



artsNOW

Integrated learning solutions

COUNTING WITH CUPS Grade Band: 2-3 Content Focus: Music & Math



LEARNING DESCRIPTION

Help students recognize and cultivate creative and critical thinking using various activities that connect math and music! Consider valuable curriculum connections that assist in the development of problem solving skills through fun and engaging learning experiences.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How can connecting math and music aid students in their problem solving abilities and cultivate creative and critical thinking?	<p>I can identify, speak, and move to a steady beat.</p> <p>I can demonstrate understanding of mathematical concepts, such as patterns, odd and even numbers, addition, fractions and multiplication through music.</p> <p>I can compose and notate music.</p>



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	I can explain how I used math to create my musical composition.
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GEORGIA STANDARDS

Curriculum Standards	Arts Standards
<p>Grade 2: 2.NR.3.1 Determine whether a group (up to 20) has an odd or even number of objects. Write an equation to express an even number as a sum of two equal addends. 2.PAR.4.1 Identify, describe, and create a numerical pattern resulting from repeating an operation such as addition and subtraction.</p> <p>Grade 3: 3.PAR.3.1 Describe, extend, and create numeric patterns related to multiplication. Make predictions related to the patterns. 3.PAR.3.2 Represent single digit multiplication and division facts using a variety of strategies. Explain the relationship between multiplication and division. 3.NR.4.1 Describe a unit fraction and explain how multiple copies of a unit fraction form a non-unit fraction. Use parts of a whole, parts of a set, points on a number line, distances on a number line and area models.</p>	<p>Grade 2: ESGM2.CR.1 Improvise melodies, variations, and accompaniments. ESGM2.CR.2 Compose and arrange music within specified guidelines. ESGM2.PR.2 Perform a varied repertoire of music on instruments, alone and with others. ESGM2.RE.1 Listen to, analyze, and describe music. ESGM2.RE.2 Evaluate music and music performances. ESGM2.CN.1 Connect music to the other fine arts and disciplines outside the arts.</p> <p>Grade 3: ESGM3.CR.1 Improvise melodies, variations, and accompaniments. ESGM3.CR.2 Compose and arrange music within specified guidelines. ESGM3.PR.2 Perform a varied repertoire of music on instruments, alone and with others. ESGM3.RE.1 Listen to, analyze, and describe music. ESGM3.RE.2 Evaluate music and music performances. ESGM3.CN.1 Connect music to the other fine arts and disciplines outside the arts.</p>

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
<p>Grade 2: 2.ATO.3 Determine whether a number through 20 is odd or even using pairings of objects, counting by twos, or finding two equal addends to represent the number (e.g., 3 + 3 = 6). 2.ATO.4 Use repeated addition to find the total number of objects arranged in a rectangular array with up to 5 rows and up to 5 columns;</p>	<p>Anchor Standard 1: I can arrange and compose music.</p> <p>Anchor Standard 2: I can improvise music.</p> <p>Anchor Standard 4: I can play instruments alone and with others.</p> <p>Anchor Standard 6: I can analyze music.</p>



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write an equation to express the total as a sum of equal addends.

Grade 3:

3.NSF.1 Develop an understanding of fractions (i.e., denominators 2, 3, 4, 6, 8, 10) as numbers.

3.ATO.1 Use concrete objects, drawings and symbols to represent multiplication facts of two single-digit whole numbers and explain the relationship between the factors (i.e., 0 – 10) and the product.

3.ATO.7 Demonstrate fluency with basic multiplication and related division facts of products and dividends through 100.

Anchor Standard 7: I can evaluate music.

Anchor Standard 9: I can relate music to other arts disciplines, other subjects, and career paths.

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
<ul style="list-style-type: none">● <u>Pattern</u> - A repeated sequence that can be found in various contexts, such as art, mathematics, nature, etc; it involves a sequence of elements (like shapes, colors, numbers, or sounds) that follow a particular order or rule● <u>Odd numbers</u> - Integers that are not divisible by 2● <u>Even numbers</u> - Integers that are not divisible by 2● <u>Multiplication</u> - Combining equal groups to find the total number of items● <u>Fractions</u> - A mathematical expression that represents the division of one quantity by another	<ul style="list-style-type: none">● <u>Body percussion</u> - Sounds produced by striking or scraping parts of the body; typically includes snapping, clapping, patting, and stamping● <u>Steady beat</u> - An unchanging continuous pulse● <u>Timbre</u> - The unique quality of a sound; also known as tone color or tone quality● <u>Dynamics</u> - Volume of sound (loudness, quietness)● <u>Found sound</u> - Sounds produced by non-traditional sound sources in the environment (e.g., scraping a ruler along a binder spine, tapping a pencil on a desk)● <u>Phrase</u> - A musical sentence● <u>Retrograde</u> - A musical line which is the reverse of a previously or simultaneously stated line● <u>Rondo</u> - A form of composition in which the first section recurs throughout the



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piece, alternating with different sections (e.g., A-B-A-B-A or A-B-A-C-A, etc.). This form is found especially in compositions of the Baroque and Classical eras.

- Tempo - The speed of the beat

MATERIALS

- Variety of unpitched percussion instruments (can be “found sound”, such as, scraping a ruler along a binder spine, tapping a pencil on a desk)
- Plastic cups in various colors and sizes
- Rhythm sticks or dowel rods
- Sound source (e.g., computer and speaker)
- Musical recordings
- Large pads and markers
- Paper and writing utensils (pencils, markers, crayons, etc.)
- Note cards with mathematical equations

INSTRUCTIONAL DESIGN

Opening/Activating Strategy

Classroom Tips - You may find it helpful to discuss proper use of, and care for, instruments prior to use. Discuss “resting” position, meaning no sound at all from instruments. Also discuss moving through “space” without touching anything else around. Pretend you are in a bubble and cannot touch anything or anyone in your surroundings.

- Turn on music with a steady beat that is easy for students to follow (or, simply play a steady beat without accompanying music).
- Students stand in the space (no formation).
- Leader claps (or plays) the beat while students walk to the pulse.
- Leader plays four beats (while students move); then students stop and clap four beats (same tempo as leader).
- Continue the game, moving around the room freely.
- Have students stop in front of someone and clap their partner’s hands for the second set of four claps.
- Thus, the sequence becomes:
 - Move to leader’s beat (set 1 = 4 beats)
 - Stop and clap beat alone (set 2 = 4 beats)
 - Move to the leader’s beat (set 3 = 4 beats)
 - Stop and clap your partner’s hands (set 4 = 4 beats).
- Have students move to a new partner each time.
- Extend the sequence by adding additional movements and/or body percussion for subsequent sets of four beats (e.g., move to leader’s beat; clap beat alone; move to leader’s beat; clap partner’s hands; move to leader’s beat; pat beat; etc.).

Work Session



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Wake-up and Warm-up

- Tell students that they will continue the activator, but now, they will turn it into a mathematical equation!
 - Example: $4+4+4+4=16$ or $4 \times 4=16$
- Experiment with different tempos and different numbers of beats (i.e., slower tempo, use body percussion or instruments to show $3+3+3+3=12$ or $3 \times 4=12$).
- Introduce a variety of rhythm instruments if available (rhythm sticks, drum, wood block, triangle, tambourine). Otherwise, use objects around the classroom, such as scraping a ruler along a binder spine, tapping a pencil on a desk.
- Take time to discuss the various shapes of each instrument (compare and contrast both shapes and sounds—timbre).
- Use students to demonstrate to group various equations that can be solved.
- Teacher will have two students play $6+6=12$.
- Arrange students in pairs and pass out equations. Then have students “play” equations and have partners solve the equations.
 - For example if a notecard shows $4+4=8$, one student would play 4 beats with one instrument or body percussion (such as clapping) and the other student would have to solve by saying “you demonstrated $4+4=8$ ”.
 - Then switch roles.
 - Then challenge the students to just play the answer (for example, 8). The other student must find a way to “play” 8, such as $2+2+2+2$.

Question and Answer

- The format of this strategy will have the question being asked on the first eight beats and the answer on the second eight beats); reverse. Display visuals of numbers.

1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	-

 - Have students speak numbers in a given tempo.
 - Have students clap once on each number while speaking; repeat, eliminating speech.
- Divide the class into two groups.
- Have students (in two groups) only clap on the EVEN number (first with speech, then without).
- Have students only clap on ODD numbers (first with speech, then without).
- Have students clap twice on one number of their choice; extend to clapping twice on two numbers.
 - Discuss how if we clap twice on one beat (or one number) it represents two half beats. Show the fraction $1/2$.
- Under each of the numbers, draw “stick notation” to show quarter notes and eighth notes. Quarter note = 1 and the eighth note = $1/2$.
- Now, incorporate questions and answers. Leader provides a question via clapping the first eight beats; students use part of the question in their answer in the second eight beats (e.g., “use the first part of my question as the first part of your answer”).
 - Extend to other body percussion, found sound, and/or unpitched percussion.
- Try the strategy using pairs instead of two groups. Divide students into pairs, with one person providing the question and another, the answer; reverse.
- Incorporate movement; add to a recording if desired (for example, “Hora Agadati” or “Jai Ho”).



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- Have students walk eight beats and then “answer” using body percussion for the next eight beats.
- Tell students that a phrase in music is a musical sentence. Ask mathematical questions such as, if each phase is eight beats and we have four phases, how many total beats?
- Extend to ask questions about the patterns.
 - If we walk the first phase, use body percussion the next phrase and then walk the next phrases, that could be called A B A pattern.
- Have students work in pairs to create a “composition” using rhythm instruments that contains between two and six phrases (each phrase must be between six and twelve beats).
- Have them label the phrases with capital letters and then show equations for “how they play” each phrase (as demonstrated in the previous activity).

Composing with Cups

- Display different colored cups and have students reach consensus about desired sound for each (e.g., blue – quarter note, yellow – eighth notes, clear – quarter rest).
- Introduce silently, having students use creative and critical thinking to figure out the values (number of sounds for each cup) independently first.
- Teacher should lead this activity in silence, changing cups (number of sounds) and even length of phrase prior to any discussion.
- Pause and discuss what students observed about the values of each cup.
- Next, have individual students create rhythmic patterns for others to perform using the different colored cups.
- Have students “conduct” their patterns by leading other students in performing them.
- Variations:
 - Experiment with performing multiple patterns at the same time (having two groups perform simultaneously), reading in retrograde (reverse order), adding dynamics (loud/soft), etc.
 - Add to a recording as desired (such as Sousa’s “Stars and Stripes Together”).
 - Have two groups face each other. Have a student compose a pattern behind another group and the group facing him/her perform the rhythm.
 - The group with their back to the composer will write the rhythm using traditional or “stick” notation.
- Finally, have students work in small groups to create their own composition with cups. Students should notate their composition and be able to explain the mathematical concepts embedded in their composition, such as multiplication.

Closing/Reflection

- Students will perform their compositions for the group. Discuss appropriate audience participation prior to performances.
- Ask the audience to help identify mathematical connections.

ASSESSMENTS

Formative



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Teachers will assess students' understanding of the content throughout the lesson by observing students' participation in the activator, ability to "play mathematical equations", ability to move and speak to a steady beat, and collaboration with groups to compose and notate a musical composition.

Summative

CHECKLIST

- Students can identify, speak, and move to a steady beat.
- Students can demonstrate understanding of mathematical concepts, such as patterns, odd and even numbers, addition, fractions, multiplication, etc., through music.
- Students can compose and notate music.
- Students can explain how they used math to create their musical compositions.

DIFFERENTIATION

Acceleration:

- Have students listen to examples of songs and identify mathematical concepts in the song construction.
- Challenge students to add dynamics to and/or change the tempo of their performances and discuss how these changes alter the music.

Remediation:

- Reduce the length of the composition students create at the end of the lesson.
- Limit the focus of the lesson to one mathematical concept (such as multiplication being a pattern of addition) that students will build upon throughout the three strategies.

ADDITIONAL RESOURCES

NA

**This integrated lesson provides differentiated ideas and activities for educators that are aligned to a sampling of standards. Standards referenced at the time of publishing may differ based on each state's adoption of new standards.*

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