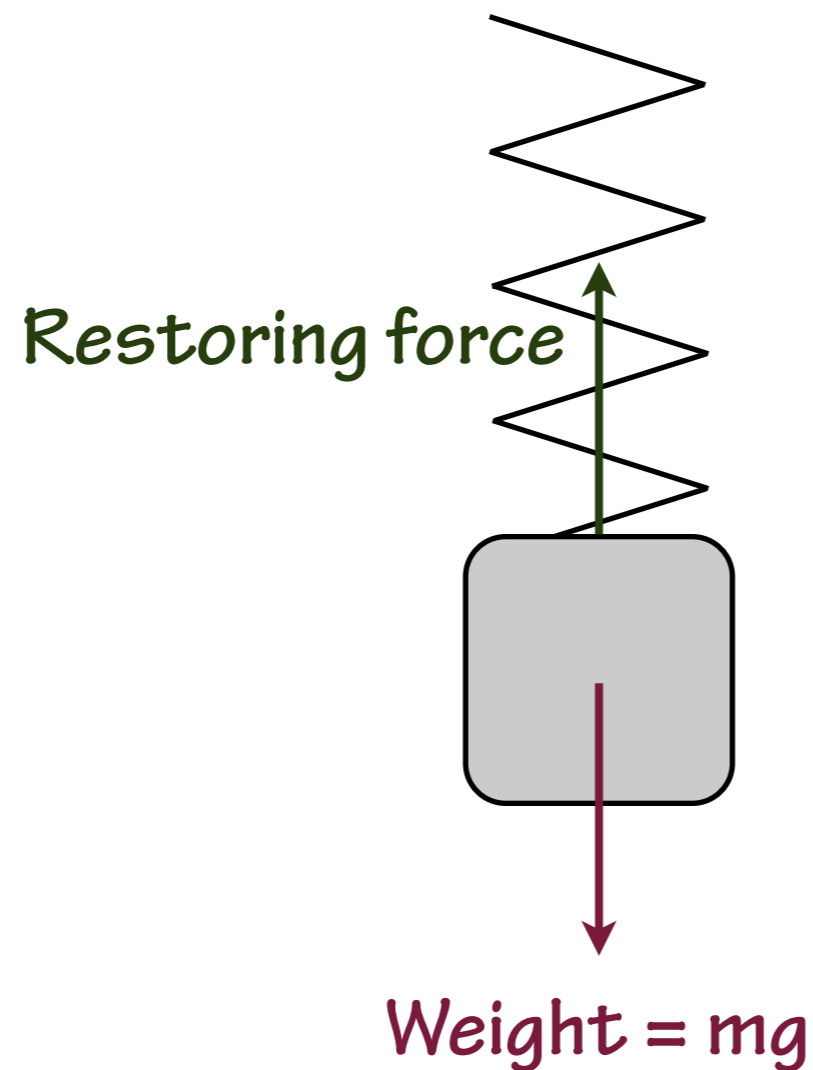
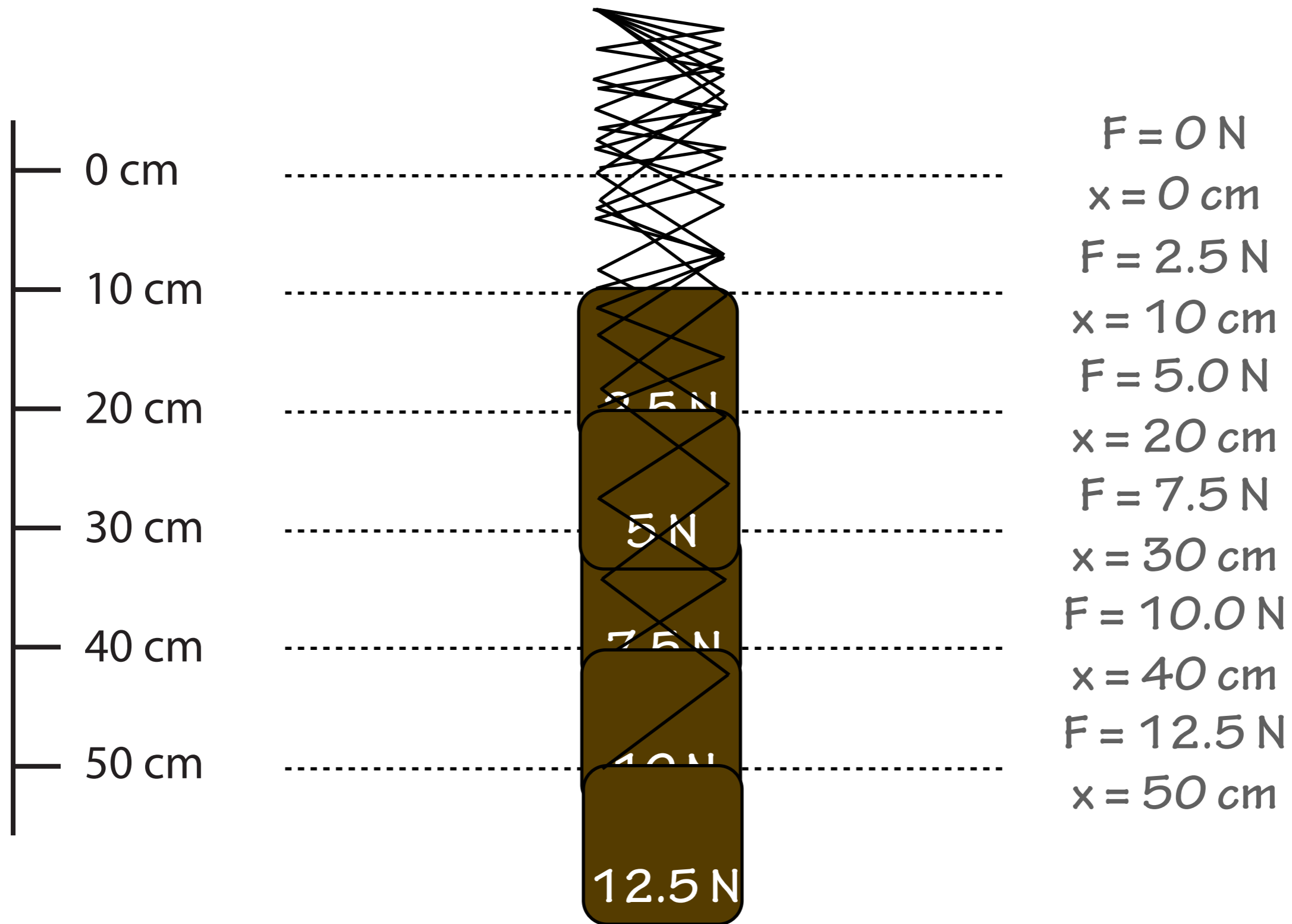


Hooke's law - restoring force

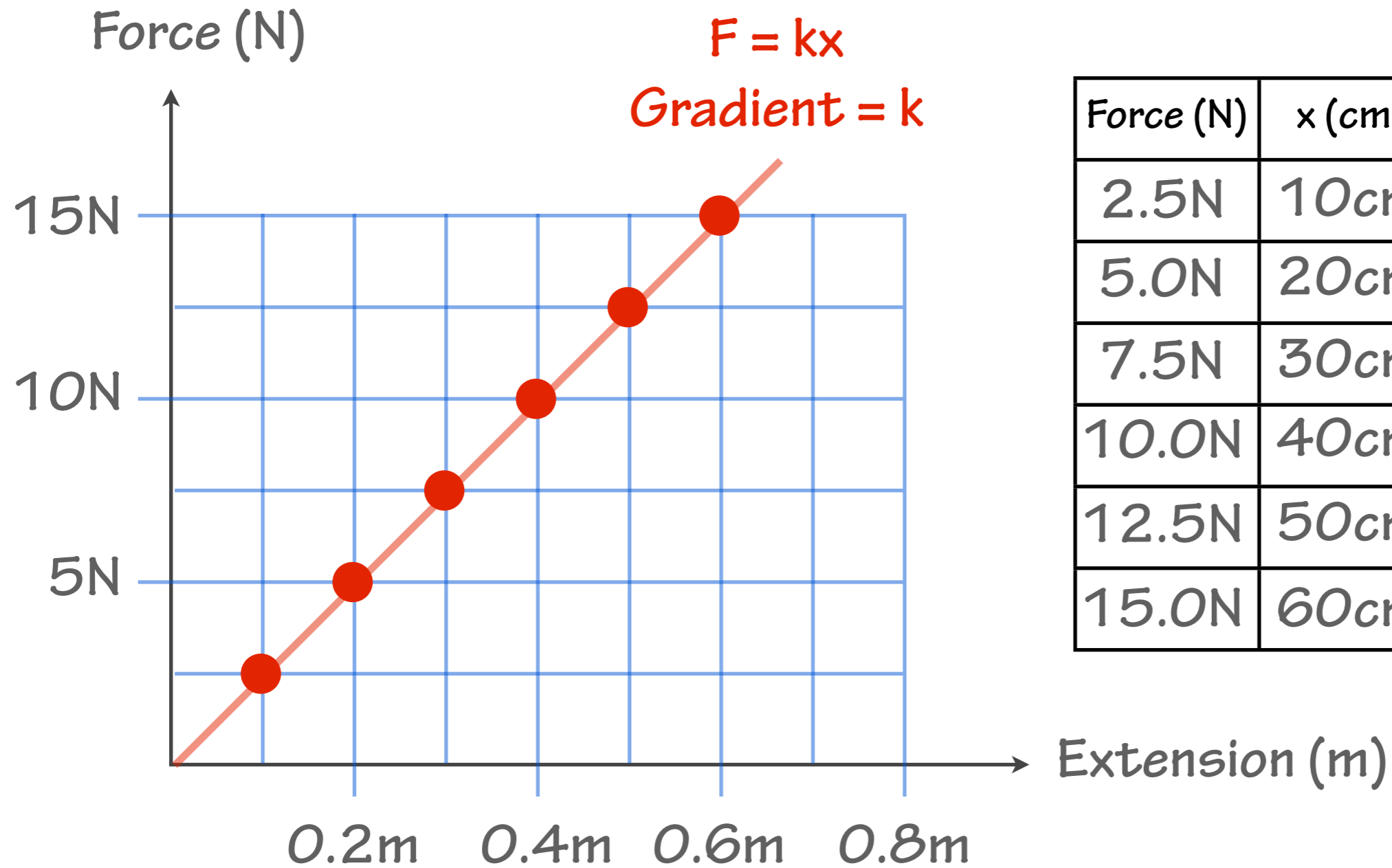
- Stretching a spring requires a force to act against the tendency to retain the same shape.
- This is often described as a “restoring force”.



Hooke's law - measuring forces & extension



Hooke's law - graphing data



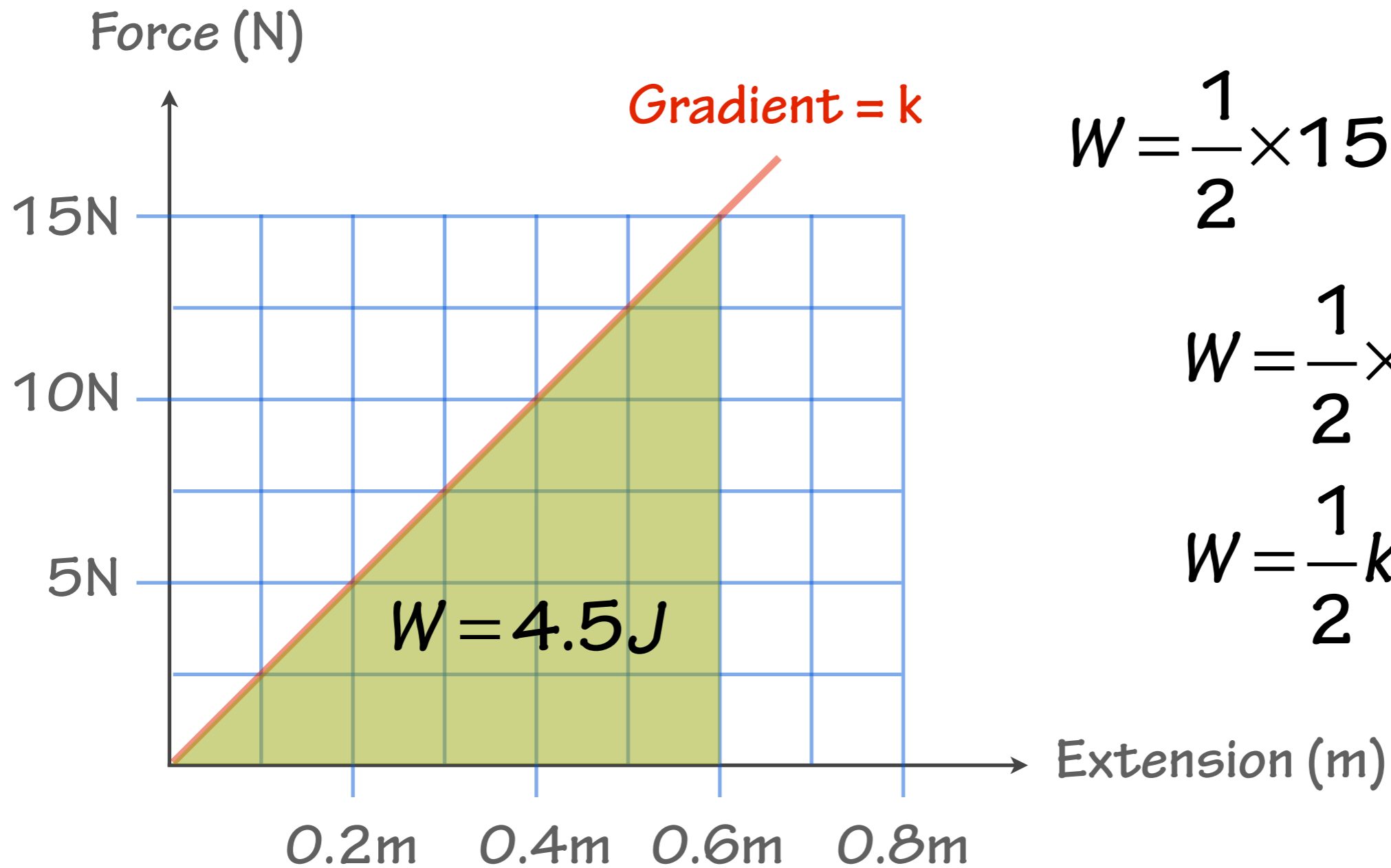
Force (N)	x (cm)	x (m)
2.5N	10cm	0.1m
5.0N	20cm	0.2m
7.5N	30cm	0.3m
10.0N	40cm	0.4m
12.5N	50cm	0.5m
15.0N	60cm	0.6m

$$k = 15\text{N} / 0.6\text{m} = 25 \text{ N/m}$$

Elastic energy

- Remember that work is the product of force & displacement.
- As the string stretches, the restoring force increases.
- An increasing work is needed for each extension as the force increases.
- The work done can be found from the area under the graph.

Elastic energy



$$W = \frac{1}{2} \times 15\text{ N} \times 0.6\text{ m}$$

$$W = \frac{1}{2} \times kx \times x$$

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

Because of the square rule, doubling the extension requires 4x the energy.