# PhyzSpringboard: Elastic Potential Energy


**1. What happens when you lift a box?**

a. Do you exert a force? Yes

b. Is the force applied through a distance? Yes

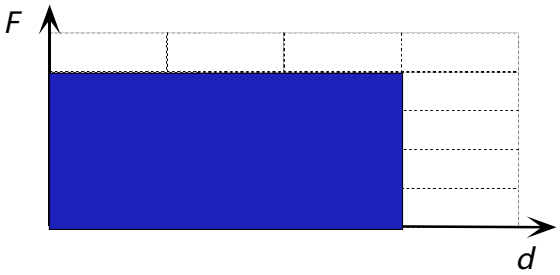
c. Is work done? Yes

d. What happens to the work you did once the box is lifted? Where is the energy stored and what is it called?

It is stored as gravitational potential energy in the box.

**2. How can the work done in this case be calculated?**

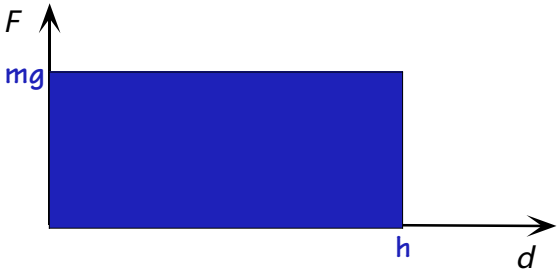
a. Make a plot of Force vs. Distance for lifting a 4 N object to a height of 3 m.




b. What is represented by the "area" bound by the "curve"? How much area is bound in this case?

$4N \cdot 3m = 12J$

c. Generalize: make a plot that represents lifting any body with a mass *m* to a height *h*. Careful: *mass* is not *force*.




d. Write a general formula for the area bound.

$PE = mgh$

**3. What happens when you stretch a spring?**

a. Do you exert a force? Yes

b. Is the force applied through a distance? Yes

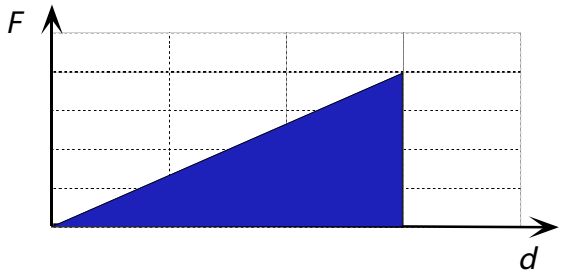
c. Is work done? Yes

d. What happens to the work you did once the spring is stretched? Where is the energy stored and what is it called?

It is stored as elastic potential energy in the spring.

**4. How can the work done in this case be calculated?**

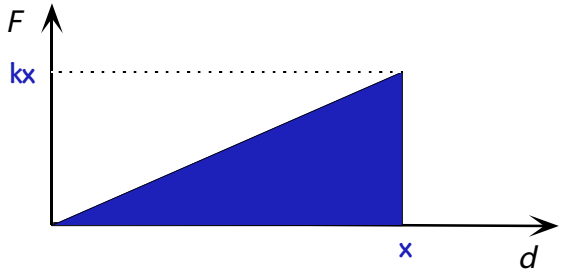
a. Make a plot of Force vs. Distance for stretching a spring 3 m with a force of 4 N.




b. What is represented by the "area" bound by the "curve"? How much area is bound in this case?

$(1/2)\ 4N \cdot 3m = 6J$

c. Generalize: make a plot that represents stretching any spring a distance *x* by applying a force *kx*.




d. Write a general formula for the area bound.

$PE = (1/2)\ kx \cdot x$

$PE = (1/2)\ kx^2$