

General Information

Teacher Name: Jamie Militello, Jamie Topper Chase Elementary

Subject: Mathematics and Music, 5th Grade

Topic: Fractions

Time Frame: Nine, 50-minute class periods

Guiding Questions: How can rhythm facilitate a greater knowledge and application of fractions as part of a whole?

Goals, Standards and Vocabulary

Overview (How and where this art-integrated unit fits into the curriculum):

The integrated math lessons will take place during the regular math block. These lessons are necessary in order to ensure active, hands-on learning and connections. Everyday Math lessons will be supplemented with the integration.

Goals (What students will realize by using the art form to activate content area):

Students will use musical notes and rhythm to understand values of fractions, renaming fractions into equivalent fractions and adding fractions.

Academic Standards and Descriptors: State Standards in the content area that this unit addresses.

Stage E

- 6A.** Students who meet the standard can demonstrate knowledge and use of numbers and their many representations in a broad range of theoretical and practical settings. (Representations)
 - 6.A.3. Differentiate how fractions are used (part of a whole, part of a set, location on a number line, and division of a whole number).
- 6B.** Students who meet the standard can investigate, represent and solve problems using number facts, operations, and their properties, algorithms, and relationships. (Operations and properties)
 - 6.B.6. Solve number sentences and word problems using addition and subtraction of fractions with unlike denominators.
- 6D.** Students who meet the standard can solve problems using comparison of quantities, ratios, proportions, and percents.
 - 6.D.1. Identify and express ratios using appropriate notation (i.e., a/b , a to b , $a:b$).

Fine Arts Standards and Descriptors: Illinois State Standards in the fine arts that this unit addresses.

Stage E

- 25A.** Students who meet the standard understand the sensory elements, organizational principles, and expressive qualities of the arts.
 - 25.A.2. Distinguish between the beat and the rhythm(s) of a given musical example.
- 26A.** Students who meet the standard understand processes, traditional tools, and modern technologies used in the arts.
 - 26.A.7. Echo, read, and/or write accurately rhythm patterns with whole, half, quarter, and eighth notes and rests in $2/4$, $3/4$, $4/4$ meter signatures.

Vocabulary Lists - Content and Art:

Content – whole number, fractions, numerator, denominator, equivalent fraction, reduce, common denominator, convert.

Music – whole, half, quarter and sixteenth notes, beat and rhythm, measure, rest, call and response, 3-2 clave, polyrhythm, wood block, musical notation.

UNIT LAYOUT

Content and Art Making Activities

Music

Day 1

Focus:

Students will be able to produce and reproduce clapping rhythm and organize background knowledge

Materials Needed:

Everyday Math Unit 4 Part B assessment (can be given prior to Day 1), drum or rhythm keeping instrument, tape recorder, class KWL Chart, student journals, colored pencils, markers

Warm-Up and Pre-Assessment Activities:

Everyday Math Unit 4 Part B assessment – pre assessment to check for background knowledge.

K and W of KWL chart.

Call and response activity: Person A creates a rhythm by clapping and the class responds with the same rhythm. This is repeated until the class is comfortable with hearing new rhythms and creating them.

Main Activity:

Students assemble and decorate the outside of their Music/Math Integration Journal.

Students take notes recording sixteenth, eighth, quarter and whole notes in their musical and fraction representation.

Introduce fraction, numerator and denominator.

- Four sixteenth notes equal one quarter note
- Eight sixteenth notes equal one half note
- Sixteen sixteenth notes equal one whole note
- There are four quarter notes in a whole measure to equal one whole note
- There are sixteen sixteenth notes in a whole measure to equal one whole note
- There are eight eighth notes in a whole measure to equal one whole note

Wrap-Up and Post Assessment Activities:

Students answer the following questions in their journals:

“What are the connections between rhythm and fractions? Do you have any previous experience playing an instrument? What should we name our classroom band?”

Teacher collects journals and checks for content understanding.

Day 2

Focus:

Students will be able to play the 3-2 clave in polyrhythm with classmates and have a better understand of beat versus rhythm.

Materials Needed:

space for class to sit in circle (with chairs), wood block (or two rulers), EAEC 3:2 Clave Step-by-Step Guide, student journals

UNIT LAYOUT

Content and Art Making Activities

Music

Warm-Up and Pre-Assessment Activities:

Students review note values through call and response activities. Teacher develops questions to identify students' knowledge of beat versus rhythm: "Beat" is a steady pulse, "Rhythm" is a specific pattern that repeats. The beat is the glue because it is what holds us all together in time.

Main Activity:

Teacher claps or uses wood blocks to demonstrate a specific rhythm: the 3:2 clave. The students practice clapping the 3-2 clave while the teacher keeps the beat on the wooden block so it can be heard along with the clapping. Students create the beat with their feet and play the 3-2 clave with their hands.

Next, students are assigned to two different groups. Group A plays four-quarter notes (the beat group), and Group B plays the 3-2 clave. The class is engaged in polyrhythm by actively playing/listening to their group's rhythm and passively listening to the other. Group A and B then switch parts.

Wrap-Up and Post Assessment Activities:

Students answer the following questions in their journals:

- What did you think about today's experience? Have you made any further connections between fractions and music?
- How would you explain the difference between a beat and rhythm?
- Teacher collects journals and checks for content understanding.

Day 3 and Day 4

Focus:

Students will be able to convert musical notation into fractions, and understand fractions and musical notes as part of a whole. Students will be able to play one full measure of notes by adding fractions with common denominators.

Materials Needed:

Journal, paper with blank measures (Appendix A), $\frac{1}{2}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{16}$ fraction strips cut into small pieces for students to draw from a hat (save for future use)

Warm-Up and Pre-Assessment Activities:

With an elbow partner, the students review their notes to remind themselves of the musical and math representation of quarter, half and sixteenth notes.

Teacher walks around with the Everyday Math Checklist for an observational assessment.

Main Activity:

Students pick a fraction out of a hat (use cut-up fraction strips). After each student has picked a fraction, have them write its musical notation (e.g. $\frac{1}{4} = \text{quarter note}$). Then, they are to fill in an entire measure using this fraction and its notation in order to make the measure equal to one whole note when added up. Next, students are to travel the room, and copy other students' whole measures with hand-picked fractions and add those to find that they equal one whole note. The final product is a measure with the following:





- Four quarter notes
- Eight eighth notes
- Sixteen sixteenth notes

UNIT LAYOUT

Content and Art Making Activities

Music

After the students gather their whole measures, the various groups perform their measures through clapping. Next, two groups with different note values perform simultaneously, which demonstrates that the measures are equivalent in number and time. Then, the students write the numeric representation of the notes in their journal and show how they add the fractions with already common denominators to equal a whole.

			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

In the next activity, the students reinforce their ability to add fractions and learn to reduce.

Wrap-Up and Post Assessment Activities:

Students answer the following questions in their journals:

- When adding fractions with common denominators does it help to think in terms of music?
- Why or why not?
- Which strategy do you employ or use when adding fractions?
- Which takes longer to play: a measure full of quarter notes or eighth notes?
- How do you know?"

Teacher collects journals and checks for content understanding.

Day 5

Focus:

Students will be able find common denominators and add fractions to create a whole

Materials Needed:

Fraction strips, measure paper, student journals, overhead projector/board

Warm-Up and Pre-Assessment Activities:

Students share the rhythms they created in the last session with an elbow partner and explain how they converted and added the fractions. Using the think-pair-share method the students name the notes and the numeric values that it corresponds with.

Teacher leads the whole class in call and response activities and reviews of the 3-2 clave.

Main Activity:

Students play a fourth note with their hands, and teacher demonstrates how to play two eighth notes, indicating an equivalent amount of time with both. Teacher directs mini-lesson on finding equivalent fractions using multiplication.

Each student is given a blank measure in order to create a full measure with multiple fractions. Each student is assigned a fraction (through fraction strips that revealed either $\frac{1}{4}$, $\frac{2}{8}$, or $\frac{4}{16}$). Students must create a full measure in a group of four with at least two different fraction values and convert their fractions into common denominators and add them to equal one.

In a whole group, students share their measures and demonstrate their conversions and addition so that all measures equal one. The class then plays their measures by clapping.

Sample measure:

$\frac{1}{4}$	$\frac{2}{8}$	$\frac{8}{16}$	$\frac{1}{4}$
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UNIT LAYOUT

Content and Art Making Activities

Music

Wrap-Up and Post Assessment Activities:

Students answer the following statements in their journals:

Explain, in words, how to find a common denominator between two fractions. Show a math and musical example.

Teacher collects journals and checks for content understanding.

Day 6

Focus:

Students will be able to convert fractions to find their with common denominators and add them. They will understand and be able to use the proper vocabulary for both the math and musical terms.

Materials Needed:

Mid-Unit Assessment (Appendix B)

Warm-Up and Pre-Assessment Activities:

With an elbow partner, the students review their notes to remind themselves of the musical and math representation of half, quarter, eighth and sixteenth notes.

Teacher walks around with Everyday Math Checklist for an observational assessment.

Main Activity:

Teacher answers questions still remaining and students individually take the mid-unit assessment.

Wrap-Up and Post Assessment Activities:

Teacher reviews the assessment on the overhead, and students correct their assessments using a different colored ink. Teacher is able to host a small group lesson for those students still struggling.

Day 7

Focus:

Students will be able to convert fractions to find their with common denominators and add them. They will understand and be able to use the proper vocabulary for both the math and musical terms.

Materials Needed:

Class KWL Chart, measure paper, board/overhead, student journals

Warm-Up and Pre-Assessment Activities:

L of KWL Chart

Main Activity:

Teacher will take small group of students and remediate as necessary, per assessment results. Students will create a list of their top five rhythms that have been created throughout the unit. Then, the teacher reunites the class, and instructs the students to then narrow down their top five to two. The two rhythms from each group are placed on an overhead and projected. Next, the class votes on which rhythms will make it to the performance.

UNIT LAYOUT

Content and Art Making Activities

Music

The students take a minute to write their desires for the performance in their journal, including:

- The group's name
- Who will introduce the group
- An explanation of the process for the audience
- Instruments (you may want to discuss the availability)

Next, the teacher directs a conversation on what the performance will look like.

The presenters meet to write their introductory speeches and explanations.

Wrap-Up and Post Assessment Activities:

Students walk through the performance.

Day 8:

Focus:

Students will rehearse the musical performance and be able to explain how arts integration furthered their understanding of fractions and their numeric value in relation to a whole.

Materials Needed:

Instruments (dowels or rulers, hands, cow-bell, table top, etc.), recording device, space for performance (classroom with desks pushed aside), note cards for speech

Warm-Up and Pre-Assessment Activities:

Teacher calls the rhythms of the performance and students respond.

Main Activity:

Students practice the final performance from “curtain call” to completion for all available time.

Wrap-Up and Post Assessment Activities:

Students listen to a tape recording of performance and discuss suggestions and feedback from audience and classmates.

Day 9

Focus:

Student will participate in the final performance assessment.

Materials Needed:

Audience (administrators, buddy room, parents, etc.), instruments, recording device, speeches

Warm-Up and Pre-Assessment Activities:

Students participate in a quick dress rehearsal.

Main Activity:

Students perform their original piece with an introduction and time for questions.

Students lead the audience in a call and response activity and part of the explanation of their arts integration experience.

UNIT LAYOUT

Content and Art Making Activities Music

Wrap-Up and Post Assessment Activities:

Students write in their journals about their feelings in regards to the performance. “How do you think the performance went?” How did you feel before/after? What would you do differently next time?”

Unit Assessments- Formative and Summative:

In addition to the attached 1-5 rubric (Appendix C), students are evaluated through an Everyday Math Achievement checklist and various assessments.

Unit Support and Resources:

Texts, websites, primary and secondary sources, supplies, materials, outside resources, etc.

Materials for this unit include:

- Everyday Math 5th grade text
- Sound recorder
- Video camera
- Camera
- Student created response journals
- Class composition pad
- Class generated KWHL chart
- Wooden dowels or rulers
- Overhead projector
- Writing utensils
- Pre and Post assessment
- Mid-Unit Assessment (see Attachment B)
- Math and Music Rubric (see Attachment C)
- Response questions for journaling
- Blank Measures handout (see Attachment A)

Field Trip: Field trip associated with this unit.

The students will perform their final piece, with an explanation of the music/math connections, to a third grade class. They will also teach the students an 8 beat rhythm and, as a group, define which fractions match the rhythm.

Documentation (photos, student work, student interviews, etc.):

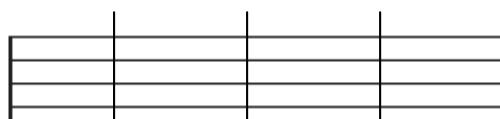
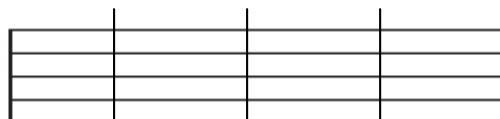
Throughout the unit, the students’ progress is document in various ways, which are described below:

- Teacher will use the Everyday Math Check List as the students are performing with the artist to check for student achievement. The final checklist is documentation of the new knowledge.
- A student will be the assigned photographer to documented the daily lessons and activities via photographs.
- A student will be assigned the camera operator to document the daily lessons and activities via film.
- The students will keep a response journal specific to the integrated math/music class. This is the place where they record ideas, recognize math/music connections and reflect on the days’ events.
- The teacher will maintain records of the students progress through formal pencil/paper pre-and post-assessments

Appendix A

Blank Measures

Name: _____

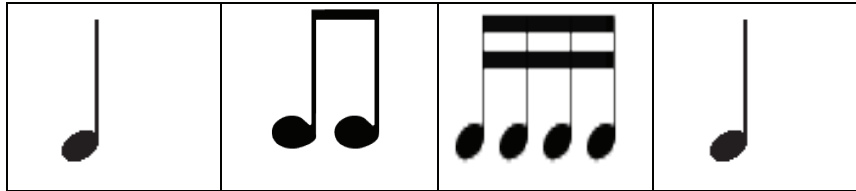


Appendix B

Mid Unit Assessment

Name: _____ Date: _____

Part A:



- Please write the fractions that match the measure above.

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- Convert the fractions into fractions with common denominators.

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- Add the fractions in the space below:

= _____

Part B

Use the space below to do the following three steps:

- Using musical notations, create the following measure: $\frac{1}{4}$, $\frac{4}{16}$, $\frac{2}{8}$, $\frac{2}{8}$.
- Write the fractions that match this measure.
- Rewrite the fractions into common denominators.
- Add the fractions.

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Appendix C

RUBRIC Chase Elementary (Participation Rubric)
Mathematics and Music
Student Name _____

		4	3	2	1	Points
Ability to write and interpret musical notation using whole, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$ notes		Writes 4 beat measures using all note values accurately and can play accurately in time	Can write out a 4 beat measure and play accurately	Understands the measures and notes can be divided into smaller parts, but cannot write it out accurately	Does not demonstrate an understanding of notation and how to translate it into sound	
Ability to keep a beat in time with the group, and play in polyrhythm		Aligns with the beat, plays rhythms accurately and in time, can hold their rhythm while another is being played.	Aligns with the beat, plays one rhythm accurately and in time	Distracted by other rhythms being played- plays a rhythm but not in time with the beat	Unable to follow a rhythm, unaware of its relation to the beat	
Ability to add beats in a measure, essentially adding fractions with both an uncommon denominators.		Student can add fractions with like and unlike denominators.	Student can add fractions with like denominators.	Student can only add fractions with like denominators when musical representation is present.	Student cannot add fractions.	
TOTAL 12						

SCALE: 1= Not so much 2= Yes, But 3= Yes 4=Yes, And