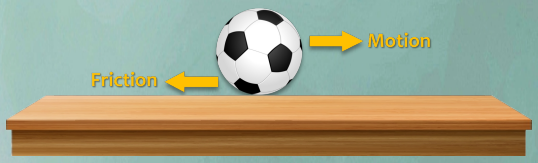


Rough surface



Smooth surface

Friction is always parallel to the surfaces in contact.



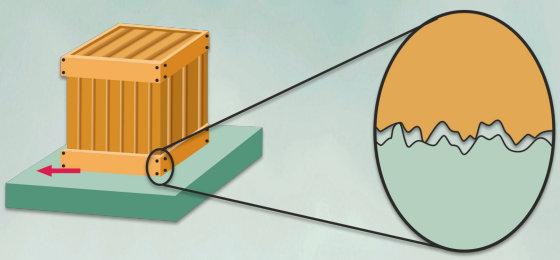
Spring balance

Spring balance is a device used for measuring the force acting on an object or the weight of an object.



The cause of friction

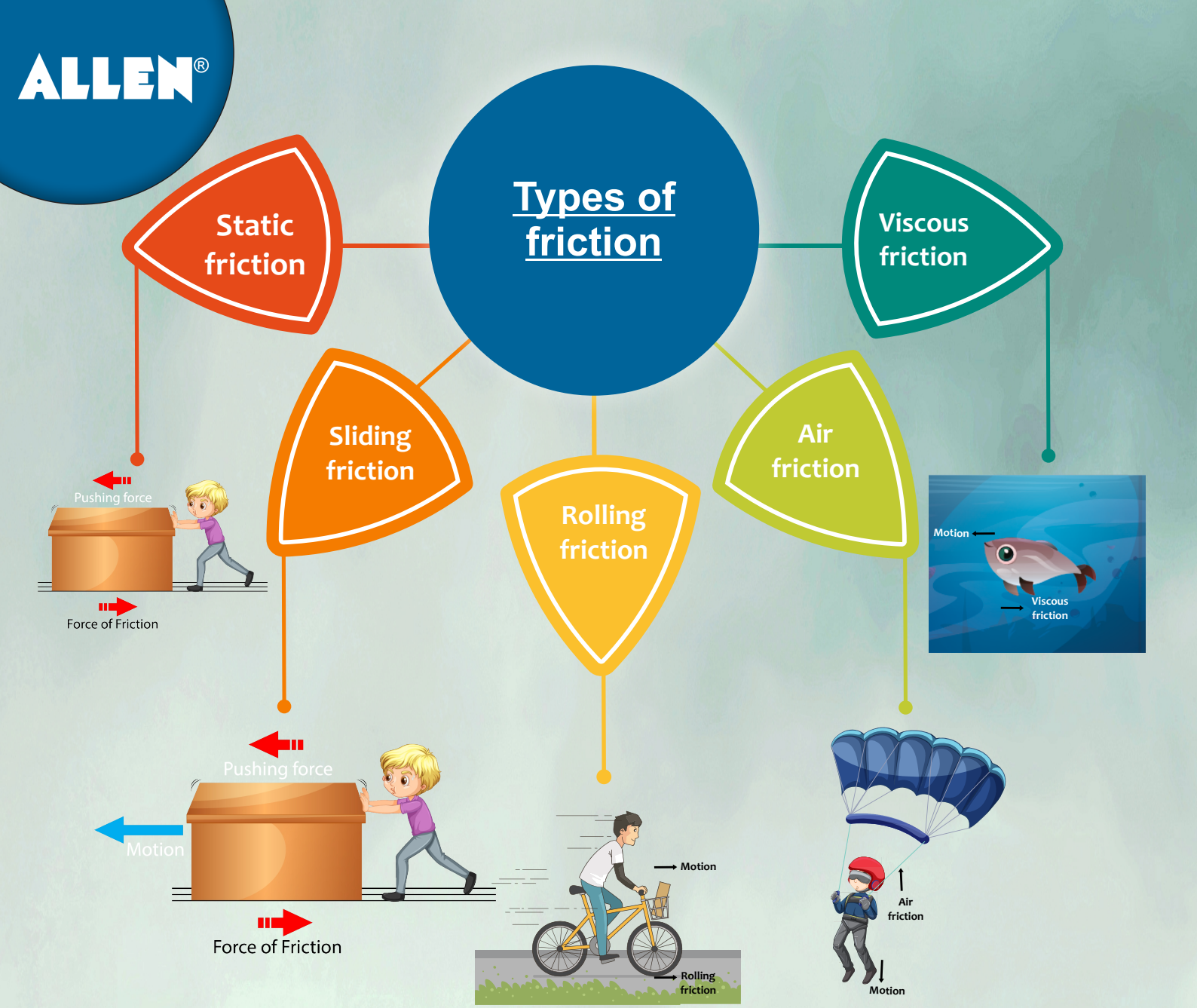
Friction is caused by the irregularities on the two surfaces in contact. These tiny hills and valleys on both the surfaces lock into one another.



Friction depends on the force between surfaces

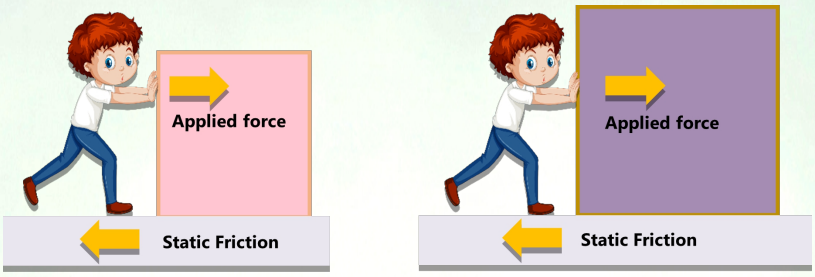
The greater the force pressing the two surfaces together, the greater will be the force of friction between them.





Static friction

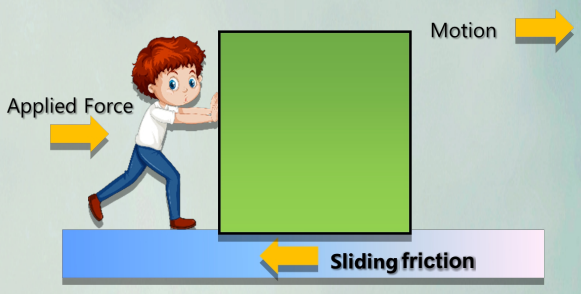
Static friction is the force between two surfaces in contact that tends to prevent a stationary object to start moving.



The maximum static friction is called the starting friction or limiting friction. It is the amount of force that must be overcome to start a stationary object to move.

Sliding friction or dynamic friction

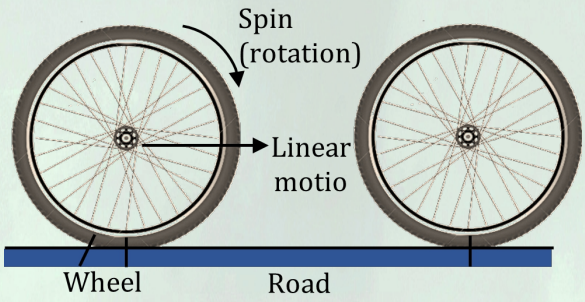
The force that opposes the movement of two surfaces that are in contact and are sliding over each other is called sliding friction.



Sliding friction is smaller than static friction

Rolling friction

When one body rolls over the surface of another body, the resistance (opposition) to its motion is called the rolling friction.



Fluid friction

The force of friction exerted by the fluids on the objects moving through them is called fluid friction.



Air resistance



Viscous friction

Types of Fluid friction

Air resistance

is a form of friction that acts to slow down any object moving in the air.

Viscous friction

The resistance offered by the liquids to the motion of the object moving through them is called viscous friction.

Factors that affect fluid friction

- Speed of the object in the fluid :
  The faster an object moves in a fluid, the greater is the fluid friction acting on it.

- Shape of the object moving in the fluid:
  A streamlined body is a shape that reduces friction drag between a fluid, such as air or water, and an object moving through it.

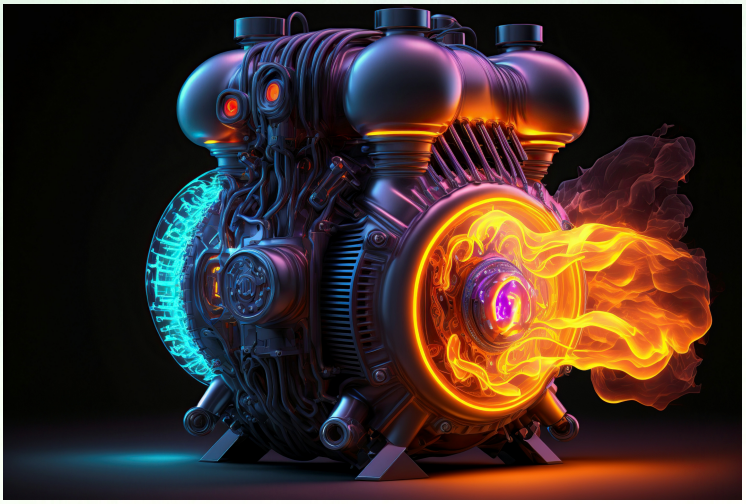
- Nature of the fluid:
  object experiences different amounts of friction in different fluids.

Friction and energy

Friction changes energy of motion into heat energy.

ex.
Heat in machines

Friction is always present in any machine with moving parts.



Friction : a necessary evil

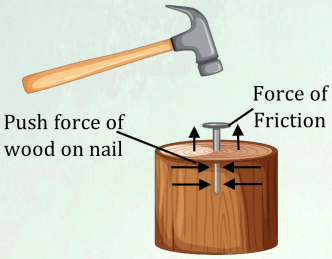
Friction is often undesirable, it causes wear of machine parts, engines, soles of shoes, etc. Thus, friction is an evil.

Friction is useful/necessary in many cases

- Friction is required to hold vessels like glass tumbler.
- You could not tie a knot ‘ without friction.
- You could not fix a nail in the wall without friction.
- You could not write with pen or pencil if there were no friction.
- Friction is useful for brakes and tyres.

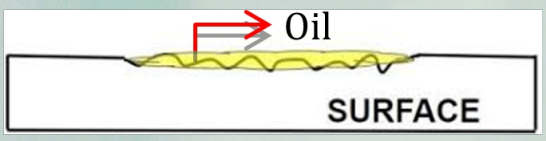


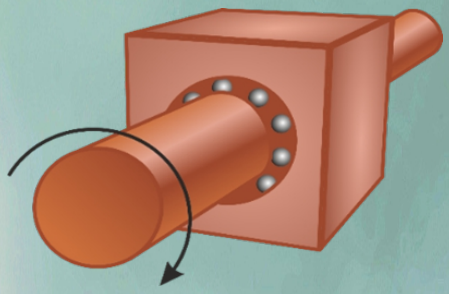












Reducing friction

- Lubricants reduce friction in machines
- Ball bearings reduce friction
- Air cushion reduces friction
- Streamlining reduces fluid friction





Increasing friction

1. Grooving the soles of shoes increases friction
2. Treads on tyres increase friction



