# Extended Essay
# Group 5
# Mathematics & Computer Science

Student Training

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# Math EEs demonstrate an appreciation for the subject by considering its:

- Applicability to solve both real & abstract problems
- Beauty, such as geometry or fractal theory
- Elegance in the proving of theorems, such as number theory
- Origin & subsequent development into various branches over periods of time
- Links between those branches &the powerful structures that enable many seemingly different problems to be solved by a single theory
- Development & resent flourishing as a result of technology

# Overview

- Can be written on any topic that has a mathematical focus, not confined to the theory of math itself
- May choose mathematical topics from fields such as engineering, the sciences, the social sciences, or statistical analysis of other experimental results in other fields
- A historical approach to mathematics is acceptable provided a clear path of development in the math is traced.

# An EE in Mathematics does NOT…

- Focus on the life of a mathematician
- Focus on personal rivalries between prominent mathematicians
- Address a trivial matter in the field
- A simple, synthesis or summary of other researchers' findings

# Research Approach

- Apply a good mathematical practice relevant to the topic
- Data must be analyzed using:
  - Appropriate techniques
  - Arguments correctly reasoned
  - Situations modeled using correct methodology
  - Problems clearly stated and techniques applied to their solutions must be at an appropriate level of sophistication

# Specific to Math EEs

- Must infuse commentary throughout the paper showing that you have not lost sight of the research question
- Careful not to vomit facts and mathematical jargon profusely
- *Relevant* visuals can be included in the body of the paper if they are pertinent proof to the solutions to problems presented

# Sample Research Questions

- What was the role of mathematics, geometry in particular, in navigation when we relied on the stars? Does it still play a part now that we have man-made satellites?
- How many square numbers are also triangular numbers, where are they, and what other problems lead to Pell's equation?
- How does the exponential function, and its calculus, inform areas of science such as nuclear physics, geology, anthropology or demography?
- What is the legacy of Archimedes' calculations of circular and parabolic areas in today's methods of integration?
- How well can π, e, and other irrationals be approximated by rational numbers?