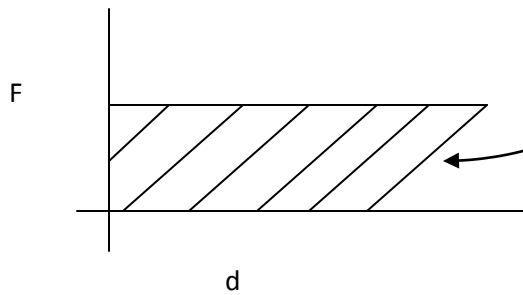


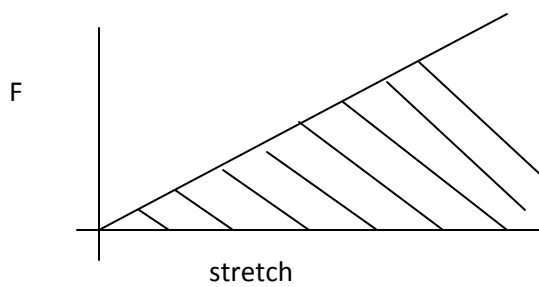
## Elastic Energy



Area under the Force/displacement graph = work done.

$$W = Fd$$

This is similar to the Force/stretch graph



**Area** under the Force/stretch graph = **work done** to stretch the graph.

**Work done = energy stored.** So....the area under this graph = elastic energy stored!

So if I know how much I've stretched (or compressed) a spring from equilibrium and the force applied, I can calculate the elastic energy stored.

$$\text{Area} = \frac{1}{2} bh$$

$$= \frac{1}{2} Fx \quad k = F/x \quad \text{so} \quad F = kx \quad (\text{Hooke's constant formula rearranged})$$

$$= \frac{1}{2} (kx)x$$

$$= \frac{1}{2} kx^2$$

So... Elastic energy stored =  $\frac{1}{2} kx^2$

$$E_e = \frac{1}{2} kx^2$$