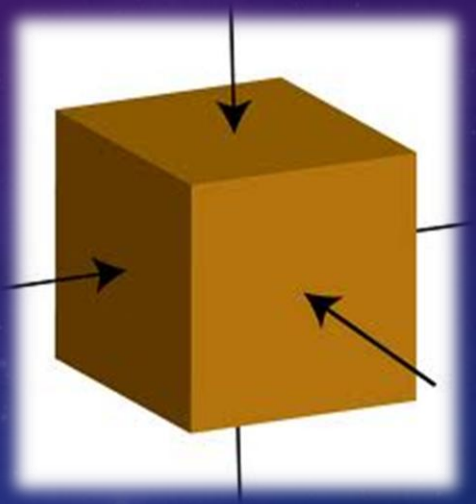
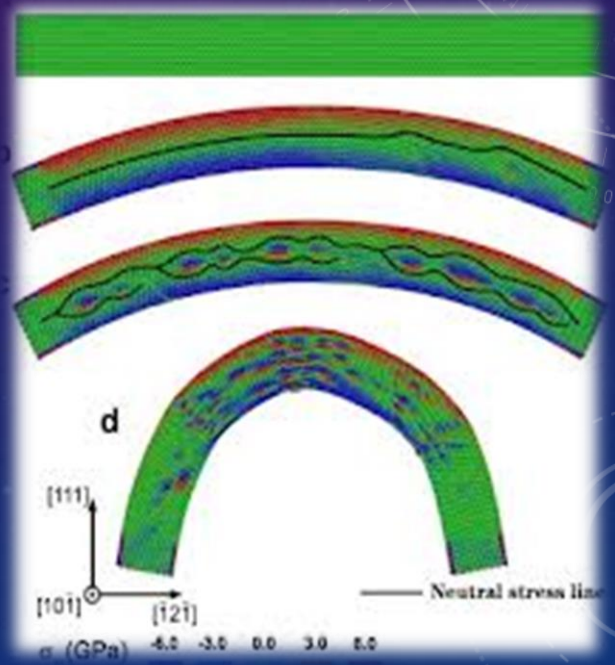
FORCES ACTING ON SOLIDS

Forces can change the size and shape of an object. They can stretch, squash, bend or twist it.





STRETCHING SPRINGS

Springs are designed to stretch a long way when small force is applied , so it is easy to measure how their length changes.

The spring is hung from a rigid clamp, so that its top end is fixed. Weights are hung on the end of the spring- there are referred to as the **load**.

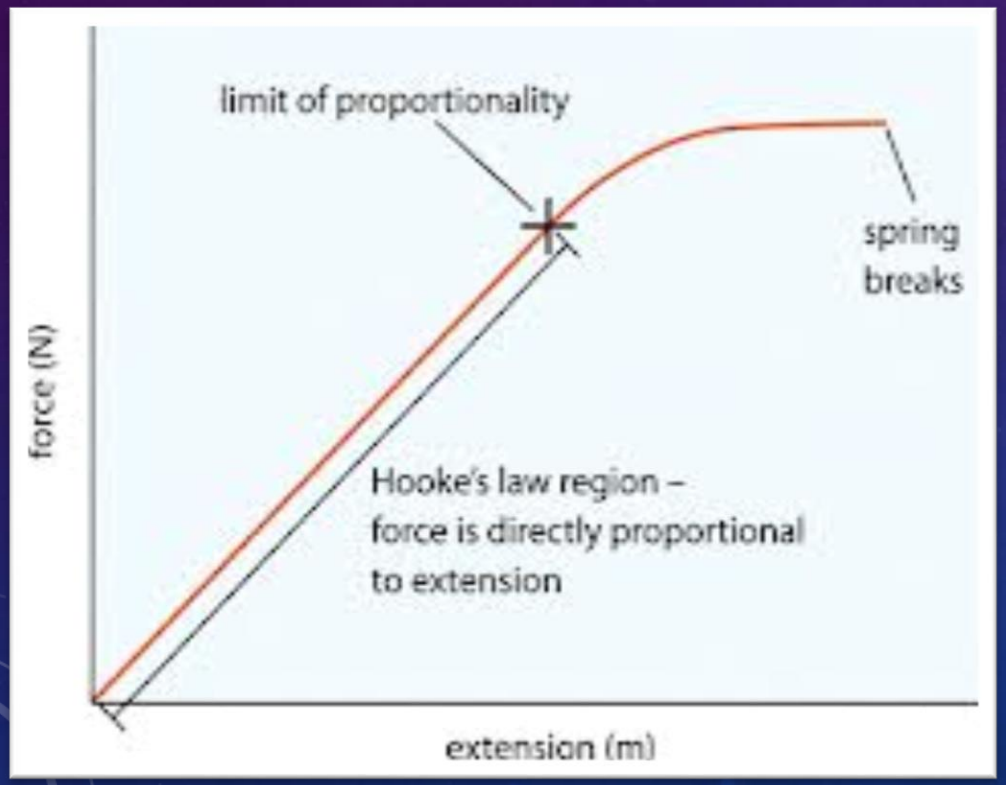
As the load is increasing, the spring stretches and its length increasing.

However, if the load is increased too far, the spring becomes permanently stretched and will not return to its original length. It has been **inelastically deformed**.

EXTENSION OF A SPRING

Length of stretched spring= original length + extension

HOOKE'S LAW



The extension of a spring is proportional to the load applied to it, provided the limit of proportionality is not exceeded.

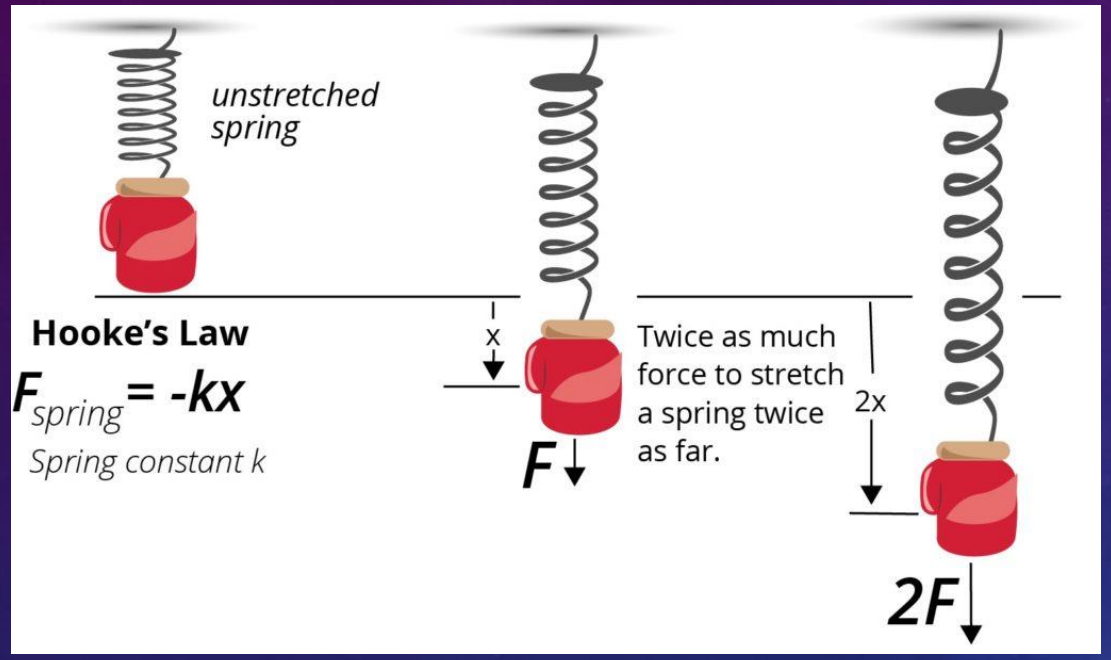
$$F=kx$$

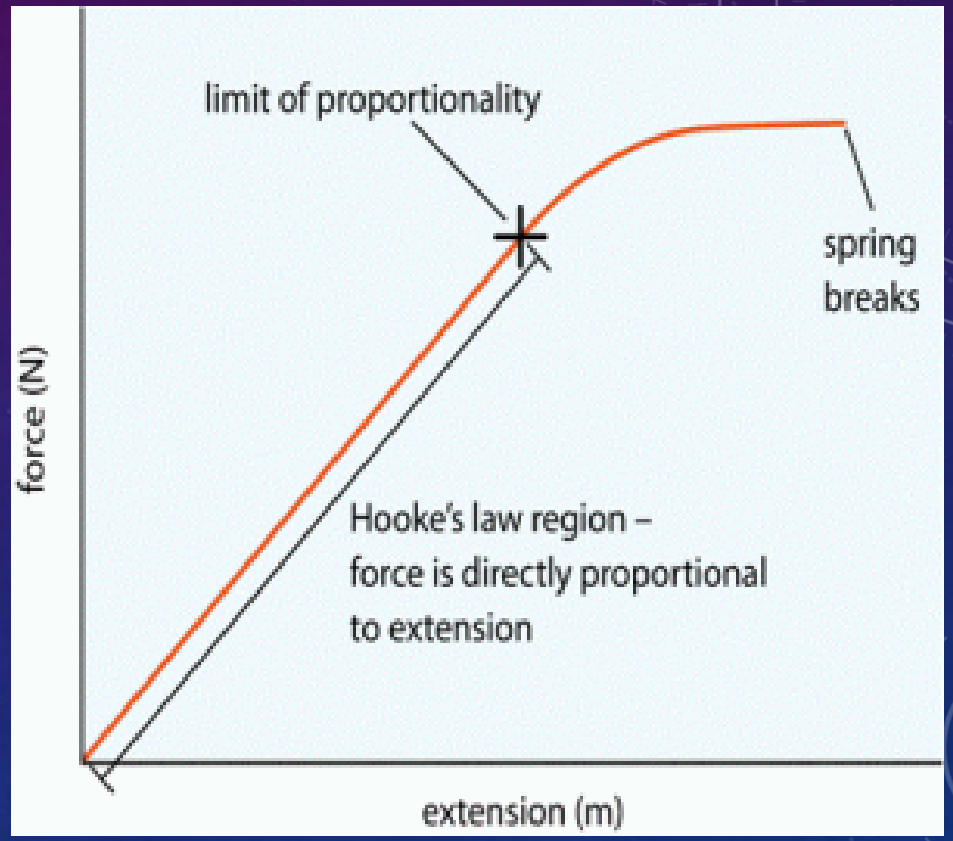
F is the load(force) stretching the spring

K is the stiffness of the spring

X is the extension of the spring

HOOKE'S LAW


unstretched spring
Hooke's Law
$F_{spring} = -kx$
Spring constant k
x
F
Twice as much force to stretch a spring twice as far.
2x
2F


limit of proportionality
spring breaks
force (N)
Hooke's law region – force is directly proportional to extension
extension (m)