WJEC England Physics GCSE

Specified Practical

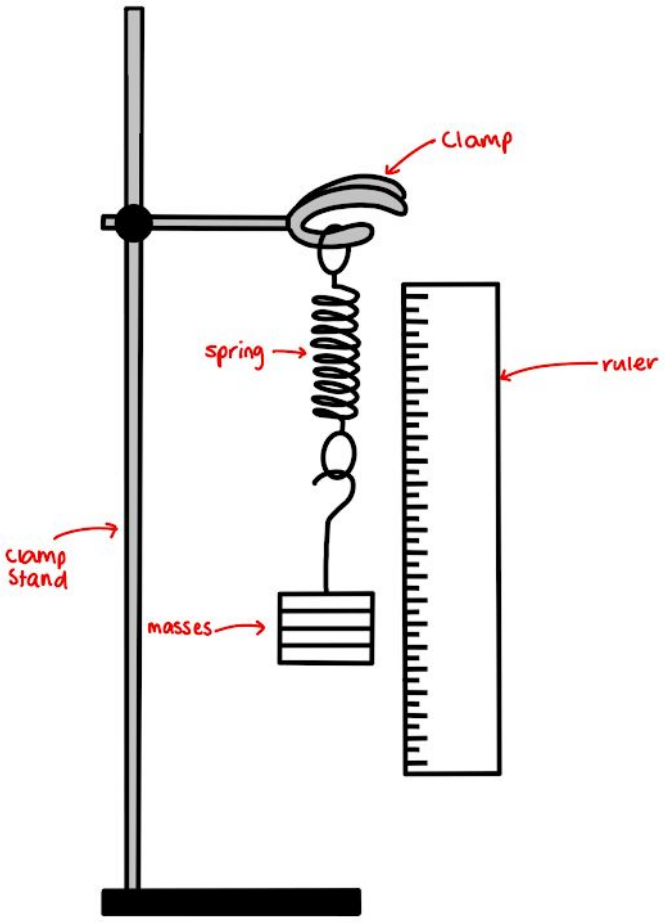
Hooke's Law

SP3.1 Investigation of the force-extension graph for a spring

Equipment

- Clamp and boss
- Clamp stand
- 7x 100g masses
- Spring
- Ruler

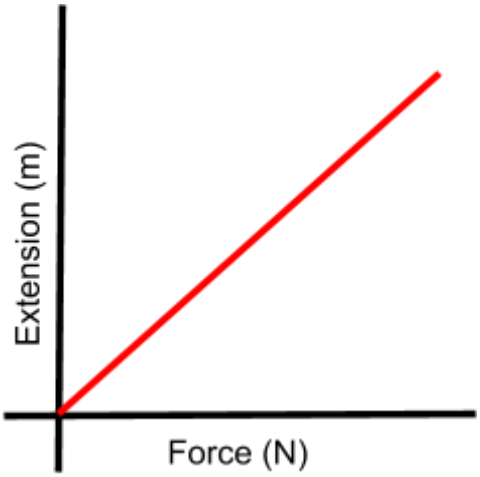
Diagram



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 until you reach 700g
5. Repeat and calculate mean values

6. 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 $k = \frac{F}{x}$
    - The work done will be the area underneath the graph
    - If the line of best fit is a straight line through the origin, the spring obeys Hooke's Law



Tips

- Ensure all measurements are taken from eye level in order to avoid parallax error.
    - All of these measurements should also be taken from the same point on the end of the string. To do this, you can attach a pointer to the spring and measure from there.
- 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.