CP 13: Forces and matter

1. Bending and stretching

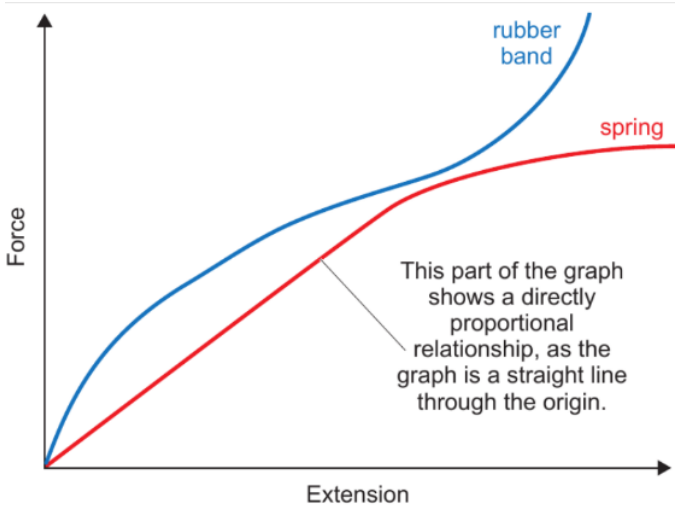
Elastic distortion	When something returns to its original shape after force is applied.
Inelastic distortion	When something doesn't return to its original shape after force is applied.
Direct proportion	Doubling A doubles B, a graph of B vs A **straight line through the origin**.

2. Core practical – investigating springs

Core Practical - Aim	To explore how increasing the force affects the extension of a spring.
Core Practical - Setup	Suspend a spring or rubber band from a clamp stand and fix a metre ruler in place so the '0' is level with the bottom of the spring/band.
Core Practical – Measurements	Hang a 100 g (1 N) mass from the rubber band / spring, and measure the extensions. Repeat up to 1 kg.
Core Practical - Variations	Repeat with different springs or wires or other materials
Core Practical - Calculations	Calculate spring constant as: Spring constant = force / extension

3. Extensions and energy transfers

Spring constant and graphs	The spring constant is the gradient of a graph of force vs extension.
Extension is greater when…	Force is higher, spring constant is lower
Work done	The energy transferred by a force.
Energy, E	Stored in a stretched spring (joules, J)
Extension, x	The increase in length of a spring when a force is applied (metres, m, or cm). Difference between length and original length
Spring constant k	A measure of the strength of a spring (units: N/m)
Force, F	Usually caused by hanging weights (newtons, N)



force exerted on a spring = spring constant × extension	$F = k \times x$
energy transferred in stretching = 0.5 × spring constant × (extension)^2	$E = \frac{1}{2} \times k \times x^2$