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Creative Writing in the Mathematics Classroom

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Introduction

Creative writing in the mathematics classroom promotes mathematical applications in the real world, constructivist learning, embodied learning, transfer of mathematical ideas, and student engagement. When students are allowed to write about mathematical concepts creatively, they are able to take concepts that they have learned and put them into their world or even create a situation where the mathematical concept applies. Applying mathematical concepts to other environments helps learners transfer mathematical concepts. Learners are able to take the mathematics content and contextualize it outside of the classroom.

Writing in mathematics also is a way for students to embody learning. Because writing involves some kind of physical action, connecting mathematics through physical means allows for active and embodied learning. Additionally, creative writing can help students to reformulate their thinking about a concept or can allow for review of mathematics material.

As teachers and learners, we see the value in creative writing in the mathematics classroom. Writing can transform us and help to deepen understanding of mathematical concepts. In the classroom, we can use creative writing to aid in students' understanding of mathematical concepts. Creative writing is also engaging and allows students the freedom to reformulate and review their mathematical thinking in their own ways.

Examples of Types of Creative Writing in the Mathematics Classroom

Multiplication Stories involving Memory Aids

In the elementary grades, teachers might invite learners to write multiplication stories that include clever memory aids. A memory aid helps the author to remember a product that he or she may have previously had difficulty recalling. Ideally, these sorts of memory aids would be used only after students have developed understanding of the meaning of multiplication, thinking skills for retrieving facts, and strategies for connecting known facts to unknown facts.

Following are some examples of multiplication stories written by students in a fourth-grade classroom:

Nine creatures from another planet were walking along the beach. I noticed that each creature only had nine fingers. I asked the creatures why they only had nine fingers. They told me that they did not have ten because a monster ate one.

When you think of the nine creatures with nine fingers each, please remember that a monster "ate one."

Nine times nine = "ate one" $9 \times 9 = 81$

My friend and I were so hungry. We ate six courses of food, and it took us each seven bites for each course.

It was a feast "for two."

When you think of eating six courses of food, with each course requiring seven bites, remember that it was a feast "for two." 6 x 7 = 42

My family is a messy bunch. All nine of us were gathered around the table for a meal. Each of us dropped six crumbs on the floor. After that, it was a filthy floor.

When you think of the nine people, each dropping six crumbs on the floor, remember that it was a "filthy floor." 9 x 6 = 54

Eight members of the soccer team were practicing. Each moved the ball 7 times. What a bunch of nifty kicks!

When you think of the 8 members of the soccer team, each moving the ball 7 times, remember the "nifty kicks." 8 x 7 = 56

There were 9 cows in the field. These cows were especially gifted and could sing. Each cow decided to sing an octave, which is made of 8 notes. All together, the cows made a "heavenly moo."

When you think of the 9 cows, each singing 8 notes, think of the "heavenly moo." 9 x 8 = 72

Eight friends are always together. One day, each friend baked five cookies. They decided to eat all of the cookies when they gathered "for tea."

When you think of the eight friends, each bringing five cookies, remember that they gathered "for tea." 8 x 5 = 40

Definition Poems

A definition poem describes a concept through multiple creative descriptions. There are numerous ways in which definition poems may be structured. One example is as follows:

_____ is…..

_____ is…..

_____ is….

Following are examples of definition poems written by Mercer University students and faculty.

A trapezoid

A trapezoid is a quadrilateral with at least one pair of parallel sides.

A trapezoid is a table top in a kindergarten classroom.

A trapezoid is half of a regular hexagon.

A trapezoid is a polygon.

A trapezoid is the rug in front of my kitchen sink.

A trapezoid is a shape with interior angles that total 360 degrees.

A trapezoid is a portion of a bridge over the river.

A trapezoid is a red pattern block.

A trapezoid is a doorway.

A trapezoid is a shutter on a window.

A trapezoid is my favorite shape.

--by William Lacefield (Mercer University faculty member)

Conics

Curvy lines

Ovals, O's, and unbound U's

Named parabola, hyperbola, and ellipse

Intersections of a plane and a cone's surface

Circles are a special case

Set of solutions of a quadratic equation in two variables

--by Austin Lord (Mercer University student)

Polynomial

A polynomial is an algebraic expression.

A polynomial is an expression with numbers and variables.

A polynomial is more than a monomial.

A polynomial might be a binomial.

A polynomial might be a trinomial.

A polynomial might be an expression with four or more terms.

A polynomial is an expression where the terms are separated by plus and minus signs.

A polynomial is an expression where the variables' exponents may be different.

A polynomial is an expression whose degree is determined by the highest exponent.

A polynomial is an expression whose degree can be a special type.

A polynomial is an expression whose degree can be linear.

A polynomial is an expression whose degree can be quadratic.

A polynomial is an expression whose degree can be cubic.

A polynomial is simplified by combining like terms.

A polynomial is written in standard form.

A polynomial is $m^4 + 2a^3 - 3t^2 + 4h$.

A polynomial is MATH!

--by Shakevia Robinson (Mercer University student)

A circle

A circle is a set of all points in a plane that are the same distance from a fixed center-point.

A circle is a 2-dimensional shape.

A circle is a semi-circle twice.

A circle is 360 degrees around.

A circle is a group of people.

A circle is a full moon.

A circle is a kitchen table.

A circle is a coffee canister lid.

A circle is the shape of a wedding band.

--by Megan Foughty (Mercer University student)

A Hexagon

A Hexagon is a polygon with six sides.

A Hexagon is two sides less than a stop sign.

A Hexagon is six angles.

A Hexagon is six little triangles.

A Hexagon is 6 lines of symmetry.

A Hexagon is a shape used in chemistry.

A Hexagon is a shape whose angles add up to 720 degrees.

A Hexagon is a shape whose outline can be hidden in trees.

A Hexagon is a shape like a bee's honeycomb.

A Hexagon is a shape that can tile the floor alone.

A Hexagon is the shell of a turtle.

A Hexagon is a shape inscribed in a circle.

A Hexagon is a shape where six sides can be equal.

A Hexagon is a shape that is the pentagon's sequel.

A hexagon is a shape that is two trapezoids.

A hexagon is a shape that is hard to avoid.

A Hexagon is a shape in two dimensions.

A Hexagon is a shape that is too beautiful to mention.

--by Bethaney Wright (Mercer University student)

A rectangle

A rectangle is a four-sided flat shape, opposites congruent

A rectangle is the canvas painting of New York City on my wall

A rectangle is the mantle that holds my most precious memories

A rectangle is the wooden cabinets in my kitchen, even the table we eat on

A rectangle is four right angles, 360* divided by 4

A rectangle is a part of the attribute shapes in my Pre-k classroom

A rectangle is a visual chart in the room

A rectangle is the folded money I shop with and the credit card I swipe with

A rectangle is the phone I'm forever talking and texting on

A rectangle is a special shape that's all round us

A rectangle is a square sometimes…a square is a special kind of rectangle

--by Subricca Hart (Mercer University student)

List Poems

A list poem infuses a list of some sort. In the mathematics classroom, list poems might focus on vocabulary terms, ideas, sets of numbers, valuable aspects of mathematics, procedures, equations, or other concepts.

Following are examples of list poems authored by Mercer University students.

Mathematical Misconceptions

There is only one way to solve a problem

Not getting the answer the first time is mathematical weakness

Math is not related to my everyday life

Math is too hard

People are born to be good at math

Not everyone is capable of being good at math

Math is all about memorization and following steps

--by Laura Markert (Mercer University student)

Laura Markert provided the following commentary related to her experience with writing this list poem:

I wrote a poem during my graduate studies titled "Mathematical Misconceptions," where I reviewed some major misconceptions that may lead students to incorrect conclusions about mathematics. This writing opportunity helped me to think about my students' academic needs.

My School Day by Fives

I wake up at **five** o'clock to get started on my way

I eat lunch at **ten** o'clock which helps get me through the day

At recess we get **fifteen** minutes to play, before its time to go to sleep

At snack time we each get **twenty** grapes to devour, which means to quickly eat

My teacher gives out **twenty-five** stickers because we were all so great

Outside waits about **thirty** cars, none of them mom's, because she's always late.

--by Douglas Henry (Mercer University student)

My name is math and I may……..

be in the grocery store when you check out.

be at the park when you are with friends.

be in the movies that you watch.

be in the world that you look at every day.

--by Elizabeth Brazelton (Mercer University student)

Acrostic Poems

An acrostic poem uses letters of words on consecutive lines to form another word or words vertically.

Following are examples of acrostic poems authored by Mercer University students.

M ath is short for mathematics

A lgebra is a part of math where letters and symbols are used

T rinomials are algebraic equations with three terms

H yperbolic geometry has no parallel lines and the angles of a triangle sum to less than 180°

E xponents represent how many times a number will be multiplied by itself

M easurements provide the concepts of length, area, and volume

A lgorithms are the step by step procedures by which an operation can be carried out

T erms are single numbers or variables separated by a + or – sign in an algebraic equation

I ntegers are positive or negative whole numbers including zero

C omposite numbers have at least one other factor besides itself and one

S lopes are the steepness or inclines of lines

--by Douglas Henry (Mercer University student)

Algebra

A-bstract

L-etters

G-ather,

E-quating to

B-rilliant,

R-ealistic

A-nswers.

--by Joseph Hoffstadter (Mercer University student)

M odel me an object to teach me what you know. A simple manipulative will help my math skills grow.

A dd it. Subtract it. Maybe multiply or divide. Basic operations of mathematics have helped me to survive.

T each me with technology, a calculator will do. Doing math by hand seems sufficient too.

H elping students relieve math fear and anxiety sounds too good to be true, but don't worry, students, because I'm here for you.

--by Chelsea Robinson (Mercer University student)

Concrete Poems

A concrete poem is shaped like an object or idea it is describing. In mathematics, a concrete poem might be shaped like a geometric figure, a mathematical symbol, or a particular numeral.

Following are examples authored by Mercer University students.

A

Simple

Triangle

3 sides, angles

Strongest of shapes

Pieces of the puzzle

That forms every other

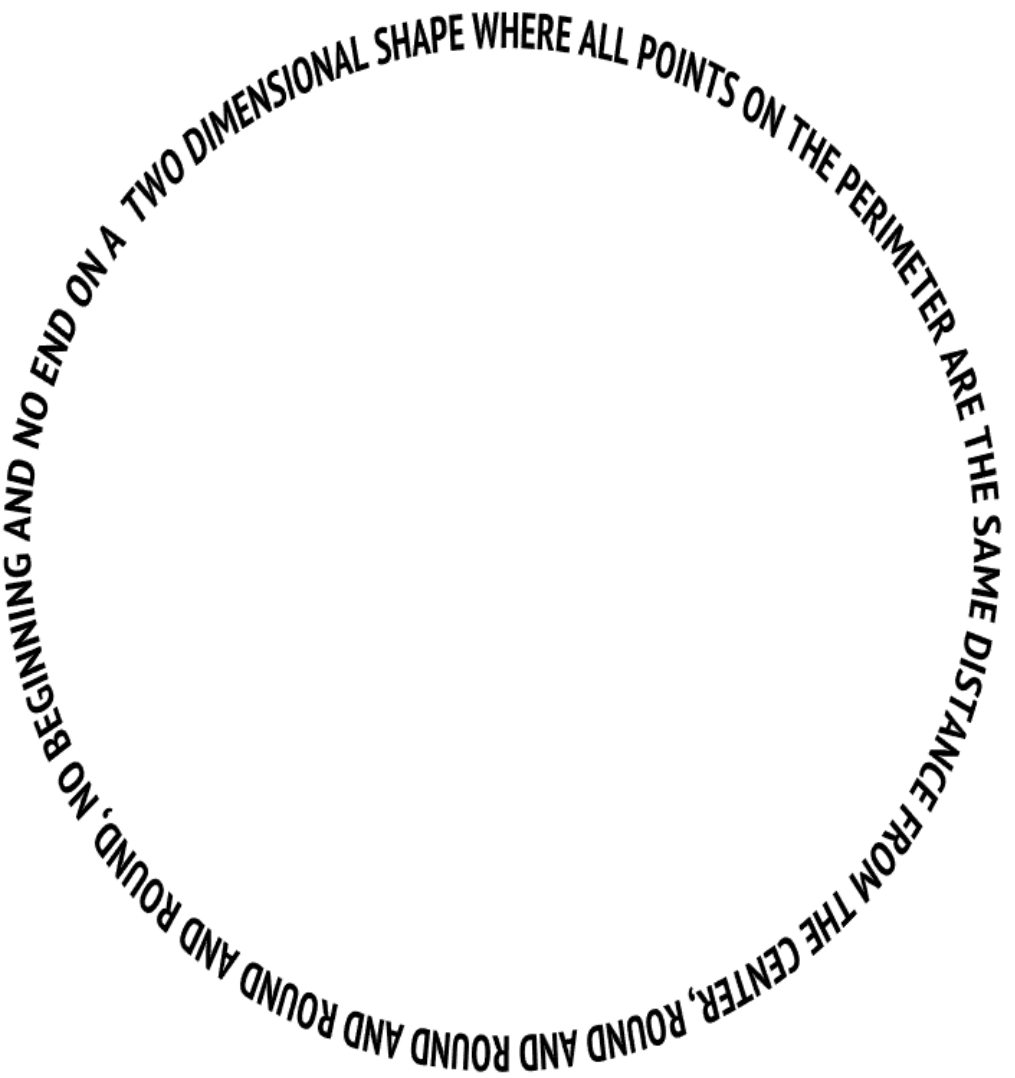
Deconstruct all the polygons

Into collections of many triangles

An important foundation of all geometry

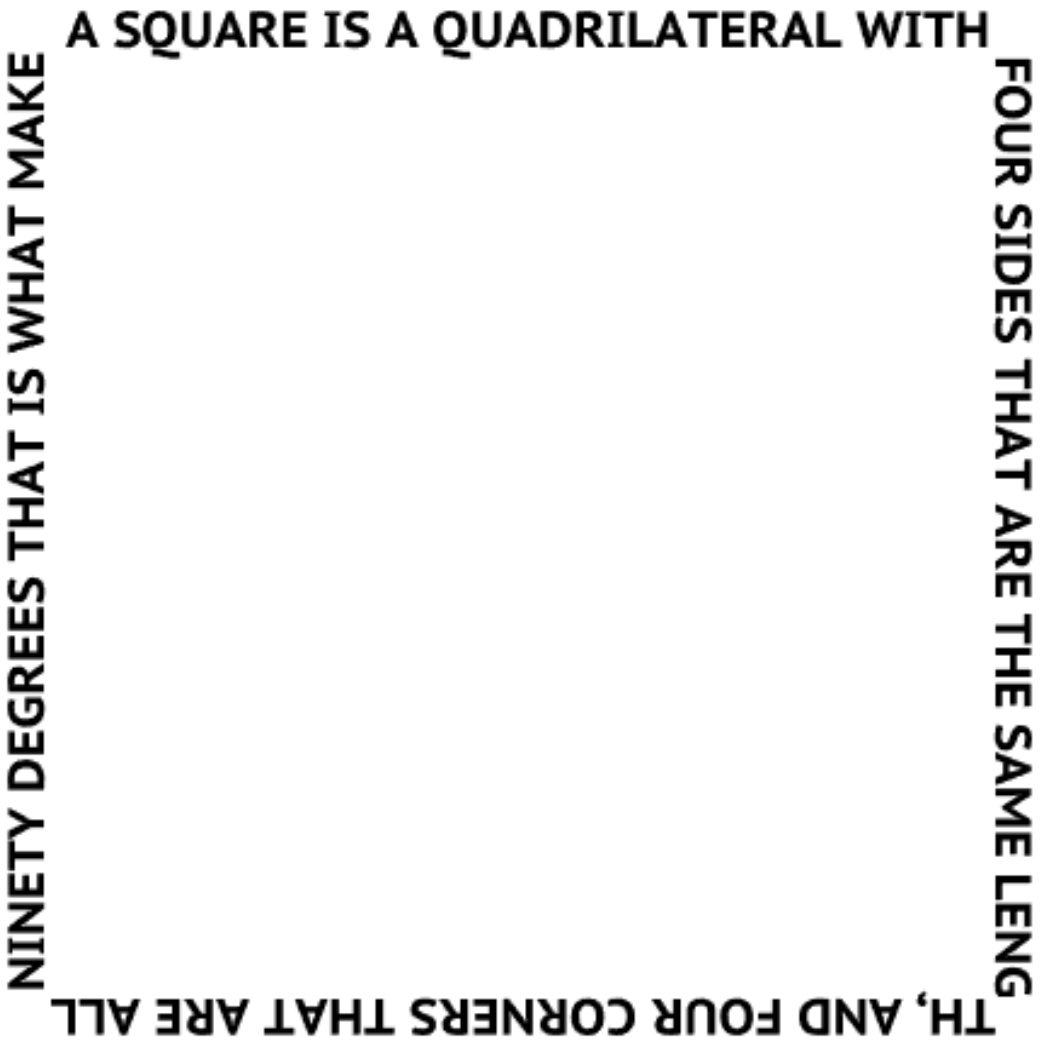
--by John Burnum (Mercer University student)

Circle



--by Emily Rodgers (Mercer University student)

Square



--by Emily Rodgers (Mercer University student)

My Pal, Pascal: A Bio From (a+b)x

Pascal's

Triangle. Yep.

You know the drill.

Without it, I'd be multiplying still.

Expanding binomials is my favorite use.

You'd rather distribute?? That's option deuce.

Look at the coefficients of the polynomial you've created.

Multiply a, b, and coefficient row to yield the answer that's related.

That's it. You've done it. Mathematically sound. Congrats math king or queen, you've just been crowned!

--by Chelsea Robinson (Mercer University student)

Square Poems

In a square poem, each line contains the same number of syllables, and the number of lines in the poem is the same as the number of syllables in a line.

Following are examples of square poems authored by Mercer University students.

Surface Area

Added area

Of all the faces

Helps me when wrapping

My Christmas presents

Or painting my house

--by Laura Markert (Mercer University student)

Laura Markert shared the following commentary pertaining to this creative writing experience:

I created a square poem about wrapping Christmas presents using surface area. This is one way I see surface area in the world. I enjoy creative writing about mathematics because it helps me recognize the relevance of the mathematics I am studying.

Trigonometry: A Square Poem

Oh trig-o-nom-e-try,

A mystery to me.

Lines, angles I don't see.

Now stoichiometry,

Is engaging to me,

I like Molarity

--by Rebecca Paschal-Young (Mercer University student)

Haiku

A haiku is composed of three lines. The first line contains five syllables, the second line contains seven syllables, and the third line contains five syllables.

Following are examples of haiku authored by Mercer University students.

Space Inside

The capacity

Calculated by numbers

An object will hold

--By Laura Markert (Mercer University student)

Derivative

instantaneous

rate of change at any time

of variables

--by Jose Santana Villa (Mercer University student)

Math is made of words.
Concepts, proofs, and arguments
inform the numbers.

--by Anna Sampson (Mercer University student)

Cinquains

A cinquain is a poem that has the following structure:

one word (subject or noun)
two words (adjectives) that describe line 1
three words (action verbs) that relate to line 1

four words (feelings or a complete sentence) that relate to line 1
one word (synonym of line 1 or a word that sums it up)

Following are examples of cinquains authored by Mercer University students.

Functions

Linear, Quadratic

Graphing, Solving, Transforming

X maps one y.

Relations

--by Shakevia Robinson (Mercer University Student)

Geometry

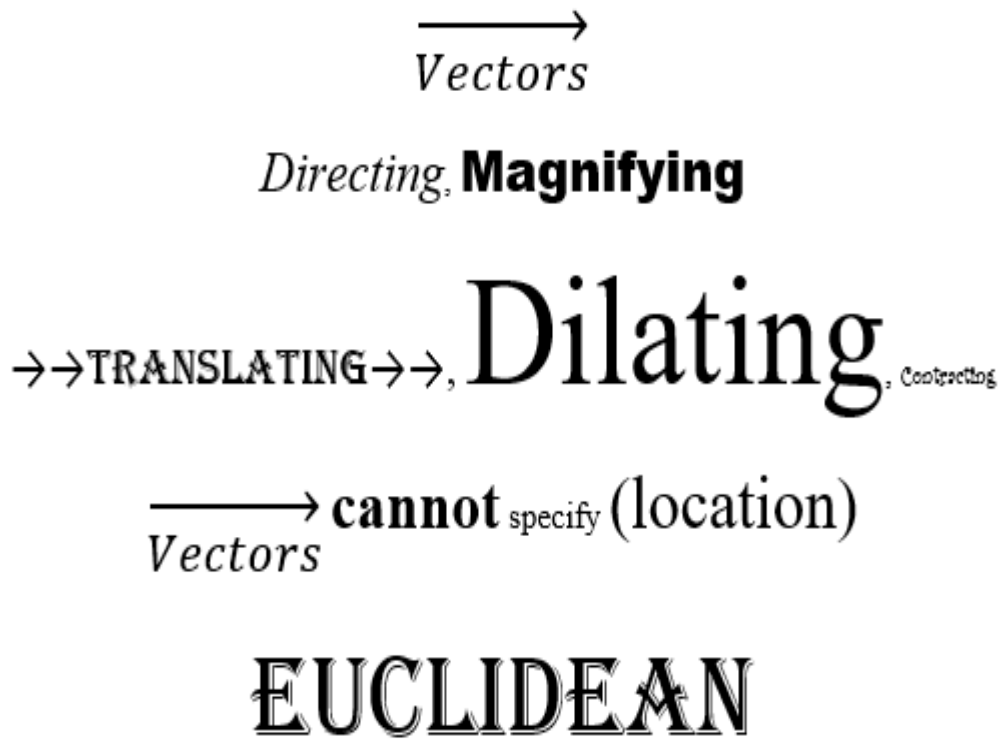
Dimensional shapes

Transforming, varying, coordinating

Create using drafting tools.

Polyhedra

--by Portia Stowes (Mercer University student)



--by Jose Santana Villa (Mercer University student)

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numbers
universal language
revealing, defining, deciding
Numbers are consistent, dependable.
concrete

--by Anna Sampson (Mercer University student)

Volume
Space inside
Multiplying, Filling, Maximizing
3D objects have volume.
Cubic

--by Jalethea Howard (Mercer University student)

Circles
No vertices
Revolving, curving, centering
Proportional to other circles
360◦

--by Bethaney Wright (Mercer University student)

Transformations
Same shape
Sliding, flipping, rotating
Same size, except dilations
Change

--by Bethaney Wright (Mercer University student)

Limericks and Limerick-Like Poems

A limerick is a humorous verse of three long and two short lines rhyming *aabba*. It is engaging to incorporate ideas of mathematics into limericks and limerick-like poems.

Following are examples of limericks and limerick-like poems authored by Mercer University students.

Prime Factorization

You are unique to each number

You are useful just like lumber

You break down to prime

GCF in no time

You wake me from my math slumber

--by Laura Markert (Mercer University student)

Regarding Tangents

A pilot was flying one day

His goal was to land in Bombay

As he got near the strip

His breaker did trip

He thought his last hope was to pray

His copilot said with a smile

"The distance to go is a mile.

If we know our height, too,

It's easy to do

We can use tangent to land this old pile!"

The landing, it could have been vicious

But the pilots' math skills were judicious

They knew the right angle

So the plane didn't mangle

The work that they did was auspicious

--by Herschel Revzin (Mercer University student)

Freestyle Writing

Writers may be invited to infuse concepts of mathematics into poetry or prose styles of their choice.

Following are examples of freestyle writing authored by Mercer University students.

Ode to a Taylor Polynomial:

An approximation.

A curve, a guess.

How close can it be? You ask.

(How close could it be? You think.)

How close would you like? I reply lightly.

Perhaps smugly, but certainly rightly.

A first try; a line.

Is it close?

Close to what?

Any guess, it seems, could be as good.

But this is not any augury or guess.

But forecast and intelligence, designed to impress.

Iteration two; yet again a line.

(Still not close. You think.)

But your mind's eye says different.

A slight angle, a clear change.

As difference ceases,

Confidence decreases.

The third attempt; finally a curve.

A good local approximation, but

A terrible global one.

Distance inexorably, unfailingly, unmercifully increases.

On a short jaunt right, or a brief excursion left

We are, it seems, of accuracy, bereft.

But jump rapidly now!

The twentieth, thirtieth, fiftieth!

As a trained cobra, the ends move.

A pair, first opposing, then agreeing.

At one hundred, then, it cannot be denied

We can get to the brink with Taylor as guide.

--by Herschel Revzin (Mercer University student)

Angles three

Acute, right, obtuse

Angles three

Defined by their degrees

Angles three

Their names descriptors

Angles three

Parts of each other

Angles three

But always apart

--by Dirk Lamb (Mercer University student)

Order of Operations Stories

A writer may design a story to illustrate a mathematical expression, using the correct order of operations.

Following is an example of an order of operations story authored by a Mercer University student.

$$\frac{\left(8\left(\frac{1}{4}\right)\right)^3 + 2(2+1) - 1}{2}$$

It was a gloomy Saturday afternoon when the sky was gray and a light drizzle was covering the front law. Phillis and Fred were disappointed in how their Saturday was already going. They started going around the house to try and find loose change. They split up to search the house. Phillis attacked the couch, finding 8 quarters immediately. She then found 8 more quarters under the pad of the love seat, doubling the amount of money she found from 2 whole dollars to 4. Meanwhile, Fred found 4 dollar bills hiding behind the fridge. They met back up to take a break and consolidate. Putting their money together, they found that they once again doubled the money Phillis had found, ultimately cubing the original amount of $2 to $8.

After their break, they broke out again. Fred found two dollar bills underneath his desk in his room. He then found another silver dollar in the bathroom! In the garage, Phillis found three dollar bills squished behind the old sleds. They met up once more to see what their new total would be. They found that they both had $3, so they doubled that amount to $6. They collected all of the money they had discovered total, $8 and $6, and added them both together to get $14. As they were inspecting the money further, however, they discovered that one of the dollars that had been squished behind the sled was too ripped up to be used. They subtracted that $1 from their total, resulting in $13!

Through all of the excitement of the luck that they have had, they did not keep track of who found what money. They agreed that it would be most fair to split the total amount of money they found evenly among themselves. Both Phillis and Fred came out of a glum raining Saturday with a fortune of $6.50.

The pieces of writing that have been shared represent examples of several types of poetry and prose that can prove beneficial in mathematics learning environments. Many other types of writing could be encouraged across all grade levels as well as in postsecondary settings. The potential for creativity is limited only by the imaginations of the teachers and the learners.

Conclusion

Creative writing in mathematics is beneficial to all learners. Adults and children alike can benefit from using creative writing in mathematics in order to aid with transfer of learning, engagement, and finding various applications in the real world. Furthermore, creative writing supports the constructivist approach because it allows the learners to construct their own understanding of the material in order to make sense of the mathematics in their own ways. Creative writing also supports the embodied learning approach because it allows students to connect their learning to the physical action of writing or typing. This allows for students to actively be involved in learning.