

# Edexcel Physics GCSE

## Topic 15.6: Forces and Matter

### Practical notes

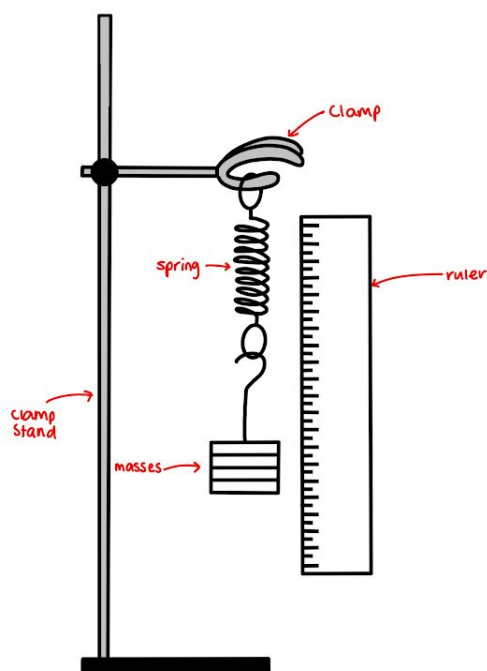


## Core Practical 8: Investigate the extension and work done when applying forces to a spring

### Equipment:

- Clamp
- Clamp stand
- 10x 0.1kg masses
- Spring
- Ruler
- G clamp or additional weights

### Diagram



### Method

1. Using the ruler, measure the initial length of the first spring when no force is applied.
2. Set up the spring so it is hanging securely from the clamp stand.
  - You can also secure the ruler to the clamp stand to ensure it does not move at all during the experiment.
3. Add one of the masses to the end of the spring and record the extension of the spring.
  - The extension is the difference between the new length and the initial length.
4. Continue adding masses and recording the extension each time.
5. Plot a graph of force against extension for the spring.
  - Force can be calculated from mass x gravitational field strength (i.e. 10 x the mass hanging on the spring).
  - The gradient of the line of best fit will be the spring constant as  $k = \frac{F}{x}$
6. Using this value, you can calculate the work done each time the spring extends.
  - Use the formula  $W = \frac{1}{2}kx^2$

### Tips



- Ensure all measurements are taken from eye level in order to avoid parallax error.
- After every measurement, remove all weights and ensure that the spring has not undergone plastic deformation. It should always return to the same initial length.
- All lengths should be measured in metres.

### **Safety Precautions**

- Ensure goggles are worn during this experiment in case the spring snaps.
- Use heavy objects or a G clamp to secure the clamp stand to the desk so that the clamp and masses do not fall over and hurt someone.

