Choice of topic

The EE may be written on any topic that has a mathematical focus and it need not be confined to the theory of mathematics itself.

Students may choose mathematical topics from fields such as engineering, the sciences or the social sciences, as well as from mathematics itself.

Statistical analyses of experimental results taken from other subject areas are also acceptable, provided that they focus on the modelling process and discuss the limitations of the results; such essays should not include extensive non-mathematical detail.

A topic selected from the history of mathematics may also be appropriate, provided that a clear line of mathematical development is demonstrated. Concentration on the lives of, or personal rivalries between, mathematicians would be irrelevant and would not score highly on the assessment criteria.

It should be noted that the assessment criteria give credit for the nature of the investigation and for the extent that reasoned arguments are applied to an appropriate research question.

Students should avoid choosing a topic that gives rise to a trivial research question or one that is not sufficiently focused to allow appropriate treatment within the requirements of the EE.

Students will normally be expected either to extend their knowledge beyond that encountered in the Diploma Programme mathematics course they are studying or to apply techniques used in their mathematics course to modelling in an appropriately chosen topic.

However, it is very important to remember that it is an essay that is being written, not a research paper for a journal of advanced mathematics, and no result, however impressive, should be quoted without evidence of the student's real understanding of it.

Examples of topics

These examples are just for guidance. Students must ensure their choice of topic is focused (left-hand column) rather than broad (right-hand column).

 Focused topics	 Broad topics
Prime numbers in cryptography	Prime numbers
The Hausdorff dimension of fractal sets	Fractals
Continued fractions in birth–death processes	Continued fractions
The proof of the law of quadratic reciprocity	CF Gauss: the mathematician
Using graph theory to minimize cost	Graph theory