# Calculus of Trigonometry & Logarithms

underground mathematics

Station guide

This station focuses on calculus of trigonometric, logarithmic and exponential functions, without the need for the chain rule, product rule or corresponding integration techniques. There is a strong graphical approach used throughout these resources to help develop connections between algebraic and geometric aspects of calculus.

Rotating derivatives offers a novel way of thinking about the derivatives of $\sin$ and $\cos$ through circular motion, while Estimating gradients can be used to introduce the derivative of $\sin x$, as well as demonstrating why we use radians in calculus. To the limit introduces the general derivative of $a^x$, and gives a chance to revisit differentiation from first principles.

The resources in the Developing section of the station encourage students to think about the underlying behaviour of functions when differentiating or integrating. They offer interesting problems that can be solved with ideas students have already met, including transformations and symmetry, rather than by applying new rules. For example, Similar derivatives invites students to find geometric explanations for the derivatives of $\tan$, $\sec$ etc., Stretching an integral encourages graphical reasoning to discover what the integral of $\frac{1}{x}$ could be, and Inverse integrals uses the power of inverse functions to find areas under curves.

This station introduces derivatives of several functions, but doesn't involve many techniques, so there are very few Review questions housed here. Most of the calculus review questions involving a variety of types of function can be found at the following stations: Chain Rule and Integration by Substitution, or Product Rule and Integration by Parts.


Copyright © University of Cambridge. All rights reserved.