

AQA Physics GCSE

Required Practical 6

Force and Extension

Method taken from [AQA Required Practical Handbook](#)

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Aim:

Determine the correlation between the mass placed on a spring and the spring's extension, by measuring resultant spring lengths.

Equipment List:

- Spring (capable of extending more than 1cm under a load of 1N)
- Metre Rule
- Suitable Pointer (splint and tape)
- Weight Stack (10 x 10g masses)
- Clamp Stand
- Two clamps and bosses
- G-Clamp or additional weight

Method:

1. Set up your equipment, ensuring the spring will return to its original dimensions if stretched within its elastic limit.
2. Attach the pointer to the base of the spring, ensuring that it isn't angled (parallel to the workbench) and perpendicular to the metre ruler. Align the top of the ruler with the top of the spring.
3. Measure the initial length of the spring without any weights attached.
4. Add a 10g mass to the base of the spring and record the length of the spring.
5. Repeat and continue to add masses, ensuring that the spring doesn't oscillate after each weight has been added.
6. Calculate the extension of the spring for each mass by subtracting the initial length of the spring from each different length of the spring.
7. Convert all masses to weights using the equation:

$$\text{Weight (N)} = \text{mass (kg)} \times 9.81 \text{ (N/kg)}$$

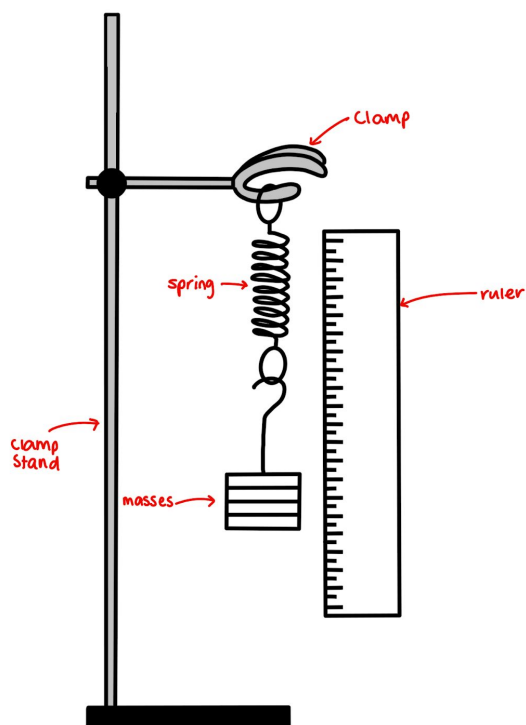
where 9.81N/kg is the gravitational field strength on Earth.

8. Plot the graph of force (y-axis) against extension (x-axis). Calculate the gradient.

If the spring obeys Hooke's Law, the graph of force against extension will be linear and pass through the origin. The gradient will be equal to $1/k$, where k is the Spring Constant measured in N/m.



Diagram:



Safety Precautions:

- Ensure the stand holding the spring and weights is secure, either by clamping the base of the stand to the desk or by putting additional weight on the base of the stand.
- Don't stand directly beneath the weights, in case they fall off.
- Take care when adding the maximum weight to the spring. If too weak, the spring may snap. If the weight exceeds the elastic limit, the spring may extend suddenly.
- Wear safety glasses in case the spring snaps.
- Place weights on gently and avoid oscillating the spring.

