

8-1-1994

Mathematics in Literature and Poetry

JoAnne S. Growney
Bloomsburg University

Follow this and additional works at: <http://scholarship.claremont.edu/hmnj>



Part of the [Mathematics Commons](#), and the [Poetry Commons](#)

Recommended Citation

Growney, JoAnne S. (1994) "Mathematics in Literature and Poetry," *Humanistic Mathematics Network Journal*: Iss. 10, Article 7.
Available at: <http://scholarship.claremont.edu/hmnj/vol1/iss10/7>

This Article is brought to you for free and open access by the Journals at Claremont at Scholarship @ Claremont. It has been accepted for inclusion in Humanistic Mathematics Network Journal by an authorized administrator of Scholarship @ Claremont. For more information, please contact scholarship@cuc.claremont.edu.

Mathematics in Literature and Poetry

by

JoAnne S. Grown

Department of Mathematics and Computer Science

Bloomsburg University Bloomsburg, PA 17815

(717) 389-4503 grow@bf486.bloomu.edu

This article is a written version of my presentation, "Encourage a Variety of Interests," at the AMS-MAA Joint Meetings in Cincinnati, Ohio on January 15, 1994.

I find that students are pleased to learn that mathematics can be found in literature and poetry as well as in the sciences and finance and other traditional "applications." Acquainting students with readings that involve mathematics helps to achieve two goals:

1. To broaden their views of "WHAT IS MATHEMATICS?"
2. To interest more students in mathematics.

In my courses, I have asked students to read poems or brief literary passages as out-of-class assignments. Although we occasionally have discussion of a passage in class, more often I ask them to follow their reading with:

1. Writing their reactions to their reading (perhaps in a journal they are keeping for the course);
2. Talking to several other people about their reading and comparing the reactions of others with their own; usually I ask them to put this in writing since some would avoid this assignment (because they feel awkward carrying it out) unless I require a tangible product—something I will collect and read.

I especially like to use item 2; students do not often have the opportunity to fit ideas from their mathematics courses into general conversation and are, in a way, deprived when their friends in other majors can informally exchange ideas from their courses. Being able to talk about mathematical ideas increases student enjoyment of mathematics and also increases their appreciation (and that of their listeners) of its relevance.

Here are some readings that I have enjoyed using; a list of references at the end gives full bibliographic information for these and suggests others.

This passage, from *Six Degrees of Separation* (a play, made into a movie) by John Guare, introduces the graph-theory conjecture that in the acquaintanceship graph for people alive in the world today, between any two vertices may be found a path of seven or fewer edges:

I read somewhere that everybody on this planet is separated by only six other people. Six degrees of separation. Between us and everybody else on this planet. The president of the United States. A gondolier in Venice. Fill in the names. I find that A] tremendously comforting that we're so close and B] Chinese water torture that we're so close. Because you have to find the right six people to make the connection. It's not just big names. It's *anyone*. A native in a rain forest. A Tierra del Fuego. An Eskimo. I am bound to everyone on this planet by a trail of six people. It's a profound thought. . . .

The next passage is from the beginning of a short story by Jorge Luis Borges, *The Library of Babel*. Many of Borges stories involve mathematical ideas—symmetry, recursion, infinity, and so on.

The universe (which others call the Library) is composed of an indefinite and perhaps infinite number of hexagonal galleries, with vast air shafts between, surrounded by very low ceilings. From any one of the hexagons one can see, interminably, the upper and lower floors. The distribution of the galleries is invariable. Twenty shelves, five long per side, cover all the sides except two; their height, which is the distance from floor to ceiling, scarcely exceeds that of a normal bookcase. One of the free sides leads to a

narrow hallway which opens onto another gallery, identical to the first and to all the rest.

The Library is a sphere whose exact center is any one of its hexagons and whose circumference is inaccessible.

There are five shelves for each of the hexagon's walls; each shelf contains thirty-five books of uniform format; each book is of four hundred and ten pages; each page, of forty lines, each line of some eighty letters which are black in color. . . .

The next passage comes from *Gone with the Wind* (Chapter 36) by Margaret Mitchell; Scarlett O'Hara and Frank Kennedy have recently married; the following paragraph is about Frank:

It had begun to dawn on him that this same sweet pretty little head was a "good head for figures." In fact, a much better one than his own and the knowledge was disquieting. He was thunderstruck to discover that she could swiftly add a long column of figures in her head when he needed a pencil and paper for more than three figures. And fractions presented no difficulties to her at all. He felt there was something unbecoming about a woman understanding fractions and business matters and he believed that, should a woman be so unfortunate as to have such unladylike comprehension, she should pretend not to. Now he disliked talking business with her as much as he had enjoyed it before they were married. Then he had thought it all beyond her mental grasp and it had been pleasant to explain things to her. Now he saw that she understood entirely too well and he felt the usual masculine indignation at the duplicity of women. Added to it was the usual masculine disillusionment in discovering that a woman has a brain.

The relationship between formal logic and logical reasoning in the "real" world is considered in this passage from *Don Quixote* (Chapter 51) by Cervantes; I like to have my students in Discrete Mathematics read it and think and talk about it. A foreigner presents a problem to Sancho Panza:

"My lord," he began, "there was a large river that separated two districts of one and the same seignorial domain—and let your Grace pay attention, for the matter is an important one and somewhat difficult of solution. To continue then: Over this river there was a bridge, and at one end of it stood a gallows with what resembled a court of justice, where four judges commonly sat to see to the enforcement of a law decreed by the lord of the river, of the bridge, and of the seignory. That was the following: 'Anyone who crosses this river shall first take oath as to whither he is bound and why. If he swears to the truth, he shall be permitted to pass; but if he tells a falsehood, he shall die without hope of pardon on the gallows that has been set up there.' Once this law and the rigorous conditions it laid down had been promulgated, there were many who told the truth and whom the judges permitted to pass freely enough. And then it happened that one day, when they came to administer the oath to a certain man, he swore and affirmed that his destination was to die upon the gallows which they had erected and that he had no other purpose in view.

"The judges held a consultation. 'If,' they said, 'we let this man pass, without hindrance, then he has perjured himself and according to the law should be put to death; but he swore that he came to die upon that scaffold, and if we hang him that will have been the truth, and in accordance with the same law he should go free.' And now, my Lord Governor, we should like to have your Grace's opinion as to what the judges should do with the man . . .

Here is Sancho's first response:

"Well, then," said Sancho, "my opinion is this: that part or the man that swore to the truth should be permitted to pass and that part of him that lied should be hanged, and thus the letter of the law will be carried out."

The questioner reminds Sancho that this would result in the man's death and Sancho tries again:

"See here, my good sir," said Sancho, "either I am a blockhead or this man you speak of deserves to die as much as he deserves to live

and cross the bridge; for if the truth saves him, the lie equally condemns him. And this being the case, as indeed it is, it is my opinion that you should go back and tell those gentlemen who sent you to me that, since there is as much reason for acquitting as for condemning him, they ought to let him to free, as it is always more praiseworthy to do good than to do harm. . . .

Usually in mathematics classes we don't talk about our feelings toward our work. Here are poems that describe feelings about geometry and algebra.

GEOMETRY

by Rita Dove, selected in 1993 to be Poet Laureate of the United States, the youngest person and the first Afro-American to be selected for that honor.

I prove a theorem and the house expands:
the windows jerk free to hover near the ceiling,
the ceiling floats away with a sigh.

As the walls clear themselves of everything
but transparency, the scent of carnations
leaves with them. I am out in the open

and above the windows have hinged into
butterflies,
sunlight glinting where they've intersected.
They are going to some point true and
unproven.

ALGEBRA

by Linda Pastan, Poet Laureate of Maryland, a poet who often uses mathematical images in her poetry; this poem appears in *Against Infinity*

I used to solve equations easily.
If train A left Sioux Falls
at nine o'clock, traveling
at a fixed rate,
I knew when it would meet train B.
Now I wonder if the trains will crash;
or else I picture naked limbs
through Pullman windows, each
a small vignette of longing.
And I knew X, or thought I did,

shuttled it back and forth
like a poor goat
across the equal sign.
X was the unknown on a motor bike,
those autumn days when leaves flew past
the color of pencil shavings.
Obedient as a genie, it gave me answers
to what I thought were questions.

Unsolved equations later, and winter now,
I know X better than I did.
His is the scarecrow's bitter mouth
sewn shut in cross-stitch;
the footprint of a weasel on snow.
X is the unknown assailant.
X marks the spot
towards which we speed like trains,
at a fixed rate.

This next poem, by Howard Nemerov, is a favorite of mine. It captures the wonder that we feel when we see mathematics fit nature. Nemerov (1920-92) is a former Poet Laureate. It appears in his collection, *The Western Approaches*.

FIGURES OF THOUGHT

To lay the logarithmic spiral on
Sea-shell and leaf alike, and see it fit,
To watch the same idea work itself out
In the fighter pilot's steepening, tightening
turn
Onto his target, setting up the kill,
And in the flight of certain wall-eyed bugs
Who cannot see to fly straight into death
But have to cast their sidelong glance at it
And come but cranking to the candle's
flame—

How secret that is, and how privileged
One feels to find the same necessity
Ciphered in forms diverse and otherwise
Without kinship—that is the beautiful
In Nature as in art, not obvious,
Not inaccessible, but just between.

It may diminish some our dry delight
To wonder if everything we are and do
Lies subject to some little law like that,
Hidden in nature, but not deeply so.

The Czechoslovakian poet, Miroslav Holub, has written a number of poems that use mathematical

images. This one is a favorite of my students; it appears in *Against Infinity* (translated by editor Jet Wimp, a mathematician and poet).

ZITO THE MAGICIAN

to amuse the king Zito changes water into
wine frogs into footmen beetles
into bailiffs he makes a Prime Minister
out of a rat he bows: daisies
grow from his fingertips
a talking bird perches on his shoulder

so there

think up something else demands the king
think up a black star Zito thinks up a black
star

think up dry water Zito thinks up dry water
think up a lake in a wicker basket Zito does

so there

up comes a student: think up an angle α
whose sine is bigger than one

Zito pales; I'm sorry
the sine of any angle is between minus one
and plus one he stutters
nothing can be done
about it

he leaves the royal chambers shuffling
through the throng of
courtiers back to his home
in a nutshell

REFERENCES for Further Reading

Mathematics in Fiction/Fantasy/Drama

Abbott, Edwin, *Flatland*, New York, Barnes & Noble, 1963. A fantasy about life in two dimensions that explores the dilemma that human beings have when they try to imagine a number of dimensions other than three.

Borges, Jorge Luis, *The Aleph and Other Stories*, New York, E. P. Dutton, 1970; *Labyrinths: Selected Stories and Other Writings*, New York, New Directions, 1964. (See also *Borges: The Labyrinth Maker*, by Ana Maria Barrenechea, New York University Press, 1965.) Borges frequently uses recursion and

other mathematical ideas; see "Death and the Compass," "The Library of Babel," "The Garden of Forking Paths," "The Circular Ruins," and others.

Burger, Dionys, *Sphereland*, New York, Crowell, 1965. A sequel to *Flatland*; a fantasy about curved space and an expanding universe.

Carroll, Lewis, *A Tangled Tale*, New York, Odark Books (The Third Press), 1885, 1974. Ten amusing tales, each embodying a mathematical question; written for children.

Cervantes, Miguel de, *Don Quixote*: The Putnam Translation, New York: Viking Press, 1951. In Chapter Fifty-one of Book Two, Sancho Panza carefully considers what to do about a foreigner who has responded cleverly to this decree: Anyone who crosses this river shall first take oath as to whither he is bound and why. If he swears to the truth, he shall be permitted to pass; but if he tells a falsehood, he shall die without hope of pardon. . . .

Fauvel, John and Jeremy Gray, editors, *The History of Mathematics: A Reader*, Macmillan, 1988. A collection of readings that includes the works of mathematicians, letters, poems, and excerpts from plays and novels; attempts to give an historical outline of mathematical activity from ancient to modern times and to show the role that mathematics has played in culture.

Guare, John, *Six Degrees of Separation*, New York: Vintage Books, 1990. In Guare's play, forthcoming also as a film, a character considers the graph theory conjecture that in the acquaintanceship graph for all people the world today it is possible to find a path of length six or less between any two vertices (page 81).

Hardwick, Michael, *The Complete Guide to Sherlock Holmes*, New York, St. Martin's Press, 1986. Hardwick gives information about where to find what in Sherlock Holmes mysteries by Sir Arthur Conan Doyle. Doyle's Sherlock Holmes mysteries contain a little bit of mathematics and many references to logic or "the science of deduction." See particularly *A Study in Scarlet*. In another Holmes tale, *The Final Problem*, one meets

Professor James Moriarty, "The Napoleon of Crime," described as an embittered and ruthless mathematical genius.

Juster, Norton, *The Phantom Tollbooth*, New York, Random House, 1965. A children's story in which a Mathematician shows Milo the way to wonderful worlds. *The Dot and the Line: A Romance in Lower Mathematics*, Random House, 1963. A straight line learns versatility in the effort to win the affection of a dot who is hopelessly in love with a squiggle. Some students enjoy the activity of writing a children's story (like one of these or like Abbott's *Flatland*). This writing activity offers worthwhile challenge of translating mathematical ideas into language that is simple yet mathematically accurate.

Mitchell, Margaret, *Gone with the Wind*, New York: Macmillan, 1938. In Chapter 38, shortly after marrying Scarlett, Frank discovers that she has a "good head for figures" and he finds this disquieting and wishes that she would pretend not to have such comprehension.

Poe, Edgar Allen, "The Purloined Letter," *Poetry and Tales*, Viking Press, 1952. Discussion of errors that occur from equating the statements "All fools are poets" and "All poets are fools;" considers differences between "mathematical truth" and "general truth."

Stoppard, Tom, *Jumpers*, New York, Grove Press, 1972. In Stoppard's play, a main character, George, considers Zeno's paradox and infinitesimals (pages 27-29) and imagines a circle as a limit of polygons (pages 71-72).

Wilmott, Richard, "The Gnome and the Pearl of Wisdom: A Fable," *Math. Magazine*, vol. 50, no. 3 (May, 1977), 141-143. A parable advocating knowledge of one-to-one correspondences between infinite sets.

Mathematics in Poetry

Baumel, Judith, *The Weight of Numbers*, Wesleyan University Press, 1988. Includes "Fibonacci," "Thirty-six Poets."

Dodson, Norman E., *Math Poetry and Stuff*, collected by Norman E. Dodson. Carlton Press, 1981. Includes "To a Basketball Player Named Fred" by C. Ray Wylie and other limericks.

Dove, Rita, *Selected Poems*, New York, Vintage Books, 1993. In 1993 Rita Dove was named Poet Laureate of the United States, the youngest person and the first Afro-American to hold this honor. In "Geometry" (page 17) she describes the ecstasy that results from obtaining the proof of a difficult theorem.

Fadiman, Clifton, *The Mathematical Magpie*, New York, Simon and Schuster, 1962. Also *Fantasia Mathematica*, 1958. *Magpie* includes essays, rhymes, and anecdotes, many amusing. *Fantasia* has some short stories and poems, including "Euclid Alone Has Looked on Beauty Bare" by Edna St. Vincent Millay, "Euclid" by Vachel Lindsay and the limerick, "There Was an Old Man Who Said, 'Do . . .'" When students are writing about reading assignments in the history of mathematics, I suggest the option of creating limericks that celebrate the accomplishments of particular mathematicians.

Gordon, Isabel S. and Sophie Sorkin, editors, *The Armchair Science Reader*, New York, Simon and Schuster, 1959. Stories, poems, essays about science (including mathematics) and scientists. Includes "When I Heard the Learn'd Astronomer" by Walt Whitman.

Grown, JoAnne, *Intersections*, Kadet Press, Bloomsburg, 1993; available from the author. Includes "A Mathematician's Nightmare," "You asked me for a birthday gift suggestion . . ." and other mathematical poems.

Humanistic Mathematics Network Journal. Many issues of this journal contain poetry and articles about the links between mathematics and the arts. In the March, 1988, issue may be found "Brief Thoughts on Exactness" by Miroslav Holub.

Moritz, Robert E., editor, *Memorabilia Mathematica*, New York, Macmillan, 1914. Reissued in 1993 by the MAA along with a

companion volume, *Out of the Mouths of Mathematicians* by Rosemary Schmalz. Moritz' collection includes verses about mathematics by Dante, DeMorgan, Goethe, and Wordsworth and a verse by A.C. Orr that is a mnemonic for the first thirty digits of π . Many students enjoy the activity of creating their own mnemonics.

Nemerov, Howard, *The Western Approaches*, University of Chicago Press, 1975. Includes "Figures of Thought," which describes the wonder felt at the discovery of the logarithmic spiral realized in diverse ways in nature, and "Two Pair," which links gambling with laws of thermodynamics and with Biblical laws.

Newman, James R., *Mathematics: A Small Library of the Literature of Mathematics*, presented with Commentaries and Notes by James R. Newman, Redmond, WA, Tempus, 1956, 1988.

Plotz, Helen, editor, *Imagination's Other Place: Poems of Science and Mathematics*, T. Y. Crowell Co., New York, 1955. Includes "Four Quartz Crystal Clocks" by Marianne Moore, "Arithmetic" by Carl Sandburg and other poems with mathematical imagery.

Robson, E. and J. Wimp, Editors, *Against Infinity: An Anthology of Contemporary Mathematical Poetry*, Parker Ford, PA. Primary Press, 1979. Includes "Algebra" by Linda Pastan, "Zito the Magician" by Miroslav Holub, and many more.

Bibliographies

Growney, JoAnne, "Mathematics and the Arts—An Annotated Bibliography," *Humanistic Mathematics Network Journal*, Vol. 8, No.1 (July 1993), pages 24-36. Copies of the bibliography also are available, by request, from the author.

Hutchinson, Joan, P., "Summertime and the living Is . . .," *AWM Newsletter*, vol 22, no. 4 (July-August 1992), pp. 9-11. Hutchinson points out these novels featuring female and male mathematicians as lead characters: *Hypatia* by Charles Kingsley, *The Dean's December* by Saul Bellow, *Rough Strife* by Lynne Sharon Schwartz, *Presumed Innocent* by Scott Turow, *First Light* by Charles Baxter, *Murder Misread* by P. M. Carlson, *Why Call Them Back From Heaven?* by Clifford D. Simak, *Sphere* by Michael Crichton, *The Calculus of Murder* and *The Advanced Calculus of Murder* by Erik Rosenthal.

Koehler, D. O., "Mathematics and Literature," *Mathematics Magazine*, Vol. 55 No. 2 (March 1982) 81-95. Koehler features works in which mathematical ideas play a significant role in the content. Featured authors include: Jonathan Swift (*A Modest Proposal*), Robert Coates (*The Law*), Thomas Pynchon (*Gravity's Rainbow*), Jorge Luis Borges (*Death and the Compass*, *The Garden of the Forking Paths*, and *The Library of Babel*), Lewis Carroll (*What the Tortoise Said to Achilles*, *Alice in Wonderland* and *Alice Through the Looking Glass*), Douglas Hofstadter (*Godel, Escher, Bach*).

Lew, John S., "Mathematical References in Literature," *Humanistic Mathematics Network Journal*, vol. 7 (April, 1992), 26-47.