Teaching Mathematics Using History and Fairy Tales

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Why integrate history and stories into math class?

- To humanize mathematics
- Connect real-life experiences with mathematics
- Show how people in the real world use math
- Relax students and alleviate math anxiety
- Solve problems
- Illustrate concepts by stories

Mathematicians–Interesting Tidbits

René Descartes (March 31, 1596 – February 11, 1650)

Blaise Pascal (June 19, 1623 – August 19, 1662)

Gerolamo Cardano (September 24, 1501 - September 21, 1576)

Niccolo Fontana Tartaglia (1499 or 1500 - December 13, 1557)

Robert Recorde (Ca. 1510-1558)

- Introduced = sign

Christoff Rudolff (1499?-1545?)

- Introduced the radical sign, 1525, in a book called Die Coss.
- √ Stretched-out r
- Used a vertical bar as a decimal point
- Used a period for equals
- Recognized the law $b^n \cdot b^m = b^{n+m}$
- Credited with introducing + and –

Michael Stifel (1486-1567)

- "Greatest German algebraist of the 16th century"
- Used + and – signs
- Also credited with modern radical sign
- Concluded world would end on 10/3/1533.
- Said Pope Leo X was the Beast in Revelation.
- Magic Squares

Thomas Hariot (1560-1621)

- Introduced < and > as we use them today
- First to write exponents as we do (a^3 instead of aaa)
- Helped Sir Walter Raleigh map NC
- Discovered sunspots
- Died of cancer from tobacco

William Oughtred (1574-1660)

- Introduced the × for multiplication
- Introduced :: for proportion and ~ for difference between
- Clergyman who gave free math lessons
- Famous pupils: John Wallis, Christopher Wren, Seth Ward

Gottfried Wilhelm von Leibniz (1646-1716)

- Used both • and ∩ for multiplication
- Calculating machine (first mechanical to multiply and divide)
- Developed binary numeral system

Johann Heinrich Rann (1622-1676)

- Introduced the ÷ symbol for division (although this symbol was used by many continental Europeans for subtraction).

Christian Kramp (1760-1826)

- First to use the n! symbol for factorials in 1808. Used because of printing problems with a previously-used symbol.

Evariste Galois (1811 - 1832)

- "Unfortunately what is little recognized is that the most worthwhile scientific books are those in which the author clearly indicates what he does not know; for an author most hurts his readers by concealing difficulties."
- Died in a duel over a woman's love

Connecting Real-Life Experiences

Real World Examples

- Reading blueprints
- Packing furniture
- "Inequalities will never affect me!"
- Emily's inequalities
- Calculator project
- Cartesian inequalities and the tennis court

Relax students and help alleviate math anxiety

Math wasn't created to make students miserable, but to solve problems!

- Religion – Pyramid, Astronomy
- Politics – Sputnik
- Money – Geometry and Egyptian taxation

Illustrate a point with a story

The Key Story

- Try turning it upside down!
- Factor: $21x^2 - x - 10$
  $(3x + 5)(7x - 2)$ doesn't work
- Try switching around to
  $(3x + 2)(7x - 5)$

Dr. Seuss's The Sneetches

- Functions

The Cat in the Box by Dana Michel (Wonder Books, 1963)

- Subsets
- Sets of Numbers

Trolls and Negative Exponents

- Working with rational expressions with negative exponents such as
  $$\frac{7x^4y^{-6}}{14x^{-2}y^9}$$

"The Elephant and the Squirrel" Children's story by Bill Sprague from A Treasury of Bedtime Stories (ed. Judith Klugmann, Doubleday, 1960).

- Stop and look at other ways of solving problems besides the obvious!

Your Turn: Any stories you'd like to share?

More information

This presentation (PowerPoint and printed version) and a handout are posted on Daryl's web page.
http://faculty.etsu.edu/stephen/
Look for "Handouts from Conference Presentations" link on the page.

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Credits

Except for pictures of books, all images of people came from Wikipedia (www.wikipedia.com) or The MacTutor History of Mathematics archive (http://www-gap.dcs.st-and.ac.uk/~history/index.html) and are in public domain.
Brown troll and key pictures by Daryl