

Piano Slam Math Activities

January, 2016

Dear teachers:

Here you will find a variety of activities that you can use with your students to encourage creativity, develop facility with language, and strengthen math skills. Feel free to use them as written or adapt them to meet the needs of your students. Some are specific activities with step-by-step instructions and others are ideas that you can develop into relevant lessons. A Glossary of math terms that also have application in the field of music is provided so that you can design your own vocabulary lessons.

The first activity presented is a general introduction to creative thinking, so if your students are not accustomed to creative writing, you may wish to start with that activity and continue with additional assignments specifically related to your math content. A resource list is provided at the end of this document, and there you will find websites that address the intersection of math and poetry, as well as links to a number of math related articles and STEAM information. We hope that you find the activities and resources valuable and that they will help your students make the transition to writing poetry for the annual Piano Slam competition.

Sincerely,

The Piano Slam Education Support Team

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Thirty Circles Activity: An Introduction to Creativity

Teacher Instructions:

This activity is designed to promote creative thinking, develop community, and allow students to “loosen up” from thinking that they are not creative. You may adapt it by discussing the characteristics of circles, and perhaps requiring them to utilize specific properties in their drawings, or by using other shapes instead of circles, and discussing the properties of each, or you may simply use this activity to engage students and help develop their creativity prior to completing some of the other writing activities which are more content focused.

Distribute the 30 circles template (see following page) individually and face down so students do not see what is on the sheet. Give instructions not to turn the paper over until given the signal.

Explain that the activity they will participate in is a creative challenge to see who can generate the most ideas. It is similar to the brainstorming process, except that they will be drawing instead of responding verbally.

When the signal is given, they will turn the paper over and use the shapes provided to create as many drawings as they can. Each shape should become a distinct object. They should think “outside the box” (or circle) and draw as many objects as they can think of. The goal is to create a large collection of various items, and to see who can design the most. They will have 3 minutes to draw. Tell them what the START and STOP signals will be and answer any questions.

Instruct students to immediately put their pen/pencil down when the STOP signal is given.

Give the START signal. After three minutes give the STOP signal and make sure they put down their pencils. See who in the group has created the most. Ask: "Who has more than 5 circles done? more than 10? “etc.

Ask for volunteers to share their papers with the whole group and explain something about their drawings or about the processes they used.

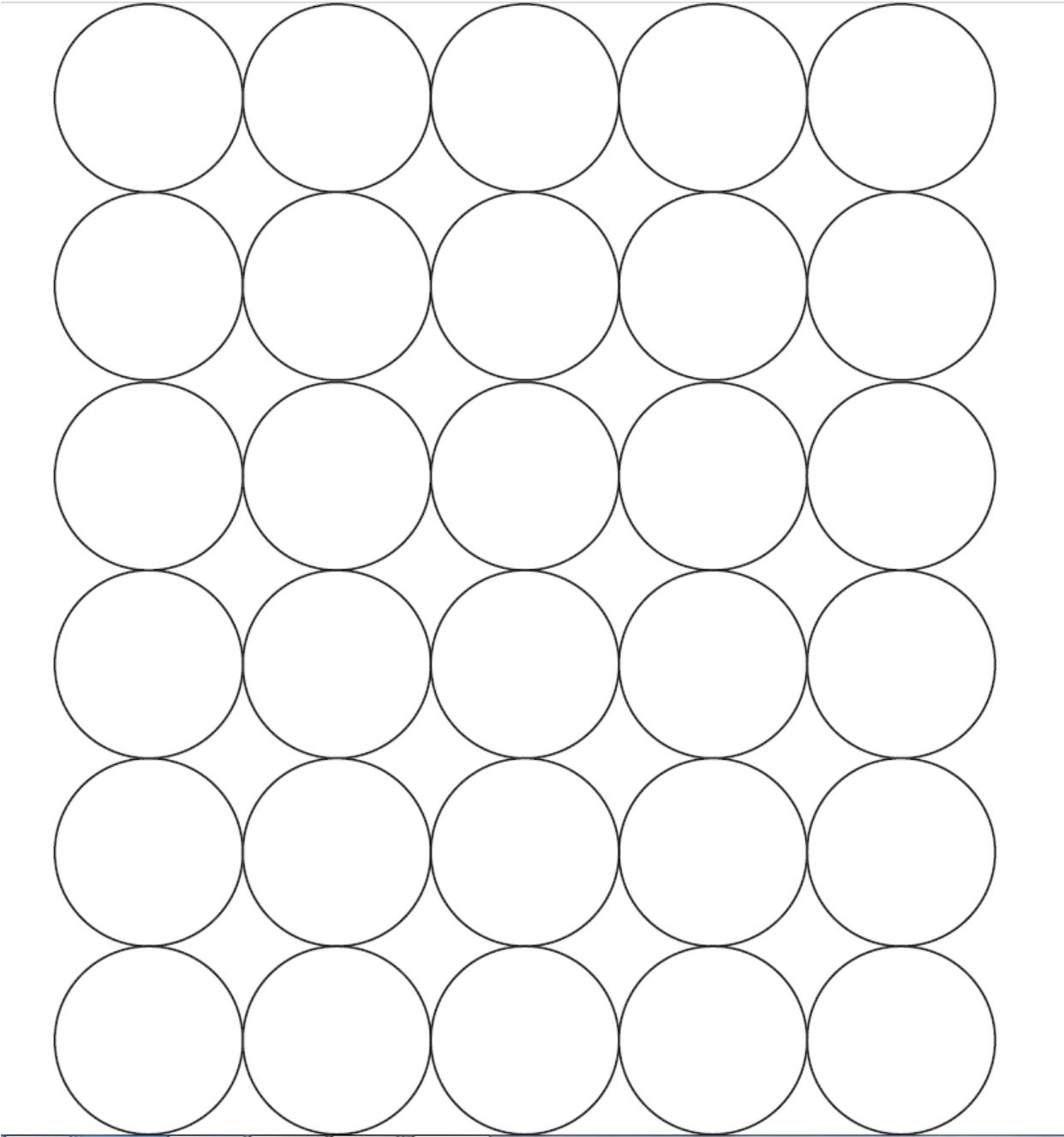
Allow 1 minute of conversation with a partner. They should compare both the number of circles they had completed and the content of their drawings. Were there any similarities? Any surprises? Any categories? Any especially creative ideas?

Allow 1 more minute for them to draw again and add any new ideas they gained.

Provide 2 more minutes for conversation, asking them to discuss with their partner which one drawing they are most proud of OR the one that best represents their own personal creativity.

In small groups (2-4 pairs gather together) they should introduce their partner to the rest of the group, using the partner's first name and something they learned via the drawing(s) on the paper.

(On the Resources page are links to an article titled, “Jumpstart Creativity,” and to a TED talk using the 30 circle activity in case you would like additional information about this process.)



Our World of Shapes Speaking/Listening/Writing Activity

Math Standards:

MAFS.K12.MP.6.1

Mathematically proficient students try to communicate precisely to others.

MAFS.912.G-MG.1.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

MAFS.912.G-CO.4.12

Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

Writing Standards:

LAFS.910.W.4.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

LAFS.910.W.1.1.d

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

Speaking and Listening Standards:

LAFS.910.SL.2.6.e

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

LAFS.910.SL.1.1.b

Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

Teacher Instructions:

Materials needed: writing paper and writing utensils, plain or construction paper to build shapes, and staplers, glue, or tape for constructing shapes.

Room arrangement: This activity requires various groupings. If space allows you may wish to start with the students in a circle so that they have room to move as they create their shapes. When they start drawing it would be appropriate to have them move to tables or pairs of desks, and for the teamwork they will need tables or desks in groups of four. A space should also be designated for the group presentations, so consider creating part of the room as a “stage.”

1. Select any geometric shape.
2. Form the shape with your hands.
3. Keeping the shape with your hands, pass the shape to your neighbor, who will maintain the shape you created.
4. Receive the shape that your partner created, so that everyone possesses a new shape.
5. Imagine you are on a boat at sea. Transfer the object to your neighbor while at sea.
6. Tell why you are drawn to the particular shape you created.
7. Offer your neighbor an example of an object in the real world that assumes your shape.
8. Draw the shape.
9. Allow the shape to morph into something else by adding one or two lines.
10. Give your shape life with color, movement, sounds, and function.
11. Become the moving morphed shape.
12. Share in groups of four how the morphed shape is a reflection of who you are and how it represents you. (Be sure to give your morphed shape more than one characteristic, as it is multi-faceted.) Listen carefully to each person’s reflection. The goal is to look for connections.
13. Determine how the moving morphed shapes can fit together and operate as a unique invention.
14. Decide and discuss what your invention can accomplish and how it can better society.
15. Compose a couplet, with a partner, (two couplets as a team of four), describing how your invention works. (A couplet is a two line rhyme.)
16. Form a paper sculpture out of the four morphed shapes and name your sculpture.
17. Develop a marketing strategy to pitch your invention.
18. As a team, design a presentation to promote your invention in a commercial or business meeting, including the two couplets and the moving creation. Give your presentation to the large group.

Number Poem

Math Standards:

MAFS.K12.MP.6.1

Mathematically proficient students try to communicate precisely to others.

MAFS.912.G-MG.1.1

Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Writing Standards:

LAFS.910.W.4.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

Teacher Instructions:

Ask students to list at least 10 of their favorite **types** of numbers. Examples might include: whole, even, rational, prime, positive, integer, fractions, congruent, etc. (If needed, suggest terms from previous lessons to get students started.)

Have students rank the number types in order of how important they are, so they should place a number beside each word in their list, with #1 being the most important. (There are no right/wrong answers for this—they must make a personal judgment on their own.)

Now ask them to circle the top three types of numbers and create three columns on their paper, with one number type at the top of each column. (You may wish to use the planning sheet on page 9 instead.) For each of the three words they should list the following responses in the appropriate column:

An associated color

An animal that comes to mind

A person, living or dead, real or imaginary

An emotion

An image from nature

A phrase that describes an indoor scene

An action or movement

An imaginary place

A descriptive word

Now they should choose ONE column to write about and create their own 15-20 line poem.

After they have completed their rough draft they should read (or listen to) the poem, “Pi,” by Wislawa Szymborska. While reading or listening ask students to identify places in the poem where the author referenced: nature, colors, specific numbers, images, emotions, etc.

Ask students to share their poems with a partner, receive feedback about their use of poetic techniques, and then revise their poems, adding at least one additional phrase or poetic technique either from the poem they read or from the suggestions received from the partner.

Pi

The admirable number pi:
three point one four one.
All the following digits are also just a start,
five nine two because it never ends.
It can't be grasped, six five three five, at a glance,
eight nine, by calculation,
seven nine, through imagination,
or even three two three eight in jest, or by comparison
four six to anything
two six four three in the world.
The longest snake on earth ends at thirty-odd feet.
Same goes for fairy tale snakes, though they make it a little longer.
The caravan of digits that is pi
does not stop at the edge of the page,
but runs off the table and into the air,
over the wall, a leaf, a bird's nest, the clouds, straight into the sky,
through all the bloatedness and bottomlessness.
Oh how short, all but mouse-like is the comet's tail!
How frail is a ray of starlight, bending in any old space!
Meanwhile two three fifteen three hundred nineteen
my phone number your shirt size
the year nineteen hundred and seventy-three sixth floor
number of inhabitants sixty-five cents
hip measurement two fingers a charade and a code,
in which we find how blithe the trostle sings!
and please remain calm,
and heaven and earth shall pass away,
but not pi, that won't happen,
it still has an okay five,
and quite a fine eight,
and all but final seven,
prodding and prodding a plodding eternity
to last.

by Wislawa Szymborska

Number Poem Planning Sheet

Number type (prime, rational, etc)				Examples from the text
Color				
Animal				
Person				
Emotion				
Nature Image				
Indoor scene				
Action/movement				
Imaginary place				
Descriptive word				

Found Poem Using Content Text
Class Activity
(May be used in math or in ANY content area.)

Appropriate Reading and Writing Standards are provided. Add your content standards as well.

Content standards:

Reading:

LAFS.910.RI.1.2 Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

LAFS910.RST.2,4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

LAFS.910.RST.2.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., forces, friction, energy).

LAFS.910.WHST.1.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

Writing:

LAFS.910.WHST.2.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.910.WHST.2.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

LAFS.910.WHST.4.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Teacher Instructions:

Approximate time: 1 hour

Select a piece of text related to your content or subject area that you want students to read and understand.

Ask students how many of them could write a poem about _____ (Fill in with the subject/topic of the text) in just 20 minutes. Record the number of hands. (That's data.)

Read a short portion of the text aloud to students (perhaps the introductory paragraph) asking them to pick out one key word as you read.

Facilitate a "sweep" of the room as everyone shares their word. (Repeats are OK.)

Now have students re-read the text, either silently or with student volunteers. Tell them while they are reading to circle, box, highlight, or underline 10 words that they find interesting. The words may be interesting because of the meaning of the word, the sound of the word, the spelling of the word, or any other reason. They should select **exactly** 10 words. (Changing one's mind is OK--they can review after reading to see if they have exactly 10 they really like. This process also encourages re-reading.)

Now ask the students to list the 10 words in the margin **in the same order** that they appear in the text. Explain that those 10 words will be the basis for a "found" poem. (It is called a found poem because the words are "found" in another text.) They may add additional words or phrases to create the poem, but the original 10 words must appear **in the same order** within the poem.

Tell students that you will lead them in creating a class poem, and then they will complete one of their own.

On the SMART BOARD, whiteboard, or chart paper, ask for a volunteer to share a word from the first paragraph. (Since they must be listed in order, ask for 1 per paragraph, and maybe 2 from the longer paragraphs until you have 10.) Ask the students to check and make sure they are in the correct order. (This process encourages re-reading.) Adjust and reorder if necessary.

After all 10 are listed, ask for audience assistance to create a poem out of the words listed. Model the process for them. Cross out and change words as needed. Emphasize that writing is messy. When the writing is finished, ask the students to check for spelling, capitalization, and punctuation. (This check encourages revision and proofreading--don't worry if everything is not perfect, or if you are not sure where the apostrophe goes--it's OK to say, "I'm not sure, but we can look it up and find out." or "I will ask a Language Arts teacher and get back to you." This is the "drafting" phase, and those elements can be worked out in the "editing" phase.)

When finished, tell them, "ta da," and return to the question: "How many of you at the beginning thought that you could write a poem about _____ in 20 minutes?" Review the data collected earlier. Now ask: "How many of you participated in creating a poem in 20 minutes? (All should

raise their hands.) Point out the increase from ---% to 100% . Then note that the group has successfully written a poem. Record the poem by asking a student to copy, type or take a picture and print it out. Post or display for all classes to see. ("Publishing" is important and students will love seeing their "word" in the class poem. Later you may display individual student poems as well.)

Now ask students to create their own poem from their 10 words.

This can be adjusted in various ways:

- Other guidelines can be added, such as, the poem must include one new understanding that the reader gained from the text.
- The teacher might assign 3 - 4 _____vocabulary terms that **MUST** be included and students select additional words to make a total of 10.
- A written reflection could be included to explain the connection between the text and the student's poem.
- A speaking component can also be added if students are asked to explain how the ideas in the text are represented in their poem.
- And in **ALL** classes, not just Language Arts classes, teachers should remind students to capitalize the first word of each line and include correct punctuation.

Note: Since literacy standards are interdisciplinary, it is good for students to complete creative tasks that incorporate both subject area content and literacy skills. Engaging in this process is one way that you can easily use the creative arts to teach content. If you do similar activities on a regular basis, it will enrich your teaching and increase student engagement.

A B C Poem

Standards:

Math Standards: Variable, depending on the topic being covered

Writing Standards:

LAFS.910.W.2.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LAFS.910.W.4.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

LAFS.910.W.1.1.d

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

Teacher Instructions:

Ask students to create an A, B, C list (See page 14) about a topic that you have covered in class. It might be broad, such as “Geometry” or more specific, such as “Angles.” They should try to write 2 words for each letter if possible, but should have at least one. (This can also be written on their own paper if copies are not available.)

Ask them to consult with a partner and share so that each person has at least one word for each letter. Go over the list as a class if necessary.

Then give students the challenge of writing a 26 word poem where each word begins with the succeeding each letter of the alphabet. (See example below.)

Analytic Geometry Poem

Axes beget coordinates,
dutifully expressing
functions, graphs,
helpful in justifications,
keeping legendary mathematics
new or peculiarly quite rational
so that understanding's visual
with x, y, z.

By: JoAnne Grownley

ABC brainstorming sheet

A _____	B _____
C _____	D _____
E _____	F _____
G _____	H _____
I _____	J _____
K _____	L _____
M _____	N _____
O _____	P _____
Q _____	R _____
S _____	T _____
U _____	V _____
W _____	X _____
Y _____	Z _____



I

Found Poem Using Science Poetry Analysis

(Lesson Modification of Julie Vivian's Idea Expo presentation: The Science of Poetry)

The Finished Product: A found poem with a creative, colorful, informative visual and online blog submission relating poetic text to a scientific topic

Steps to Complete Found Poem Project:

1. Have students search for a poem related to a scientific field of interest to them.
2. Ask students to retype the selected poem in a fancy or script font and print a hard copy that has been triple-spaced.
3. Facilitate a class poetry slam.
4. Share with students that they will analyze their selected poem first, before creating a found poem, and should complete the following tasks.
 - a. Identify three images that come to mind while reading the poem and explain how each image is related to science.
 - b. Select one of the images and brainstorm descriptive and/or sensory details that depict the image.
 - c. Reflect on the tone conveyed through the author's poem.
 - d. Circle 8-12 words or phrases that demonstrate the tone of the poem.
 - e. Select and list three tone adjectives from the Tone Vocabulary List that you feel best convey the author's tone.
 - f. Write an analysis statement of the tone the author presents, using evidence (8-12 words) to support the claim of that intentional tone.
 - g. Research a science topic related to the poem.
 - h. Record 10 facts about the selected topic.
 - i. Circle the most important word or phrase from each fact.
 - j. Compile a list of circled words from the poem and the researched science facts.
 - k. Create a found poem using the compiled list.
 - l. Determine the tone of your found poem.
 - m. Share your found poem with a peer and ask what tone is conveyed.
 - n. Revise and edit as needed.
 - o. Illustrate your final draft.
5. Explain how students will compose a blog post of five sentences.
 - a. Sentence 1: Introduce the science topic and its related field of science
 - b. Sentence 2: Clarify goals of the science field
 - c. Sentence 3: Explain the relationship of your poem to the science field
 - d. Sentence 4: Describe career possibilities and activities related to your topic
 - e. Sentence 5: Publish your entire found poem or select only one line of the poem.
6. Create an online profile at www.weebly.com, choosing a template and webpage title. Type the blog post in any of the boxes in the template.

Science Poetry Analysis Transformed into Found Poem

Poem Title and Author: _____

Publication Date: _____

Field of Science and Science Topic: _____

Poem Analysis Steps

1. List three images and how they relate to science

a. _____

b. _____

c. _____

2. Circle the selected image.

3. Write descriptive or sensory details

a. _____

e. _____

b. _____

f. _____

c. _____

g. _____

d. _____

h. _____

4. Provide three "tone" adjectives (See following page)

a. _____ b. _____ c. _____

List Science Topic Facts

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Compiled List of Important Words from Poem and Facts

Found Poem

Blog Post about Science Found Poem

- f. Sentence 1: Introduce the science topic and its related field of science
- g. Sentence 2: Clarify goals of the science field
- h. Sentence 3: Explain the relationship of your poem to the science field
- i. Sentence 4: Describe career possibilities and activities related to your topic
- j. Sentence 5: Publish your entire found poem or select only one line of the poem.

Math Poetry Analysis Transformed into Found Poem

Use the same procedures as for the Science Analysis Transformed into Found Poem.

Poem Title and Author: _____

Publication Date: _____

Mathematics Topic: _____

Poem Analysis Steps

- List three images and how they relate to mathematics
 - _____
 - _____
 - _____
- Circle the selected image.
- Write descriptive or sensory details
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____
- Provide three "tone" adjectives
 - _____
 - _____
 - _____

List Mathematics Topic Facts

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Compiled List of Important Words from Poem and Facts

Found Poem

Blog Post about Mathematics Found Poem

- a. Sentence 1: Introduce the mathematics topic
- b. Sentence 2: Clarify how the mathematics topic relates to the field of mathematics
- c. Sentence 3: Explain the relationship of your poem to the mathematics field
- d. Sentence 4: Describe career possibilities and activities related to your topic
- e. Sentence 5: Publish your entire found poem or select only one line of the poem.

Tone Vocabulary List

Positive Tone/Attitude Words

Amiable	Consoling	Friendly	Playful
Amused	Content	Happy	Pleasant
Appreciative	Dreamy	Hopeful	Proud
Authoritative	Ecstatic	Impassioned	Relaxed
Benevolent	Elated	Jovial	Reverent
Brave	Elevated	Joyful	Romantic
Calm	Encouraging	Jubilant	Soothing
Cheerful	Energetic	Lighthearted	Surprised
Cheery	Enthusiastic	Loving	Sweet
Compassionate	Excited	Optimistic	Sympathetic
Complimentary	Exuberant	Passionate	Vibrant
Confident	Fanciful	Peaceful	Whimsical

Negative Tone/Attitude Words

Accusing	Choleric	Furious	Quarrelsome
Aggravated	Coarse	Harsh	Shameful
Agitated	Cold	Haughty	Smooth
Angry	Condemnatory	Hateful	Snooty
Apathetic	Condescending	Hurtful	Superficial
Arrogant	Contradictory	Indignant	Surly
Artificial	Critical	Inflammatory	Testy
Audacious	Desperate	Insulting	Threatening
Belligerent	Disappointed	Irritated	Tired
Bitter	Disgruntled	Manipulative	Uninterested
Boring	Disgusted	Obnoxious	Wrathful
Brash	Disinterested	Outraged	
Childish	Facetious	Passive	

Humor-Irony-Sarcasm Tone/Attitude Words

Amused	Droll	Mock-heroic	Sardonic
Bantering	Facetious	Mocking	Satiric
Bitter	Flippant	Mock-serious	Scornful
Caustic	Giddy	Patronizing	Sharp
Comical	Humorous	Pompous	Silly
Condescending	Insolent	Quizzical	Taunting
Contemptuous	Ironic	Ribald	Teasing
Critical	Irreverent	Ridiculing	Whimsical
Cynical	Joking	Sad	Wry
Disdainful	Malicious	Sarcastic	

Sorrow-Fear-Worry Tone/Attitude Words

Aggravated	Embarrassed	Morose	Resigned
Agitated	Fearful	Mournful	Sad
Anxious	Foreboding	Nervous	Serious
Apologetic	Gloomy	Numb	Sober
Apprehensive	Grave	Ominous	Solemn
Concerned	Hollow	Paranoid	Somber
Confused	Hopeless	Pessimistic	Staid
Dejected	Horrific	Pitiful	Upset
Depressed	Horror	Poignant	
Despairing	Melancholy	Regretful	
Disturbed	Miserable	Remorseful	

Neutral Tone/Attitude Words

Admonitory	Dramatic	Intimate	Questioning
Allusive (not <i>illusiv</i> e)	Earnest	Judgmental	Reflective
Apathetic	Expectant	Learned	Reminiscent
Authoritative	Factual	Loud	Resigned
Baffled	Fervent	Lyrical	Restrained
Callous	Formal	Matter-of-fact	Seductive
Candid	Forthright	Meditative	Sentimental
Ceremonial	Frivolous	Nostalgic	Serious
Clinical	Haughty	Objective	Shocking
Consoling	Histrionic	Obsequious	Sincere
Contemplative	Humble	Patriotic	Unemotional
Conventional	Incredulous	Persuasive	Urgent
Detached	Informative	Pleading	Vexed
Didactic	Inquisitive	Pretentious	Wistful
Disbelieving	Instructive	Provocative	Zealous

Source: <http://valenciacollege.edu/east/academicsuccess/eap/documents/tonewords.pdf>

Rhythm Activities

Watch the video about the Drums Alive Program:

<http://www.pressconnects.com/story/news/2016/01/12/chenango-bridge-elementary-students-try-drums-alive-activity-created-germany/78682648/>

(There is a print article at the link also, in case the video is not accessible.)

These are creative ideas that may be used to combine the rhythm of music with various mathematical concepts. They can be adapted to any grade level or math topic.

1. Play music in the background for students to tap sticks to the beat as they think of ways to use particular math vocabulary in sentences. (The math/music vocabulary document could be used for this activity.) Students share with partner and then with the whole group. Facilitate the selection of phrases to create a class poem as a review of recent content.
2. Ask students to tap out syllabic pattern beat of various math rules. (e.g., algebraic, logic, or geometric rules). Start with simple words and phrases and then add descriptions (adjectives, adverbs) creatively.
3. Display word problems for students to solve. They read aloud while they march in place and tap the beat on a drum/large ball/desk. Select a group to go first (Boys, then girls, or anyone wearing a certain color or a particular age, or anyone who has a sibling. etc.) The teacher will tap a certain pattern for the think-wait time, and students say the answer as they march in a certain pattern around the drums/balls/desks, touching the number of objects corresponding with the correct answer.
4. Use beating rhythms with drumsticks to brainstorm alliteration. Call out, "A," and go around the room, asking for a math related word. Then do "B," etc. Or use the rhythm to create an ABC story, or a favorite fruit/food/color/place. Then ask students to develop a poem with a partner or triad by adding adjectives and adverbs to selected topic and phrases.
5. Choose a shape. Have students around the room, while tapping the beat to an instrumental melody, state things that are primarily the selected shape. The class might select one of the suggested objects for the next sweep around the room with the first person describing the object, using an adjective. The second person states a verb. The third person says an adverb and the fourth person says the sentence using the object, description, verb and adverb. The class could physicalize the statement with a motion and test out different genres of music to see how the beats change the motions. Ask students to work together in small groups or as a class to create a poem that captures a specific emotion (humorous, witty, funny, melancholy, etc.)

Glossary

MUSICAL /// MATH Terminology for PIANO SLAM

Teachers: This document lists many music terms that also have application to math. Use this to design creative writing activities for your students or as a reference document when your students are writing poetry for the Piano Slam Competition.



Term	Musical Terminology	Mathematical Terminology
Arc	In music , arc form is a sectional structure for a piece of music based on repetition, in reverse order, of most musical sections such that the overall form is symmetric , most often around a central point.	➤ Arc - the length of a curve.
Bass Base	Describes tones of low frequency or range. In musical compositions, these are the lowest parts of the music.	➤ Base - in plane geometry or solid geometry, the bottom of a figure. If the top is parallel to the bottom (as in a trapezoid or prism), both the top and bottom are called bases.
Binary	Binary form is a musical form in which two related, though different musical sections, are usually repeated.	➤ Binary - a binary number is a number expressed in the binary numeral system, or base-2 numeral system,



Term	Musical Terminology	Mathematical Terminology
		<p>which represents numeric values using two different symbols: typically 0 (zero) and 1 (one).</p>
<p>Chord</p>	<p>A chord, in music, is any harmonic set of three or more notes that is heard as if sounding simultaneously.</p>	<p>➤ Chord - a line segment on the interior of a circle. A chord has both endpoints on the circle.</p>
<p>Count</p>	<p>In music, counting is a system of regularly occurring sounds that serve to assist with the performance of music by allowing an easy identification of the beat.</p>	<p>➤ Count - the numbers used for counting. That is, the numbers 1, 2, 3, 4, etc.</p>
<p>Double</p>	<p>In music, double-time is a type of meter and tempo or rhythmic feel, which is often used to define that the same musical part will be played in twice the tempo count.</p>	<p>➤ Doubling time - for a substance growing exponentially, the time it takes for the amount of the substance to double.</p>
<p>Fractions and Note Types</p>	<ul style="list-style-type: none"> ➤ Whole – 4/4 – One Whole Note ➤ Half – 2/4 – Half (of Whole) Note ➤ Quarter – 1/4 – Quarter (of Whole) Note <ul style="list-style-type: none"> ○ There are also further sub-divisions of the Whole Note <ul style="list-style-type: none"> ▪ Eighth Notes (1/8), ▪ Sixteenth Notes (1/16), ▪ Thirty-Second Notes (1/32) ▪ 1/64, 1/128, 1/256 and so on, infinitely... 	
<p>Harmonics and Harmonic series</p>	<p>A harmonic is any member of the harmonic series, an ideal set of frequencies that are positive integer multiples of a common fundamental frequency. (e.g. a violin string (1/1) when stopped at exactly the Half point (1/2),</p>	<p>➤ Harmonic progression - The sequence</p> $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$ <ul style="list-style-type: none"> ○ Note: The harmonic mean



Term	Musical Terminology	Mathematical Terminology
	will vibrate one octave higher, at half of that Half (1/4), will vibrate two octaves higher, and so on)	<p>of two terms of the harmonic sequence is the term halfway between the two original terms. For example, the harmonic mean of $\frac{1}{2}$ and $\frac{1}{6}$ is $\frac{1}{4}$.</p>
Interval	In music , an interval is the difference between two pitches.	➤ Interval the set of all real numbers between two given numbers. The two numbers on the ends are the endpoints. The endpoints might or might not be included in the interval depending whether the interval is open, closed, or half-open (same as half-closed).
Line	Also called a tune or melody , is a linear succession of musical tones that the listener perceives as a single entity. It is often defined as being connected by two points, a beginning and end .	➤ Line - the geometric figure formed by two points. A line is the straight path connecting two points and extending beyond the points in both directions.
Measure	In musical notation, a measure is a segment of time corresponding to a specific number of beats in which each beat is represented by a particular note value.	➤ Measure - the process of assigning a number to a physical property. Examples of measurement include length, size of an angle, area, volume, mass, Time, etc.



Term	Musical Terminology	Mathematical Terminology
Meter	In music, the meter defines how many beats can exist within a given measure; the number of beats per measure determines the term associated with that meter .	➤ Meter - the fundamental unit of length in the metric system, equal to 100 centimeters or approximately 39.37 inches.
Round	A round is a musical composition in which a minimum of three melodies sing exactly the same melody at the unison (and may continue repeating it indefinitely), but with each voice beginning at different times so that different parts of the melody coincide in the different ... The children's song "Row, Row, Row Your Boat", is one example of such a round .	➤ Round (rounding off) - a method of approximating a number using a nearby number at a given degree of accuracy. For example, 3.14159265... rounded to the nearest thousandth is 3.142. That is because the third number after the decimal point is the thousandths place, and because 3.14159265... is closer to 3.142 than 3.141.
Scale	In music , a scale is any set of musical notes ordered by fundamental frequency or pitch.	➤ Scale - any real numbers, or any quantity that can be measured using a single real number. Temperature, length, and mass are all scales. A scalar is said to have magnitude but no direction. A quantity with both direction and magnitude, such as force or velocity, is called a vector.
Serial	In music, serial music is a form of musical composition based on the placement of a series of tones, in a particular, non-repeating sequence .	➤ Serial - the sum of the terms of a sequence. For example, the series for the sequence 1, 3, 5, 7, 9, . . . , 131, 133 is the sum $1 + 3 + 5 + 7 + 9 + \dots + 131 + 133$.



Term	Musical Terminology	Mathematical Terminology
Set	In music , as in mathematics, a set is a collection of objects or items. In musical contexts the term is traditionally applied most often to collections of pitches or pitch-classes.	➤ Set - a group of numbers, variables, geometric figures, or just about anything. Sets are written using set braces $\{ \}$. For example, $\{1,2,3\}$ is the set containing the elements 1, 2, and 3.
Subdivision	To break up a larger metrical pattern into smaller parts so that it may be more easily understood.	➤ Subdivision - the act of dividing a whole into pieces.
Symmetry	In music, symmetry is commonly found in the rising and falling of scales and in the composition of rounds and arc rondos .	➤ Symmetry – mathematically, symmetry means that one shape becomes exactly like another when you move it in some way: turn, flip or slide. For two objects to be symmetrical , they must be the same size and shape, with one object having a different orientation from the first.
Time	A time signature, or meter, is a written indicator that shows the number of beats per measure and the type of note that carries the beat in a piece of music .	➤ Time - measure in which events can be ordered from the past through the present into the future, and also the measure of durations of events and the intervals ...
Variation	In music , variation is a formal technique where material is repeated in an altered form. The changes may involve harmony, melody, counterpoint, rhythm, timbre, orchestration or any combination of these.	➤ Variation - a quantity that can change or that may take on different values.

Resources

Introductory Activity 30 Circles article:

“Jumpstart Creativity With the 30 Circles Challenge”

<http://www.skills21.org/2013/01/jumpstart-creativity-with-the-30-circles-challenge/>

Websites that discuss Math and Poetry:

This site gives a list of quotations about mathematics and poetry.

<https://www.math.washington.edu/~greenber/MoreQuotes.html>

This site shows examples of poems and poets that were inspired by math in some way.

<http://poetrywithmathematics.blogspot.com/>

This website has resources and articles to demystify and make math more accessible to all. Although written for adults, teachers may find useful information here.

<http://mathforgrownups.com/the-math-of-poetry-yep-theres-a-connection/>

In this article the author explores why poets sometimes think mathematically, and there is a link to another essay on how mathematicians sometimes think poetically.

<http://talkingwriting.com/why-poets-sometimes-think-in-numbers>

The suggestions by this author usually involve very high level mathematical concepts, so would need adaptation for Middle or High School teachers, but there are some very interesting articles and sample poems here.

<http://mathematicalpoetry.blogspot.com/2008/02/download-polyaesthetics-and.html>

Math Articles:

“Get Better at Math by Disrupting Your Brain,” [Scientific American](#)

<http://www.scientificamerican.com/article/get-better-at-math-by-disrupting-brain/>

“Why is it Socially Acceptable to be Bad at Math?” Psychology Today

<https://www.psychologytoday.com/blog/finding-the-next-einstein/201203/why-is-it-socially-acceptable-be-bad-math>

“‘I’m Not a Math Person’ is no Longer a Valid Excuse” Business Insider

<http://www.businessinsider.com/being-good-at-math-is-not-about-natural-ability-2013-11>

“Final Proof that Maths and Poetry Have a Special Relationship” The Guardian

<http://www.theguardian.com/books/booksblog/2009/feb/04/maths-poetry-pi-fibonacci>

STEAM Articles:

“Gaining STEAM: Teaching Science Through Art” Us News and World Report

<http://www.usnews.com/news/stem-solutions/articles/2014/02/13/gaining-steam-teaching-science-through-art>

“STEM vs. STEAM: Why the ‘A’ Makes a Difference” Edudemic

<http://www.edudemic.com/stem-vs-steam-why-the-a-makes-all-the-difference/>

“STEM vs. STEAM: Do the Arts Belong?” EdWeek

<http://www.edweek.org/tm/articles/2014/11/18/ctq-jolly-stem-vs-steam.html>

“STEAM Rising: Why we Need to put the Arts into STEM Education” Slate

http://www.slate.com/articles/technology/future_tense/2015/06/steam_vs_stem_why_we_need_to_put_the_arts_into_stem_education.html