

5.5 – Elastic objects and Conservation of Energy

An elastic item is one that will return to its original state when deformed (typically stretch or compressed). The original state is the equilibrium state.

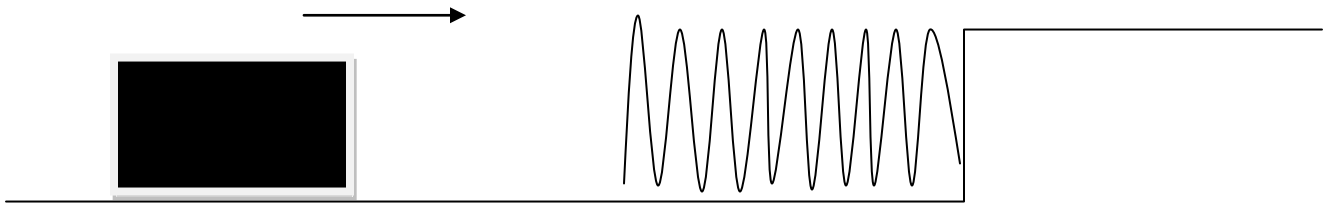
ie: bungee cord, shock absorber, sling shot

Force / Stretch graph – area under graph = work done to deform
- slope of best fit line = elastic constant (k)

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

Conservation of Energy

A block of mass 2.5 kg is sliding along a smooth, level surface (ie: assume frictionless) at 3.0 m/s when it hits a stationary spring bumper fixed to the wall, whose elastic constant is 360 N/m. What is the maximum amount the spring is compressed?



Assume 100% efficiency in the energy transfer. Max. compression when all E_k transferred to E_e .

$$E_k \rightarrow E_e$$

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

$$(2.5\text{kg}) (3 \text{ m/s}) (3\text{m/s}) = 360 \text{ N/m} (x^2)$$

$$x^2 = 0.0625\text{m}^2$$

$$x = +/- 0.25 \text{ m} \quad * \text{ What does +/- mean?}$$

The spring will compress maximally by 25 cm.

Homework : p. 254 # 1,2,3,4,5,6