Instructions:

1. Find a partner in your section.

2. Select a topic from the list below and email me. No two groups in the same section should present on the same topic.

3. Hand in outline of presentation and paper on Oct 20th.

4. E-mail me with the date you’d like to present (first come, first served).

5. Hand in paper by 12:00 pm Friday, Dec 11.

Guidelines

• Presentation should be 30 minutes.

• Paper should be around 8 pages long.

• Must use at least one real source.

• 1–2 pages of “substantial mathematical content” in your own words!

• The content of the paper depends on the topic you choose. You should focus on the mathematical ideas more than the non-mathematical ideas.

For example:

• Biographies: Your paper should include a short biographical sketch of your subject but focus on the contributions the person made to mathematics. The “substantial mathematical content” would be a reasonably detailed discussion of one of their ideas.

• Cultures: You should explain where the culture fits in to the history of mathematics as a whole — for instance, the Islamic mathematicians had access to the work of the Greeks — but focus on the contributions and influence of the culture you’ve chosen and discuss one of their theorems in detail.

• Book about mathematics: provide some context as to why people care about the problem/topic, summarize some of the main points of the book, and provide one argument in detail.

• Fiction: Your paper should address how math figures in the plot, what type of mathematics is used, and explain a relevant theorem.

• If you have questions, ask! I will also provide feedback on your outline.
Biographies


Note: I have tried to select mathematicians who had interesting lives and whose contributions are accessible. You can find biographies in the library.

Cultures

Suggestions: Babylonian, Incan, Islamic, Greek, Indian, Japanese, Chinese.
Sources: Any reasonable book about the history of mathematics.

Specific Theorems

Sources:
- Fermat’s Enigma: The Epic Quest to Solve the World’s Greatest Mathematical Problem (Singh and Lynch).
- Four Colors Suffice: How the Map Problem Was Solved (Wilson).
- Symmetry and the Monster: The Story of One of the Greatest Quests of Mathematics (Ronan).
- The Pythagorean Theorem: A 4,000-Year History (Maor).

Numbers

<table>
<thead>
<tr>
<th>Number</th>
<th>Source</th>
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<tbody>
<tr>
<td>$e$</td>
<td>$e$: The Story of a Number (Maor)</td>
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<tr>
<td>$\sqrt{2}$</td>
<td>$\sqrt{2}$: A Dialogue Concerning a Number and a Sequence (Flannery)</td>
</tr>
<tr>
<td>$i$</td>
<td>An Imaginary Tale: The Story of $\sqrt{-1}$ (Nahin)</td>
</tr>
<tr>
<td>$\pi$</td>
<td>A Biography of the World’s Most Mysterious Number (Posamentier)</td>
</tr>
<tr>
<td>$0$</td>
<td>$0$: Biography of a Dangerous Idea (Seife)</td>
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Mathematical Fiction

Novels:
- Surreal Numbers: How Two Ex-students Turned on to Pure Mathematics and Found Total Happiness (Knuth).
- Uncle Petros and the Goldbach’s Conjecture (Doxiadis).
- The Annotated Flatland: A Romance of Many Dimensions (Abbot and Stewart).
Geometry/Topology

Sources:

- The Shape of Space (Weeks).
- The Knot Book (Adams).
- Flexagons Inside Out (Pook).

Infinity

Sources:

- To Infinity and Beyond (Maor).
- The Infinite Book: A Short Guide to the Boundless, Timeless and Endless (Barrow).

Cryptography

Sources:

- The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography (Singh).

Math in Society

Sources:

- A Mathematician Reads the Newspaper (Paulos).
- Innumeracy: Mathematical Illiteracy and its Consequences (Paulos).

Chaos and Fractals

Source: Chapter 6 of textbook.

Choose Your Own Topic

Must have substantial mathematical content and be cleared with me well in advance.