
GCSE Physics required practical activity 7: Force and Extension

Student sheet

Required practical activity	Apparatus and techniques
Investigate the relationship between force and extension for a spring.	AT 1, AT 2

Making and calibrating a spring balance (newtonmeter)

In this activity you will investigate the relationship between the weight hung from a spring and how much longer the spring gets (the extension). You will plot a graph of extension against weight and use your graph to find the weight of a mystery object.

Learning outcomes
1
2
Teachers to add these with particular reference to working scientifically

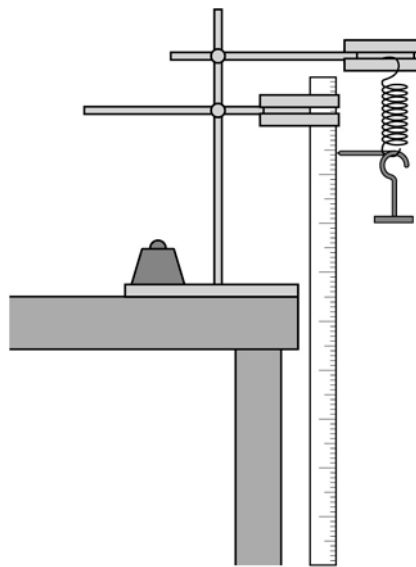
Method

You are provided with the following:

- a spring
- a metre ruler
- a splint and tape to act as a pointer
- a 10 N weight stack.
- a clamp stand, and two clamps and bosses
- a heavy weight to prevent the apparatus tipping over.
- a mystery object to weigh.

You should read these instructions carefully before you start work.

1. Attach the two clamps to the clamp stand using the bosses. The top clamp should be further out than the lower one.
2. Place the clamp stand near the edge of a bench so that the ends of the clamps stick out beyond the bench.
3. Place a heavy weight on the base of the clamp stand to stop the clamp stand tipping over.



4. Hang the spring from the top clamp.
5. Attach the ruler to the bottom clamp with the zero on the scale at the top of the ruler. (If there are two scales going in opposite directions you will have to remember to read the one that increases going down.)
6. Adjust the ruler so that it is vertical, and the zero on the scale is at the same height as the top of the spring.
7. Attach the splint securely to the bottom of the spring. Make sure that the splint is horizontal and that it rests against the scale of the ruler.
8. Take a reading on the ruler – this is the length of the unstretched spring.
9. Carefully hook the base of the weight stack onto the bottom of the spring. This weighs 1.0 newton (1.0 N).
10. Take a reading on the ruler – this is the length of the spring when a force of 1.0 N is applied to it.
11. Add further weights, measuring the length of the spring each time.

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12. Record your results in a suitable table. You will need a third column for the extension. This is the amount the string has stretched. To calculate this you subtract the length of the unstretched spring from each of your length readings.

Weight in N	Length of spring in cm	Extension of spring in cm

13. Do not put the apparatus away yet. Plot a graph of extension against weight.
14. Hang the unknown object on the spring. Measure the extension and use your graph to determine the object's weight. Check it with a newtonmeter.