ACTIVITY 3- Nuclear Structure

Materials

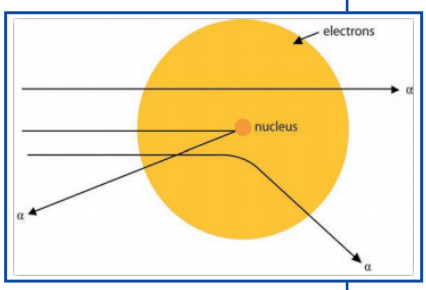
- Rope
- Volunteer
- Nerf guns

Hi, my name is Emma I am a STEM Ambassador and work in the Westlakes Laboratories. Today I am going to show you an exciting experiment you can do at home **"but remember to ask an adult to help you."**
You can watch how I got on at www.cavendishnuclear.com

Method

- Think about the smallest thing you can and you probably think of an atom. But atoms are made up of even smaller particles, called protons, neutrons and electrons.
- A long time ago, before 1911, scientists thought that the atom was structured a bit like a plum pudding, with the 'cakey' part being positive and the plums being lots of little negative bits.
- Here we have a cookie - so in this 'plum pudding' model, the cookie would be positive, and the raisins would be negative.
- In 1911, British scientist Ernest Rutherford did an experiment known as Rutherford's scattering experiment.
- He fired positively charged alpha particles at gold foil, believing that if the atom was positively charged, the positive particles fired it at would be deflected - like magnets!
- However this didn't happen. Some of these positive alpha particles went straight through the atom, and some changed, showing that the nucleus of the atom (the middle part) must be very small, leaving a lot of the atom empty. It also showed that the nucleus must be positive too.

Demonstration using speaker + as many nerf guns as possible. I stand in the centre of a large circle to represent the nucleus in the centre of an atom; Jack fires the nerf guns straight ahead through the whole circle. Some of the darts will hit me and bounce off, but most of the darts will miss and go completely straight – presuming he doesn't shoot them all at me.



The yellow circle represents the atom as a whole (electrons are too small to be seen) and can be represented with a chalk line on the ground or some tape; the nucleus is a pupil volunteer. Looking at where the darts land can show the direction of the alpha particles. Most will go straight through (since the circle is mostly empty), and some will hit the nucleus and be deflected.