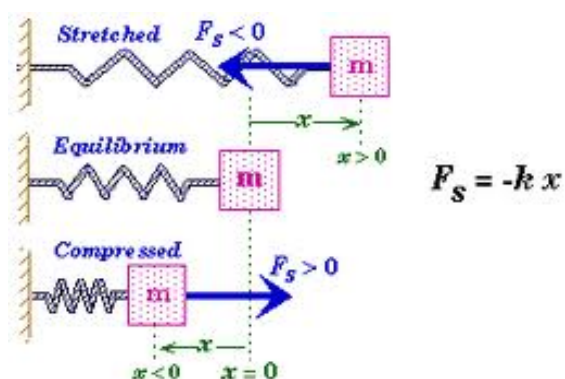


7.5 Work



Work by a constant force:

Work =(force)(distance)

$$W = F \cdot D$$

Example: Find work to lift a 10 lb bag 3 feet.

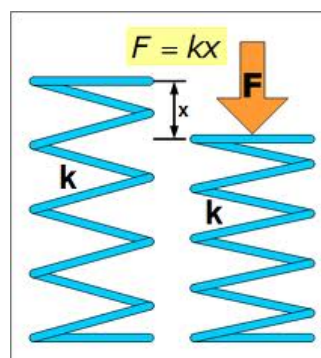
$$W = (10 \text{ lb.})(3 \text{ ft.})$$

30 foot-pounds

Work by a variable force:

$$W = \int_a^b F(x) dx$$

Hooke's Law $F = kx$



Example

Find work if

$F = 3x^2$ lbs. on an object and it is moved 8 feet.

$$W = \int_0^8 3x^2 dx$$

answer: 512 ft lbs.


 https://www.youtube.com/watch?v=x_0YWeHXZFE

Nice overview
(5 min.)

More in depth problems

 <https://www.youtube.com/watch?v=SYEGQpT1X5s>

16 min. introductory examples
springs ropes and chains

 <https://www.youtube.com/watch?v=2pblnn9PkHQ>

10 min. rope example

 <https://www.youtube.com/watch?v=fJtxJv5sdqo>

10 min. introductory examples
pumping water from a tank

Example

It takes 20 lbs to compress a spring 5 inches from its length of 10 inches. How much work will it take to compress it from 5 to 7 inches?

$$F = kx$$

$$20 = k \cdot 5$$

$$4 = k$$

$$\text{so } F = 4x$$

$$W = \int_5^7 4x dx$$

answer 48 in lbs.

