

**KNOWLEDGE ORGANISER**  
**BIG IDEA: FORCES**  
**TOPIC: CONTACT FORCES**

Key Word	Definition
<b>equilibrium</b>	State of an object when opposing forces are balanced.
<b>deformation</b>	Changing shape due to a force.
<b>linear relationship</b>	When two variables are graphed and show a straight line which goes through the origin, and they can be called proportional.
<b>Newton</b>	Unit for measuring forces (N).
<b>resultant force</b>	Single force which can replace all the forces acting on an object and have the same effect.
<b>friction</b>	Force opposing motion which is caused by the interaction of surfaces moving over one another. It is called 'drag' if one is a fluid.
<b>tension</b>	Force extending or pulling apart.
<b>compression</b>	Force squashing or pushing together.
<b>contact force</b>	One that acts by direct contact

**Friction**

Friction happens when two surfaces rub together. These forces act in the opposite direction to the movement. Friction makes it more difficult for things to move. Friction is a contact force.

**Helpful frictional forces**

- Friction between our shoes and the floor stop us from slipping
- Friction between tyres and roads stop cars from skidding

**Unhelpful frictional forces**

If you do not lubricate your bike regularly with oil, the friction in the chain and axles increases. Your bike will be noisy and difficult to pedal. When there is a lot of friction between moving parts, energy is transferred to the surroundings, causing heating. Friction can be reduced using oil or grease. This is called lubrication.

**Drag**

Moving objects experience drag as they move. Drag is caused by the frictional forces of the air or water against the object. The faster the vehicle moves, the bigger the air resistance becomes. Drag is a contact force.

**Streamlining**

Streamlining reduces air resistance. Streamlined objects have smooth shapes that allow the air to flow over them more easily.



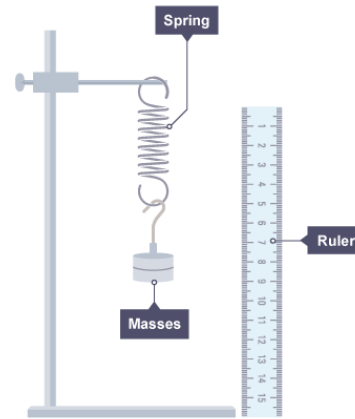
The air flow over a car travelling at low speed

**Hooke's Law**

The extension of a material or a spring is its increase in length when pulled. Hooke's Law says that the extension of an elastic object is directly proportional to the force applied to it. In other words:

- If the force applied is doubled, the extension doubles
- If no force is applied, there is no extension

The graph of force against extension is a straight line through the origin, which shows a linear relationship. The force and extension are proportional. At some point the spring will not go back to its original length when you remove the force. This is the elastic limit.



An experiment to investigate Hooke's Law

