

## Enrich Discussions about Mathematics with Poems

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*"It is true that a mathematician who is not somewhat of a poet  
will never be a complete mathematician."* [Karl Weierstrass](#) (Germany, 1815-1897)

**Suppose you are with a group** -- some friends, an undergraduate class, a high-school math club, etc.— and you would like to discuss with them **the nature of mathematics**. But where to begin? One starting point could be [the poem "Geometry" by Rita Dove](#) – a poem that shows a student's excitement when completing a proof; here is its opening stanza:

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

**If you are with students who are struggling** it may be easier to start a conversation about a poem than about their own difficulties. Here, a possible discussion-stimulant, is the opening stanza of ["The Mathematics of Chance" by student Melanie Simms](#); her poem was composed in fulfillment of a class assignment for her required college course, "Mathematical Thinking."

The gods of chance  
Have left me skewed  
My distribution, variable!  
With ranges far, and ranges wide  
My navigation's terrible!

Admiration of **the beauty and power of mathematics** is communicated by Howard Nemerov, in ["Figures of Thought"](#) – a poem that opens with these lines:

To lay the logarithmic spiral on  
Seashell and leaf alike, and see it fit,  
To watch the same idea work itself out  
In the fighter pilot's steepening, tightening turn . . .

For all of the poetry-samples offered herein, the complete poem is available in the blog, **"Intersections: Poetry with Mathematics"** at <https://poetrywithmathematics.blogspot.com>. The blog contains poems that I began collecting and using while teaching – sharing them with students and colleagues – and, now that I am retired, I have been able to substantially enlarge the number and variety of my collected mathy poems. Blog postings include poems that explore and celebrate mathematical ideas, poems that honor mathematics and mathematicians, poems that express the concerns of students, and poems that address the role of mathematics in society – with sensitivity to gender issues, environmental issues, and so on. Readers are invited to visit and explore. (<https://poetrywithmathematics.blogspot.com>)

## Similarities between Math and Poetry

**Both poetry and mathematics are condensed languages**, each with rich webs of meanings that hover around brief statements. Just as 0 can mean a point on a number line or the number of eggs in an empty carton or an additive identity, so also a variety of meanings are available to those of us who read the opening lines of [\*Carl Sandburg's "Number Man" \(for the ghost of Johann Sebastian Bach\)\*](#):

He was born to wonder about numbers.

He balanced fives against tens  
and made them sleep together  
and love each other.

A fine poem, like a mathematical idea, may fit in more than one place. This property of mathematics (and poetry) can be a reason for sticking with a subject that can seem difficult. Chilean poet Nicanor Parra's writing is described as mathematical – spare. And difficult! As illustrated in [the opening lines of his poem, "Thoughts."](#)

What  
Pascal asked himself  
is man:  
A number raised to the zero power.

Reading, re-reading, and again re-reading . . . these are strategies that both mathematics and poetry ask of us in order to find desired insights and understanding.

Poetry can be a window toward mathematics; this article's topics and brief poetic quotes can stimulate math-related discussions and creative activity. The quotations herein stem from the author's experiences with college students, but diverse varieties of math people who are looking for common ground all can discuss views and attitudes using a "consider-a-poem" strategy.

## Historical Ties

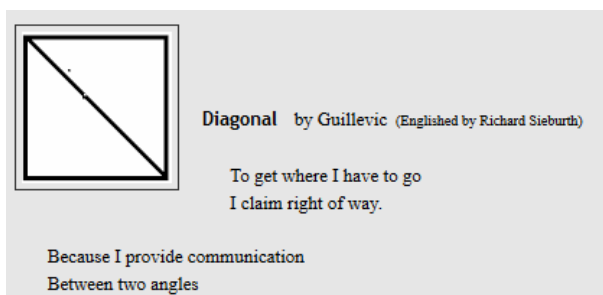
**Poetry has links to mathematics throughout its history.** For example, we find verses by William Rowan Hamilton (1805-1865), the mathematician who discovered quaternions (useful in the design of video games and 3D-effects in cinema). Here are the opening lines of [Hamilton's poetic tribute, "To the Memory of Fourier"](#):

"Fourier! with solemn and profound delight,  
Joy born of awe, but kindling momentarily  
To an intense and thrilling ecstasy,  
I gaze upon thy glory and grow bright:"

An African-American free-man, mathematician Benjamin Banneker (1731-1806) was publisher of an almanac that included a host of puzzle-poems and scientific facts – for example, he correctly predicted the 1789 solar eclipse. [Banneker's eighteenth-century verse, "The Puzzle of the Hound and the Hare,"](#) is an energetically-stated puzzle that ends with these lines:

Four times She Leap'd for the dogs three  
 But two of the Dogs leaps did agree  
 With three of hers, nor pray declare  
 How many leaps he took to Catch the Hare.

Have you ever gotten angry with a mathematical symbol – or, perhaps, been delighted by another? The French poet Guillevic (1909-97) has developed a wide range of verses that give personalities to mathematical objects. Here is part of "Diagonal," [one of several Guillevic-samples offered in the blog](#):



Many poems have been written [to celebrate mathematical people](#). Based on actual math-history accounts, poet Susan H. Case has written a collection of poems entitled *The Scottish Café* in which the collaboration of mathematicians at a café in Lvov, Poland is described – these poems offer a poetic answer to the question, "What do mathematicians do?" Here are a few lines [from Case's opening poem, "Fixed Points"](#):

Banach -- Mazur -- always the center  
 at a little table with a marble top  
 where they talk and write  
 and stare silently at the spaces in their minds  
 filled with even more formulas  
 than those written down on the marble table top

## Highlighting Female Mathematicians

In 2010, [the very first posting](#) in my blog -- "[Intersections – Poetry with Mathematics](#)" -- is a poem I was inspired to write after learning about the life of mathematician Amalie Emmy Noether (1882–1935). My poem ends with these lines that illustrate the bias that many of us hope society can outgrow.

Today, history books proclaim that Noether  
 is the greatest mathematician  
 her sex has produced. They say she was good  
 for a woman.

A recent film featuring a [NASA mathematician, Katherine Johnson](#), points out this sad fact:

Hidden figures:  
 women no one  
 notices are  
 changing the world.

An important test score for each of us is "How Many Women Mathematicians Can You Name?" – the quoted title names [a richly informative article by Judy Green](#) (*Math Horizons*, November, 2001,) that is [cited in the blog](#) along with these poems that help us learn to respond to Green's question:

"A Mere Girl" [by Brian McCabe about Sophie Germain](#),

"Code" [by Eavan Boland about Grace Murray Hopper](#),

"Ada" [by Carol Dorf about Ada Lovelace](#),

"With Reason: A Portrait" [by JoAnne Growney about Sophia Kovalevsky](#),

and a brief "found poem" using [the words of Fannie Hurst](#).

**NOTE:** If a particular mathematician or math topic interests you, the **SEARCH** feature in the right-hand column of the blog "[Intersections – Poetry with Mathematics](#)" can help you to find all of the postings that feature that item.

The experiences of girls in math classes often is different from that of boys – consider, for example, this girl's words [in "Hanging Fire" by Caribbean-American poet Audre Lorde](#):

Nobody even stops to think  
about my side of it  
I should have been on the Math Team  
my marks were better than his . . .

Girls who are good at math often are not recognized – or may even hide their math abilities in order to maintain friendships and other relationships. My poem "[Which Girl Am I?](#)" was written while I contemplated a sculpture ("[Split Tales](#)" by artist Mark Behme) of a divided woman. This poem can be useful in stimulating discussion among math-girls; here is a stanza from near the end of the poem.

Long division is difficult  
and plagued with remainders.

## Cross-cultural Poetry

Appreciating the contributions from cultures other than our own is illustrated by these stanzas of the poem, "[Calculations](#)," by [Spanish poet Brenda Cárdenas](#) -- who contrasts a teacher's assessment of a student with the historic achievement of her Mayan ancestors.

"I don't know what to tell you.  
Your daughter doesn't understand  
math. Numbers trouble her, leave  
her stuck on ground zero."

*And it was the Maya  
who imagined the zero,  
a sign for nothing, for everything,  
in their great calculations.*

A cento is a poem composed by a writer who quotes lines from other writers. It is a somewhat easy poem for beginning writers, requiring only choosing meaningful statements from ones already written rather than starting from scratch. Here is a cento with lines chosen by

[participants at the 2017 Bridges Math-Arts conference](#) -- selected [from a data base of more than 300 math and poetry statements](#) :

How many women mathematicians can you name?  
 How many of you love mathematics?  
 Women count. Men count. People count.  
 Counting each and every step along this rocky shore.

Authors of the four lines above are Judy Green, Shakuntala Devi, Anonymous, and Mike Naylor.

### Further Thoughts

To close these poetry-math meanderings, here is a small poem, perhaps familiar to many readers -- ["Outwitted" by Edwin Markham](#) (1852-1940).

He drew a circle that shut me out—  
 Heretic, rebel, a thing to flout.  
 But Love and I had the wit to win:  
 We drew a circle that took him in!

And so, let us draw our circle – one that includes mathematics and poetry and students and teachers and readers and writers and . . .

Let us read and think and learn . . . and discuss . . . and create . . . mathematics and poetry!

**About the author:** **JoAnne Growney** earned a doctorate in mathematics in 1970 and an MFA in poetry in 2002 and is an Emeritus Professor at Bloomsburg (PA) University. A supporter of the hypothesis, "Everything connects," and of the enlargement of STEM to STEAM, Growney has made more than a thousand postings to her long-term blog, "Intersections -- Poetry with Mathematics" at <https://poetrywithmathematics.blogspot.com>. ← visit this link and browse and ENJOY!

