**How far can we stretch things?**

**Levels:** 3-5  
**NoS achievement aims:** Investigating in science   
**Contextual strands:** Physical world   
**Topic:** Forces in action

**Rationale**

The amount of distortion of a material increases in proportion to the force applied (within limits).

By conducting experiments to gather data about the stretch in a rubber band, students will model scientific investigations and explore scientific laws.

**What you need**

* A range of different sized rubber bands.
* Sets of hanging weights, about 250 g each, totalling about 3 kg per set (or 25 N force meters).
* Two small double ended hooks per group.
* One 30 cm rule per group.
* A selection of springs and appropriate weights (for the activity extension – see below).

**Focus**

* How heavy a load do you think rubber bands can hold? How far can they stretch before they break? Do all rubber bands stretch the same amount? Why/why not?
* Can you suggest a pattern in what happens to rubber bands as we slowly increase the load on them? If we hang twice the load, do we get twice the stretch?
* How could we find out if we are right? What could we measure? What could we change?
* Do all materials behave the same as rubber bands? If we tried pulling steel wires, how could we measure very small stretches?
* Is there a ‘law of stretching’ that might apply to anything?
* What experimental evidence would scientists need to confirm such a law?

**Exploration**

1. Discuss with the class any patterns they might predict regarding stretch and load.
2. What sort of evidence would support your predictions? What variables could you measure and how could you record your data systematically?
3. Show them the equipment available then get them to discuss in groups how they could set up an experiment to test their predictions.
4. Invite each group to set up their equipment and record their measurements. Ask them to make a note of any problems they have with their method.
5. Have each group compare their data with the other groups, and discuss as a class any patterns about the relationship between stretch and load.

**Reflection**

* Did you obtain any data that supported your predictions? Why/why not?
* Did you find any limits to your predictions? If you did, what do you think the reason was?
* Why might you find it hard to test the stretching of watch springs?
* What new evidence would you need to gather to formulate a law about all elastic materials?