Elastic Potential Energy

$$\text{E.P.E.} = \frac{\lambda x^2}{2l}$$

The Elastic Potential Energy (E.P.E.) stored in a spring or string is equal to the work done in stretching/compressing it.

Work done =

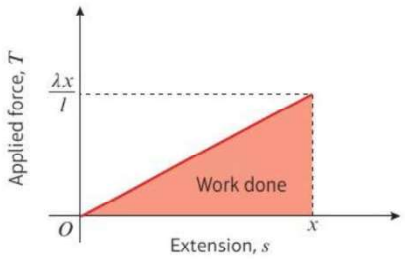
Initial tension (before extending) =

Final tension (after extending) =

Average tension =

EPE = average tension x distance =

Area of triangle = work done



Integration:

$$E.P.E. = \int_0^x T\,ds = \int_0^x \frac{\lambda s}{l}\,ds = \left[\frac{\lambda s^2}{2l}\right]_0^x = \frac{\lambda x^2}{2l}$$

The variable s represents the extension at any point during stretching. x represents the final extension.

An elastic string has natural length 1.4m and modulus of elasticity 6N. Find the energy stored in the string when its length is 1.6m

A light elastic spring has natural length 0.6m and modulus of elasticity 10N. Find the work done in compressing the spring from a length of 0.5m to a length of 0.3m.

Ex 3C - quick!