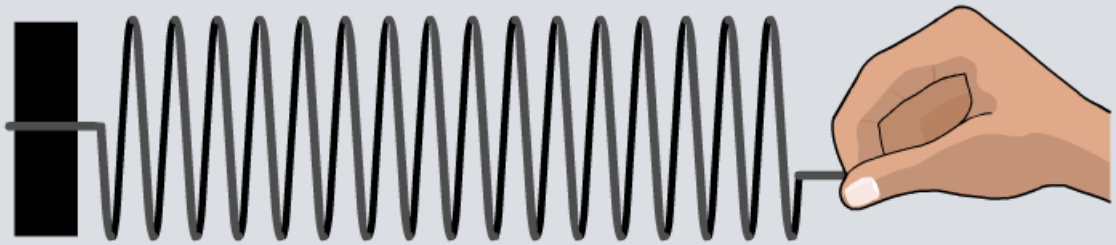
Springs



Introduction to springs

The behavior of **springs** is important since they have many uses, from car and bike suspension to clock-making.

It is important to know how springs will react when forces are applied.

Tensile and compressive forces

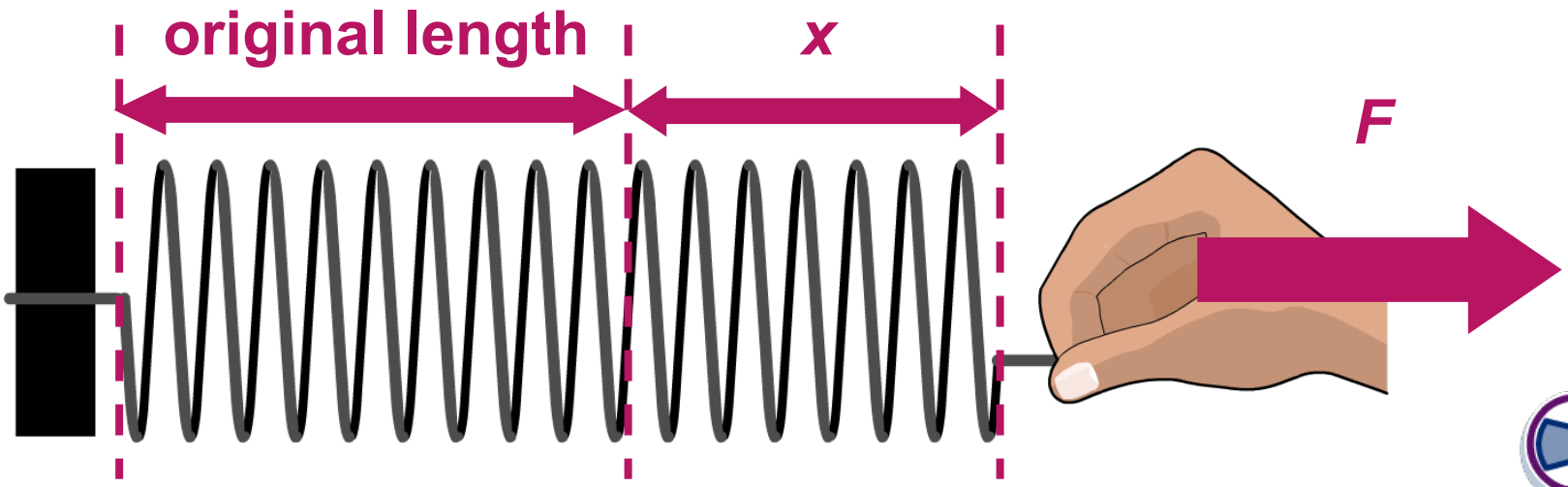
Restoring force

Hooke's law and the force constant

Hooke's law states that the extension of a spring, x, is directly proportional to the force applied to it, F.

$F \propto x$ or $\boxed{F = kx}$ where k is a constant.

k is called the **force constant** or the **spring constant**, or sometimes the **stiffness constant**. The units of k are Nm^{-1}.



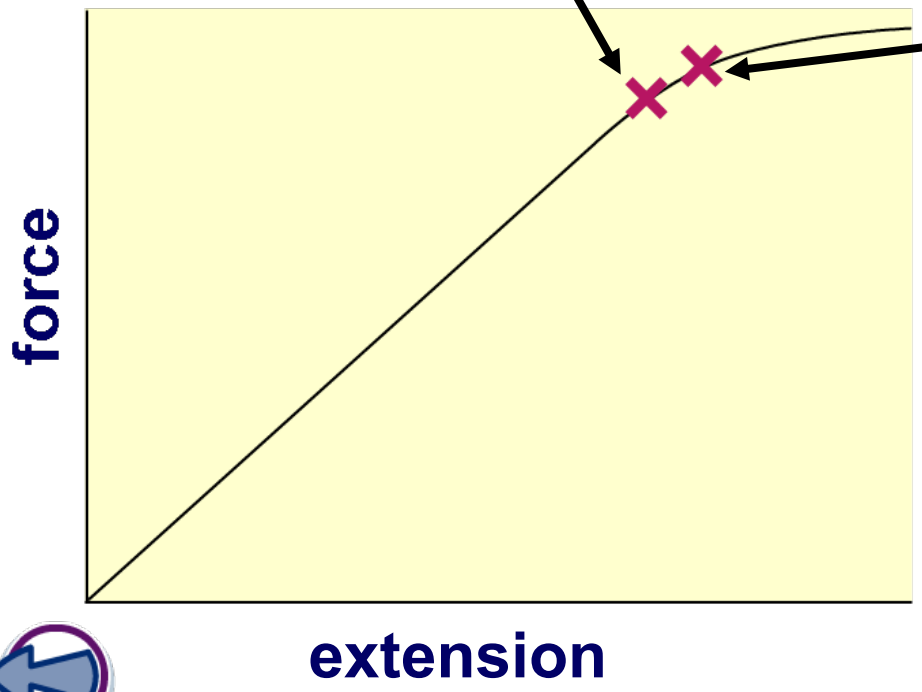
Finding the force constant

Calculating the force constant

Elastic limit for springs

If a spring is stretched far enough, it reaches the **limit of proportionality** and then the **elastic limit**.

The limit of proportionality is a point beyond which behavior no longer conforms to Hooke's law.



The elastic limit is a point beyond which the spring will no longer return to its original shape when the force is removed.

Elasticity is the ability to regain shape after deforming forces are removed.