

Classifying Variables

Several famous experiments have been described below, and some important variables listed. For each variable, answer first if it is the **independent, dependent** or **control** variable in the experiment. Then decide if it is **continuous, discrete, categoric** or **ordered**.

Rutherford Scattering

In 1911, Ernest Rutherford performed an experiment to investigate the structure of the atom. He fired energetic alpha particles at foil made from various metals, and measured the angle of deflection of the particles as they came out the other side. To his great surprise, many of them were actually deflected by huge angles (sometimes more than 90 degrees).

(eg) Type of metal *Independent, Categoric*

(1) Angle of deflection

(2) Type of particle fired

(3) Distance to foil

Diffraction of Electrons through a Double-Slit

Inspired by Louis de Broglie's theories, Davisson and Germer in 1927 demonstrated that sometimes electrons can show wave-like properties – they behave very strangely indeed. They fired electrons through a double slit (two slits next to each other) and observed the pattern that emerged on the other side, measuring the distance between the peaks of activity. They varied the distance between the double-slits.

(1) Number of slits used

(2) Distance between slits

(3) Type of particle fired

(4) Distance between the peaks

Galileo's Experiments with Falling Objects

In the late 1500s, Galileo Galilei demonstrated one of the most important principles of Science: never trust what other people have told you. For centuries, people believed that heavier objects fall to Earth faster than light ones. However, this is not the case, as he demonstrated by dropping objects from the Leaning Tower of Pisa.