A Gentle Introduction

Imagine you're in a car cruising smoothly and relaxed at a constant 30 miles per hour. Imagine you then press the accelerator pedal. If you keep it pressed your speed increases to 35, 40, 50, and 60 miles per hour.

The speed of the car *changes*.

In this section, we'll explore the idea of things changing — like the speed of a car - and how to work out that change mathematically. What do we mean, mathematically? We mean understanding how things are related to each other, so we can work out precisely how changes in one result in changes in another. Like car speed changing with the time on my watch. Or plant height changing with rain levels. Or the extension of a metal spring changing as we apply different amounts of pulling force.

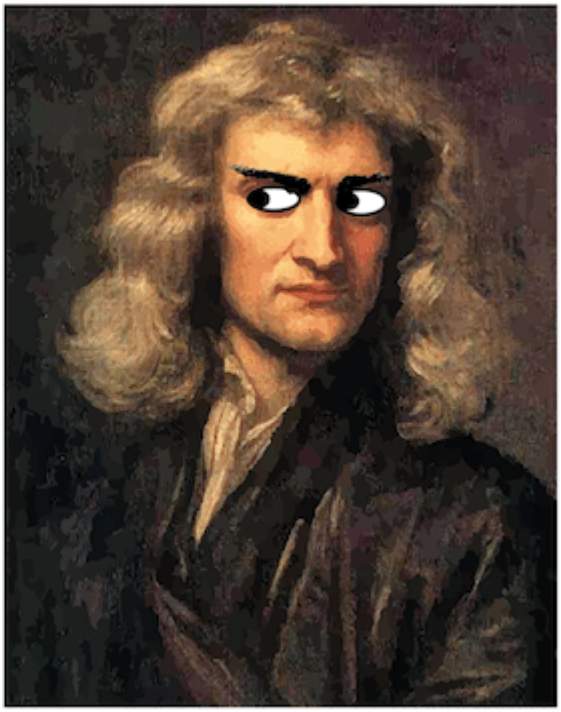
This is called *calculus* by mathematicians. I hesitated about calling this section calculus because many people seem to think that is a hard, scary subject to be avoided. That's a real shame, and the fault of bad teaching and terrible school textbooks.

By the end of this appendix, you'll see that working out how things change in a mathematically precise way — because that's all calculus really is — is not that difficult for many usage scenarios.

Even if you've done calculus or *differentiation* already, perhaps at school, it is worth going through this section because we will understand how calculus was invented back in history. The ideas and tools used by those pioneering mathematicians are really useful to have in your back pocket and can be very helpful when trying to solve different kinds of problems in future.

If you enjoy a good historical punch-up, look up the drama between Leibniz and Newton who both claimed to have invented calculus first!

Gottfried Leibniz



Sir Isaac Newton