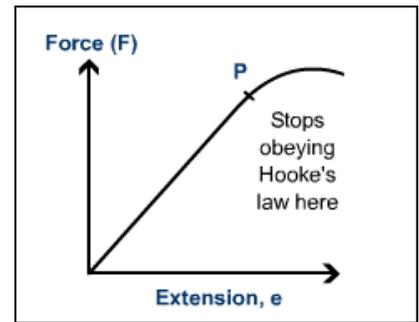


Hooke's Law

What did Hooke discover?

- the more **force** that was put on materials the more they _____
- With some materials they also extended in a regular way
-eg. if the force was _____ so did the extension
- this was true as long as their _____ was not exceeded



What is the elastic limit?

- The material no longer shows elastic _____
-ie does not return to _____ size when stretching force is _____

- i.e. is _____ or _____ than _____
- The material is _____ as the above effects are caused by _____ of some atomic _____

Since Force is *proportional* to extension Hooke's Law could be put as $F \propto x$

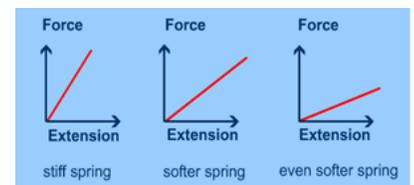
Where F is the applied force in _____

x is the extension in _____

Or if k is the _____ constant $F = kx$

What does k mean in $F=kx$?

- k is called the _____ **constant** and is a measure of the _____ of the _____ or material
- It has units of _____ (newtons per metre)
- The _____ the k the _____ the spring
- Materials with a _____ k need a _____ force to for a given _____



Example

- A spring is 0.38m long.
- When it is pulled by a force of 2.0 N, it stretches to 0.42 m.
- What is the spring constant? (Assume the spring behaves elastically.)

Extension:

An engineer needs to know how far a long beam will sag under a load. The table shows some results:

load (N)	1000	2000	3200	4400	5200	6500
sag (cm)	2.0	4.0	6.6	8.8	10.4	13.4

- a] Plot a graph of the sag against load. (**Plot x = load, y = sag**)
- b] One of the measurements for sag is wrong.
(i) Which? (ii) What should the result be?
- c] What would be the sag for a load of 4500 N?
- d] What load would give a sag of 5.2 cm?
- e] Would a longer beam sag more or less? Sketch its graph on the same axes.

SAG: to sink, bend, or curve, esp. in the middle, from weight or pressure; to hang down unevenly or loosely; to lose firmness, strength, or intensity