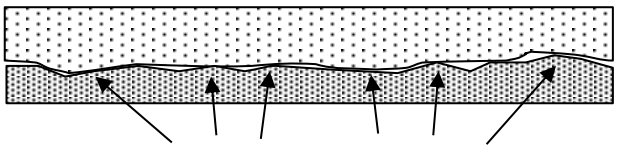
# FRICTION

Friction is the force that tries to stop objects moving.

Whenever one object slides over another, ***friction acts to slow down*** the moving object.

Frictional forces occur because surfaces can never be completely smooth. Two surfaces in contact have many points that try to "stick together".



Many points in contact.

The size of the force of friction depends on the following.

- ***The roughness of the surface.***

  The rougher the surface, the greater the friction.

- ***The force pushing the two surfaces together (usually the weight of the object on top).***

  The greater the weight (load), the greater the friction.

- ***The surface area in contact.***

  The greater the surface area, the greater the friction.

**Types of Friction**

- ***Limiting friction*** - friction that tends to keep an object stationary.
- ***Sliding friction*** - friction that occurs when one surface slides over another.
- ***Rolling friction*** - friction that occurs when one object rolls over a surface.

In terms of the size of friction: **limiting > sliding > rolling.**

# FRICTION IN EVERYDAY LIFE

We use friction every day - sometimes needing more friction and at other times needing to reduce it.

## Reducing Friction

### *Lubrication*

- An oily substance is placed between two surfaces in contact.
- Allows the surfaces to slide easily over each other.

e.g. Oil in a car's engine reduces the friction of the pistons moving in the cylinders.

### *Bearings*

- Ball-bearings and roller-bearings make surfaces roll over one another.
- Much less friction than sliding friction.

e.g. Bearings in the axles of bicycle and car wheels.

### *Polish*

- Makes surface very smooth so they slide more easily.

e.g. Yachts are polished so that their hulls slide easily through the water.

### *Streamlining*

- Objects that travel at speed have special shapes that reduce friction.

e.g. Cars, planes, birds and fish have shapes that allow them to move at speed.

### *Air Cushions*

- Air blown between two surfaces reduces friction significantly.

e.g. Hovercraft move on a cushion of air.

## Increasing Friction

### *Roughen the Surface*

- The rougher the surface, the more points of contact that act to stop it slipping.

e.g. Tread on a tyre; the teeth on a file; the striking surface on a box of matches.

### *Use a Large Force Between Surfaces*

e.g. Tie a knot tightly so that it does not slip; air scoops force racing cars harder into the track which increases their grip.