

Reflections/Notes:

Form/Structure/Organization • Relationships • Patterns •  
Musical Notation • Rhythm • Coins • Money



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## The Sound of Numbers

Using rhythmical experiences in music, the students will explore numbers and their relationships. Every aspect of music can be described mathematically. An understanding of patterns, the ability to develop operations, reveal functions, and being able to move toward higher levels of abstractions, can be strengthened through parallel music study. Dividing beats and meters: patterns; and starting the same patterns at different times to create canons: developing operations will be explored in this lesson.

**Essential Question: What do numbers sound like “out loud”? How can we use sound and experience to deepen our math experience?**

### Process

- Begin with a sequence of “echo rhythms”. (Try using different levels of *body percussion*: clapping, snapping, patting, and stomping.) For the younger students, use four beat patterns, for the older students, extend the patterns to eight beats in length.
- Review the concept of patterns, and explain that today’s focus will be on exploring patterns in rhythms.
- Set up instruments grouped in patterns of 3 or 4. (For example, for 3: A woodblock and two maracas. For 4: A drum and three triangles.) Pass out instruments in the pattern and have students pass the beat while chanting a rhyme that matches the chosen grouping. “Pease Porridge” works well for 4 and “Did Ever See A Lassie” works well for 3.
- Explain that beats have one or more sounds in them.
- Have children work in pairs. Each pair will share a large piece of paper (11 ½ x14) that is folded in half horizontally. (The younger students will use stickers, and the older students will use notation.) With the paper open, each child will place a combination of stickers on their paper. (The older children will draw selected notation.)
  - They will have a choice of placing one large sticker (quarter note), or two smaller stickers (eighth notes), or a quarter rest on their side of the paper.
- Explain that the students will use their finished products to create patterns that will be played to accompany music.
- Take up the papers and randomly select four of them to place on four chairs which have been placed at the front of the room. (Because they have been folded horizontally, they will sit nicely on the back of the chairs.)
- Use a pointer and review the length of the different symbols. The single stickers represent quarter notes, and they will be longer. The double stickers represent eighth notes, and they will be shorter, with two of them in each beat. The four beats are represented by the four chairs.
- With second grade, discuss the division of the beat. The beat never changes, but the length of the sounds within each beat does. The beat is constant, but the rhythm can change. Discuss the presence of fractions in music.
- Turn on a music selection and have the students chant the rhythm represented by the patterns, then add body percussion, and finally add rhythm instruments. (Anything with strong rhythm works, I have used *Sock Him In the Jaw* from the Miss Pettigrew soundtrack.
- After a few repetitions of the pattern, randomly turn one of the folded papers around, so that the pattern changes.
- Finish class with a discussion of the differences and similarities in the patterns performed.

### Assessment

- The students will be observed in the performance with the music to see if they play the correct patterns.

### Materials

- 11 ½ x 14 paper, enough for the students to use one per pair
- Stickers, larger ones to represent quarter notes, smaller ones to represent eighth notes
- Markers or crayons for students past the first half of first grade
- Ipod Dock
- Ipod
- Music Selection
- Pointer
- Rhythm Instruments
- Four chairs

### Vocabulary

#### Body percussion

Sounds produced by striking or scraping parts of the body; typically includes snapping, clapping, patting, and stamping

#### Unpitched percussion

Percussion instrument whose sound is typically produced by shaking, striking, or scraping and does not produce a specific pitch; includes shakers (maracas), drums (bongos, hand drums, congas), woods (claves, rhythm sticks, woodblocks, etc.), and metals (triangle, cowbell, finger cymbals)

#### Found sound

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)

#### Tempo

The speed at which a music piece is performed

#### Staccato

Short, detached sounds

#### Legato

Smooth, connected sounds

#### Beat

A unit of measurement in rhythmic time

#### Rhythm

Combinations of long and short, or even or uneven sounds that establish a musical continuum and convey a sense of movement.

#### Note Value

the relative duration of a musical note.

#### Quarter Note

A musical note having the time value of a quarter of a whole note or half a half note.

#### Eighth Note

A note having the time value of an eighth of a whole note or half a quarter note, represented by a large dot with a hooked stem.

#### Quarter Note Rest

A rest or break from playing for the duration of a quarter note.

### Classroom Tips

The assessment can be extended by having the students draw their own pattern and use body percussion or instruments to play it. The first and second grade students can explore creating longer patterns by adding four more chairs. Music selections can be played and students can listen for patterns in the music. (Beethoven No. 5, *The Elephant* from **Carnival of the Animals**)

## Academic Knowledge and Skills Gwinnett County Public Schools

### MATHEMATICS

#### GRADE K

##### E - Algebra

- identify, create, extend, and transfer patterns from one representation to another using actions, objects, and geometric shapes (GPS) (KMA\_E2007-47)
- extend a given pattern and recognize similarities, such as color, shape, texture, or number, in different patterns (GPS) (KMA\_E2007-49)
- sort and categorize objects by identifying attributes such as longer/shorter, more/less, taller/shorter, and heavier/lighter, and make generalizations (KMA\_E2007-51)

#### GRADE 1

##### E - Algebra

- describe how both repeating and growing patterns are generated (ITBS) (1MA\_E2007-63)

#### GRADE 2

##### A - Process Skills

- recognize and apply mathematics in contexts outside of mathematics (GPS) (2MA\_A2007-16)
  - create and use pictures, manipulatives, models, and symbols to organize, record, and communicate mathematical ideas (GPS) (2MA\_A2007-17)
- ##### B - Numbers and Operations
- model, identify, label, and compare fractions (thirds, sixths, eighths, tenths) as a representation of equal parts of a whole or a set (GPS) (2MA\_B2007-35)

### MUSIC

#### GRADE K

##### A - Duration (Rhythm/Beat)

- respond to a steady beat through singing, moving, and playing instruments (QCC) (KGM\_A2005-1)
- develop an awareness of long-short sounds (KGM\_A2005-3)

##### C - Form

- demonstrate an awareness of same, different, and repeated patterns in melody, rhythm, text, and sections of music (QCC) (KGM\_C2005-7)

#### GRADE 1

##### A - Duration (Rhythm/Beat)

- respond to a steady beat through singing, moving, and playing instruments (QCC) (1GM\_A2005-1)
- develop an awareness of long-short sounds (1GM\_A2005-4)

##### C - Form

- identify repeating and contrasting sections in melodies, rhythms, texts, and sections of music (QCC) (1GM\_C2005-9)

#### GRADE 2

##### A - Duration (Rhythm/Beat)

- respond to a steady beat through singing, moving, and playing instruments (QCC) (2GM\_A2005-1)
- develop an awareness of long-short sounds (2GM\_A2005-3)

##### C - Form

- recognize repeating and contrasting patterns, phrases, sections, and simple formula formal structures (AB, ABA) (QCC) (2GM\_C2005-9)

##### F - Notation

- explore standard notation, such as quarter note, eighth note, quarter rest, half note, and whole note (2GM\_F2005-19)
- perform rhythm patterns represented by standard notation (2GM\_F2005-20)

## Common Core Georgia Performance Standards

### MATHEMATICS

#### GRADE K

**MCCK.MD.1:** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

**MCCK.MD.2:** Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.

#### GRADE 1

**MCC1.MD.1:** Order three objects by length; compare the lengths of two objects indirectly by using a third object.

**MCC1.MD.2:** Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

**MCC1.G.3:** Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

#### GRADE 2

**MCC2.G.1:** Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

**MCC2.G.2:** Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

**MCC2.G.3:** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape

## National Standards

### MATHEMATICS

**NM-ALG.PK-2.1:** Understands patterns, relations and functions  
**NM-GEO.PK-2.1:** Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

### MUSIC

**Standard 2:** Performing on instruments, alone and with others, a varied repertoire of music  
**Standard 5:** Reading and notating music.  
**Standard 8:** Understanding relationships between music, the other arts, and disciplines outside the arts.