



SUPER POWER: Super Muscles!

NEWTON METER BOX

LAB NOTES...

What's going on?

Our muscles are made up of lots of tiny stretchy fibres, a little bit like your elastic bands.

Muscles attach to our bones, and they help us to lift heavy objects by either shortening or lengthening these muscle fibres. To get stronger, we need to have more muscle fibres in each muscle, and we can get more fibres by doing activities like sports training or weight lifting. The more we push our muscles to do work, the more muscle fibres we build, and the easier it is to do the activity next time. That's why training for sports is so important, as every time you do you are helping your body to build more muscle fibres so you can get faster and stronger.

As scientists, when we want to measure weight or force we use something called a Newton Meter. It works by hanging a weight from something stretchy like a spring, and measuring how far the spring stretches. In this experiment, you built a Newton Meter and used it to measure the amount of stretch in an elastic band when it had to lift a heavy weight.

TO MAKE YOUR NEWTON METER...

1. Watch the video of Nanogirl making her Newton Meter!
2. If you want to, start by covering and decorating your box.
3. Make one of the large faces of your box the front and draw two horizontal lines, one 3cm down from the top and one 3cm up from the bottom of the box.
4. On the same face draw vertical lines, one 2cm from the left edge and one 2cm from the right edge of the box.
5. You should now have a rectangle drawn in the middle of your box.
6. Cut out this centre rectangle to create a viewing window.
7. Make a mark 4 cm down and 4cm from the front on both sides of the box.
8. Use a skewer to poke holes through the box at these marks.
9. Push a skewer through one hole, through the middle of four elastic bands then out through the hole on the other side of the box.
10. Trim off any long ends of the skewer.
11. Next make your measuring scale. Make marks 1cm apart to the side of your viewing window and label them with zero at the top and the largest number at the bottom.
12. Cut 3 skewers a little longer than the length of your viewing window.
13. Lay one skewer horizontally across the front of the viewing window.
14. Tape the other two skewers vertically along the sides of the viewing window, on top of the horizontal skewer but not obscuring your scale.
15. Great! You have made your Newton Meter!
16. To test it, find something small and heavy to attach to the elastic bands. If you need to, use a paper clip and another elastic band to help you hang your weight.
17. Without any weight, look into the box and move the cross-skewer in line with the bottom of The elastic bands. Where the skewer crosses the scale, read off the number. If you have a notebook you can write it down!
18. Hook the weight onto one elastic band, and move the skewer down so it's in line with the bottom of the stretched elastic band. How far has the elastic band stretched?

BUILD TIME
15
MINS

YOU WILL NEED

- Cardboard box
(e.g. tissue box, cereal box or shoe box)
- Scissors
- Ruler
- Pencil
- Pen
- Paper clip
- 4 x elastic bands
- 4 x wooden skewers or straight sticks
- Small, heavy weight (e.g. a rock)
- (Optional) colouring and decorating supplies
- (Optional) a notebook to write down your results

19. Now hook the paper clip through two elastic bands, move the skewer in line with the bottom and read the scale again. Has it moved?
20. Keep on adding more elastic bands to the hook, and observe how the elastic bands stretch different amounts when they are sharing the load.

How many elastic bands do you need to add before there is no change in the number you read off the scale?

Why do you think it's called a Newton meter?

Put your hand around your upper arm and try to tense your muscles by making a fist with your hand and squeezing it tight. Can you feel your muscles working?