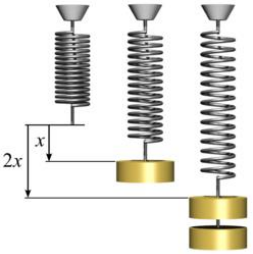
Department of Science.
2º ESO lab practice.

MEASURING FORCES: DYNAMOMETER SPRINGS AND HOOKE'S LAW

INTRODUCTION

A spring is a spiral of wire which returns to its original shape after it is pressed or pulled. This reaction is known as **elastic force.** A **dynamometer** is based on this type of force. It consists of a spring which stretches when force is applied to it. The dynamometer is calibrated to find the relationship between the extension and force. It gives us a reading of the force applied, given in newtons.



If we pull a spring it gets longer when we exert more force to it. We can see that when we apply double the force on the spring, it gets twice as long. Therefore, the extension of the spring (x) is **directly proportional to the force applied to it** (F). This is the conclusion drawn by the English physicist **Robert Hooke** in 1660 and that is why it is called **Hooke's Law:**

$$F = k \cdot x$$

MATERIAL

- Springs.
- Weights (20 and 50 g).
- Dynamometer.
- Ruler.

PROCEDURE

Check initial position from the spring with a ruler. Next, add 40 g (two weights from 20 g) and measure the elongation produced in the spring. Repeat the procedure with 50, 70, 100 y 120 g. Then, repeat all the process with at least two springs.

RESULTS

1. Make a **table** (as shown below) with the spring elongation according to the masses hanged from the spring.

Mass (g)	Elongation (mm)

2. From these data, make a *mass-elongation* **graph** on a graph paper.
3. Measure the force corresponding to each weight with a dynamometer and add this results to the previous table. Then, using Hooke's Law, calculate **spring constant (k)** from each of the springs (**clue**: you have to calculate an average value).
4. If we apply a force of 5 N to each of the springs you have used, ¿what elongation would be produced on each one? (Use Hooke's Law)
5. Express your opinion about any aspect of this experiment.