Behind The Music: Exploring the Multiplication and Division of Fractions

Kia Aisha Dessaure

Introduction

"Music is the pleasure the human soul experiences from counting without being aware that it is counting," said the "Father of Calculus," Gottfried Wilhelm von Leibniz. For years, in my sixth grade classroom, I have played music while scholars rotated stations, engaged in cooperative group activities, or even as they completed a math foldable. A wide variety of music from the European classics to jazz of the Harlem Renaissance to Spanish folklore from their History studies has been played as background music for the purpose of focusing scholar attention, enhancing skills in communication, and serving as a time management strategy for scholars. As an educator, music in my sixth grade classroom turned out to be a powerful tool, motivator, and source of entertainment for scholars of all levels and abilities. Little did I realize that integrating math objectives and musical theory concepts would capture the hearts and minds of middle school scholars and further increase their understanding and knowledge of fraction operations.

All over the world, educators engage their scholars in math and music activities that stimulate creativity, provide a foundation of understanding for the content being delivered, and give children the ability to utilize their higher order thinking skills. I decided to focus my curriculum unit on the integration of math and music for this reason. I honed in on the multiplication and division of fractions, largely in part because this is a difficult concept for scholars to grasp. Scholars understand that the multiplication of fractions involves multiplying straight-across (numerator times numerator, and denominator times denominator). But as we shift to division the line of understanding gets blurry as scholars have to find reciprocals of fractions or cancel out numbers. With carefully planned out lessons and providing music as the motivator, scholars will not only learn the procedural process of fraction operation, but gain conceptual knowledge as well. This knowledge will help as they learn higher level mathematics and move throughout their educational career.

Purpose

Throughout the unit I will teach objectives aligned with the Common Core State Standards for grades five and six on fraction operations. As North Carolina makes the shift from one standard course of study to another, it is important to remember that, as educators, we must teach scholars on objectives not taught during the transition. For this

reason, I have pulled objectives from the fifth grade Common Core State Standards in mathematics to be taught.

As educators, it is critical that we tailor our lessons to fit the diverse needs of our ever-growing scholar population. It is important that we learn to adapt our lessons as our children change each year. This year I have had the opportunity to educate two scholars with high functioning Autism. After conducting research on the disorder, I have learned that children with Autism Spectrum Disorder are overwhelmed by sensory input; therefore, music and music therapy prove to be beneficial to autistic children as it helps them to organize their thoughts and engage in the tasks at hand. Parts of this unit have been modified to meet the needs of those scholars.

I have designed this unit for scholars at the sixth grade honors level. I teach sixth grade honors math at John Motley Morehead S.T.E.M. Academy, where technology integration and a love for science, engineering, and mathematics are embedded into the core curriculum. The following curriculum unit will also explore the science of the sound of music, feature music film clips, and give scholars a glimpse into the field of audio and music engineering to support the vision and mission of John Motley Morehead S.T.E.M. Academy.

Objectives

The Common Core State Standards for fifth and sixth grade mathematics have scholars multiplying and dividing fractions with like and unlike denominators as well as reasoning abstractly and quantitatively. Scholars have to dissect mathematical tasks as well as create meaningful representations of the problems presented.

In this unit, I will introduce the multiplication and division of fractions. Scholars will use music note conversions to understand that the repeated addition of fractions is similar to multiplying fractions. Scholars will apply this knowledge with various independent and group activities from the "Dancing Music Note" and exposure to film clips involving the music process.

Scholars will learn the importance of the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Scholars will be presented with real world audio and music engineering problem tasks in which they will have to identify factual information, eliminate non essential data, and elicit their higher order thinking skills to answer the questions posed. Once scholars get an answer to a portion of their task, it will provide them with information needed to move onto the next task. With these tasks, scholars will learn to apply and extend previous understanding of fraction operation and look closely to discern structure in a word problem.

In this unit scholars will be engaged, motivated, and entertained through the use of music, technology, and integration of scholar-created literary works. Throughout the duration of this unit, music will be infused into the mathematics curriculum in the form of music theory concepts, analyzing the sound of music, music note conversion, and the actual playing of music within the classroom.

Mathematical Background

Vocabulary

In the sixth grade, scholars are exposed to a wide variety of mathematical vocabulary terms. At the start of each week, scholars are introduced to five to ten vocabulary words that will be used for the following week. Scholars create Frayer Model vocabulary cards where they have to write the definition of the word in sixth grade language, identify three to five essential characteristics of the term, give real world examples, and draw illustrations of the word. The Frayer Model strategy gives scholars the opportunity to communicate their understanding and to make connections by providing their own examples and illustrations.

Multiplication of Fractions

Sixth grade scholars must have an understanding of multiplying fractions before they can move on to the dividing of fractions. As scholars learn to multiply fractions, it is important that they come up with their own generalizations and conjectures on the topic. Scholars will see that the multiplication of fractions is very similar to the addition of fractions. Scholars will be able to decompose fractions additively and relate repeated addition to multiplication. Scholars will begin to understand that when you multiply two whole numbers, neither which is zero, your product is always equal to or greater than each of the factors. Scholars will generalize that you multiply a fraction less than one by another fraction less than one; the product is always less than either fraction.

Division of Fractions

After scholars are introduced to the multiplication of fractions (and demonstrate a proficiency of 85% or higher), scholars will learn how to divide fractions with like and unlike denominators. With the introduction of dividing fractions, it is important for educators to teach reciprocal, and the reason as to why we always "flip" the second fraction or simply cross multiply and simplify. This will help scholars to begin to reason abstractly and quantitatively in regards to fraction operation.

Science Background

Wavelength is topics that will be integrated into the Multiplication and Division of Fractions. It is beneficial for educators to learn about wavelength and how frequencies of different lengths create unique sounds.

Strategies

Prior to teaching the proposed unit, it is essential that the educator have in-depth knowledge on fraction operations so that scholars get the best information possible. There are numerous books and websites dedicated to the subject matter. In the development of this curriculum unit, I also utilized social networking websites such as "Twitter" and "Facebook" for in-depth insight into the world of music and mathematics integration, and to collaborate with leaders in the field of mathematics education. The websites, blogs, and books used have been cited in the bibliography portion of this curriculum unit for further reading on the topic.

Included in this unit are strategies ranging from music note conversion and the dancing musical note, the math behind the sound of music, technology usage in the classroom, literacy integration, and mathematical musical chairs. These strategies encourage cooperation among scholars; makes the learning of fraction operations relevant to their life; and increases exposure of S.T.E.M. education.

Music Note Conversion and the Dancing Musical Note

Music symbols are widely used in music styles, scores, and compositions. The music note is proportional in relation to all other note values, and takes the value in fraction form. For the music note conversion piece, scholars will be given a piece of sheet music and will have to convert all music notes to fraction. This will give scholars the opportunity to reason abstractly, and create different note combinations to make a whole note using fraction operation.

The dancing musical note involves scholars taking the fraction conversion of their selected note, and creating a mobile using colored cardstock and yarn. The mobile will list the steps on how to multiply and divide fractions as well as give examples that the scholar can refer back to. This music and art integrated activity appeals to visual learners as they begin to conceptualize the mathematical process involving fraction operations.

The Sound of Music

Exploring the math behind the sound of music involves scholars looking at and analyzing wavelengths and frequencies. An instrument's tone is a complex mixture of different waves and frequencies; and instruments produce notes that have a frequency in combination with multiples of that frequency. Wavelengths can also be measured in fraction representations. Scholars will complete activities in which they have to use representations and the multiplication and division of fractions using wavelengths and frequencies.

Increasing Technology in the Classroom (B.Y.O.T)

As a S.T.E.M. Academy and a Bring Your Own Technology (B.Y.O.T) school, it is important that I integrate technology into the proposed curriculum unit. Scholars will have the opportunity to watch film clips of the music being studied; listen to audio of a variety of music genres, and use netbooks to conduct research on wavelengths, and TI-73 calculators to check computations. In being a flipped classroom, scholars will view videos of concepts being taught in class (at home) and take Cornell Notes in their Interactive Math Notebook.

Literacy Integration: Jigsaw Activity

Teaching literacy across the content areas is important as we prepare scholars to be twenty-first century learners. In preparation for this, I have incorporated activities surrounded around the comprehension, creation, and completion around literary-mathematical tasks. Mathematically proficient scholars are able to make sense of problems and persevere in solving them. Scholars will be given tasks in which they have to create products to help their peers solve problems involving the multiplication and division of fractions. As scholars complete the jigsaw activity, they will listen to music. For this activity, music will serve as a time management tool and a noise level indicator. The noise level in the classroom is not to surpass the volume of the music being played. Once the music has stopped playing, scholars know that it is time to wrap up their activity and present their finished jigsaw to their group members.

Mathematical Musical Chairs

The culminating activity for the proposed curriculum unit is called "Math Musical Chairs." Scholars will partake in this activity on day eight of the unit prior to their Multiplying and Dividing Fractions summative assessment. This review activity involves scholars standing outside a group of desks in circle formation. The desks inside the circle amount to the number of scholars involved in the kinesthetic activity minus two desks. The teacher will play music featured during the proposed curriculum unit and scholars will walk in unison around the desks. When the teacher stops the music abruptly, scholars have to find a desk closest to them to sit. Two scholars are left out of the circle formation, and have to answer a math question in order to stay in the game. This activity gets scholars actively involved in the learning process and engaged in the review of fraction operations.

Classroom Activities

The activities chosen for this unit have been carefully selected and created off of researched based best practice strategies and meeting the mathematical needs and challenges facing the sixth grade math scholars at John Motley Morehead S.T.E.M.

Academy. All lessons and activities contained in this unit are able to be modified to accommodate diverse learners.

Day One

Prior to day one, scholars will take a pre-assessment on the multiplication and division of fractions (See Attachment 1). Based on data, the teacher will tailor lessons to fit the needs of individual learners. Scholars will have also completed the Frayer Model vocabulary cards for the words fraction, numerator, denominator, mixed number, and reciprocal (See Attachment 2).

The teacher will begin the first lesson of the curriculum unit by activating the prior knowledge of the scholars. Scholars will be introduced to fractions as they are used in everyday life. The teacher will ask the class if they can give examples of fractions, and then will prompt them to think about how fractions are used in everyday life. The teacher should then have them discuss in what classes do they use fractions and how. Scholars should make conjectures that band/music class uses fractions with music notes.

The class will begin to have a discussion on how rhythm relates to fractions. Explain to scholars that rhythm is fractions. As the denominator increases, the pieces become smaller and the more pieces it takes to equal a whole. Also explain the larger the denominator, the shorter the musical note.

The teacher will then introduce a music activity where scholars get a sense of how the rhythm of fractions sounds. Scholars will clap the value of the whole note, half note, quarter note, eighth note, and sixteenth notes. As scholars begin to master the rhythm of the fraction, they will then identify the fraction for each type of note. The teacher will then divide the class into two groups. One side will clap on the whole note (every four beats) and the other side claps on the quarter note (once every beat of the four beat measures). Upon completion of this activity, scholars will receive an activity sheet with music notes and their fraction conversion. In pairs, scholars will have to turn all notes to fractions.

Day one homework will have scholars taking Cornell Notes on a Multiplying and Dividing Fractions video (See Attachment 4). Educators can utilize a pre-made fraction video online, make a PowerPoint, or create a video using websites like Screencast-o-matic. For the summary portion, have scholars create a Multi Flow Map graphic organizer (with examples) to show the steps required to “multiply” and "divide" fractions (See Attachment 3).

Day Two

As scholars enter the classroom, it is important to have a warm-up displayed that will activate their learning of the prior night’s homework. The scholars will solve a one step multiplication AND division fraction problem as the educator checks their Interactive

Math Notebooks for completed Cornell Notes and Multi-Flow Maps. Once the teacher has checked all notebooks, the teacher will walk through the steps of how to multiply and divide fractions. For the warm-up activity, it is important that teachers use like and unlike denominators so that scholars can see the process for solving fractions is the same. Once the warm-up is complete, the teacher will move onto the next lesson – reviewing of the homework.

The teacher will have posted around the room questions from the Cornell Notes on large poster paper. The teacher will number scholars off into cooperative learning groups in which they will have to discuss and answer the question on their assigned poster paper. The teacher will play one (1) five minute song, and at the end of the song will call on one scholar from each group to answer the question.

Once all questions have been answered and scholars have had the opportunity to amend or make additions to their Cornell Notes, the teacher (with the assistance of the Music Education Teacher) will conduct a mini lesson on music theory, and how fractions play an important role in the development of music composition. During this portion of the mini lesson, it is important that the teacher have sufficient knowledge of music theory concepts as well as visuals to aid diverse learners.

It is important for scholars to realize that music notes have corresponding fraction values. Using visual aids show scholars a whole note, half note, quarter note, eighth note, sixteenth note, and a thirty-two note. Have scholars think about the relationships between a whole note and a half note, and a half note to a whole note. Besides addition and subtraction, what other operations are in use as you go up from one note to the next or down one note to the next. As scholars begin to process information, have them draw the music note and write down their fraction counterpart in their Interactive Math Notebook.

The next activity will incorporate the use of technology and music note conversion. Begin the activity by asking scholars what music they enjoy listening to. Explain to scholars that music has evolved over time, and so has peoples taste in music. School-age children enjoy listening to artists such as Justin Bieber and One Direction where as popular artists of long ago included Michael Jackson and groups such as The Backstreet Boys. For this next task, have scholars watch a video of the song played that will accompany the music sheet conversion activity. Scholars will have a chance to hear and see how the music is played before analyzing the fraction notes on the piece of sheet music.

After scholars have watched the video, the teacher will hand the scholars a piece of sheet music with notes on them as well as a blank piece of sheet music for scholars to write down the music note fraction equivalence. Using a piece of sheet music of the song the scholars watched from the video, scholars will convert ALL music notes to fractions. Scholars will use ONLY one bar to figure out mathematical operations from one note to

another. Scholars will have to determine to get from one note to the next, by what operation and number was used. Scholars will have to make conjectures and estimate then work on problems. Scholars will complete the rest of the activity for homework. This activity will be segue-way for day three introduction activity. (For this activity, the teacher used sheet music for Michael Jackson's "Billy Jean." Prior research will be needed to find accompanying sheet music. There are websites that provide free sheet music as well as paid for sheet music for more contemporary, popular songs.)

Day Three

Integrating literacy across the content area is crucial as our state experiences the shift from the North Carolina Standard Course of Study to the Common Core State Standards. Scholars are challenged now, more than ever before, to explain step by step instructions to higher order, multi-step mathematical equations to constructing and solving numerical sentences for geometric shapes. It is imperative that as educators preparing our scholars for a competitive global workforce, that we provide them with experiences that will enhance their creativity and their multi step instructional telling skills in a comprehensive way. A fun and creative way to accomplish this is through the use of foldables!

Scholars will begin the day's activities with a review of music theory concepts. The teacher will hold up images of various musical notes, and the scholars will have to determine their fraction value. In addition to determining their fractional value, the teacher will pose questions such as, "How many ½ notes can fit into a whole note? How many quarter notes can fit into a half note? What methods did you use to solve these problems?"

After a discussion on fraction values and how many measures/notes can fit into a specified music note (tie in their day two homework assignment), scholars will write down step by step instructions on how they found the answer to the problem posed. Scholars will have to list the steps on their paper as well as provide varying examples for the division and multiplication of fractions. This will begin the process for the dancing musical note activity.

To create the dancing musical note, scholars will need art supplies (markers, scissors), two sheets of colored cardstock music note template (See Attachment 5), a hole puncher, yarn, stapler and tissue paper filling (optional). Using markers, scholars are going to copy the steps of how to multiply and divide fractions onto their music note cardstock template. One set for instructions for each template. Encourage scholars to get creative and decorate their music note for added effects. Scholars will then cut out the template and hole punch the top of the music note. Staple the two music notes together, and tie yarn into the hole punch. The yarn attached to the top of the foldable makes it dance as scholars are allowed to hang the foldable as one would for a mobile.

For increased dramatic effects, insert the paper/tissue filling into the foldable before stapling the sides together. This gives the foldable a three dimensional effect. Before dancing musical notes are hung to the ceiling in the classroom, check to make sure school safety guidelines allow it.

Day Four and Five

Exploring the science behind the sound of music allows scholars to apply and extend their newfound knowledge of the multiplication and division of fractions with the integration of music theory concepts and science. Scholars are challenged to solve real world problems that audio and music engineers face using technology such as netbooks and TI-73 calculators.

Audio and music engineering is a fast growing and lucrative career field for those interested in the behind the scenes of music production. Audio and music engineers face various levels of difficulties as they edit a piece of music to ensure that the sound of music is in conjunction with timing. For this activity, scholars will be investigating the math and science behind music (See Attachment 6).

Begin the lesson by having scholars listen to a piece of instrumental music OR by playing an original piece of music. Have a discussion on the piece of music, and have scholars try to figure out what type of instrument or sounds that they hear. Show the scholars two musical instrument of your choice (one must be an open ended instrument while the other a close ended instrument. If you do not have access to a musical instrument, there are sites available that show diagrams of instruments). Explain to scholars that many instruments depend on air moving through the instruments. There are two types of instruments: open ended and close ended. An open ended instrument has both ends open to the air while a close ended instrument has one end closed off. With an open ended instrument you blow in through one end and the sound comes out of the other end of the instrument. A close ended instrument, however, you blow in through the mouth piece and the end of the mouth piece is closed off. Optional: to increase engagement, have a scholar who is in the band elective to explain how music instruments work.

Explain to the scholars that an instruments tone is a complex mixture of different waves and frequencies; and instruments produce notes that have a frequency in combination with multiples of that frequency. Explain that the shorter the wavelength, the higher the frequency and the higher the pitch; while on the other hand, the bigger the wavelength, the lower the pitch and the frequency. Wavelengths can be measured in fraction representations.

On the board draw a few diagrams of a wavelength. Have each diagram represent a different fractional value. Inform scholars that when referring to the sound an instrument makes, one is really investigating how much of the wavelength can fit into the

pipe of the instrument. Different amounts of wavelength produce different sounds being heard. For the following activity, scholars will investigate what different fractional values produce what sounds and in what instruments.

Begin by dividing scholars into groups. Half of the class will be an open ended instrument group, while the other half of the class will be composed of closed ended instruments individuals. Once the class has been split into groups, divide the original groups into smaller subgroups. There will be three open ended instrument groups made up of four people (trumpet, saxophone, and trombone) and three close ended instrument groups made up of four people (flute, clarinet, and another instrument of your choice). Each group will consist of a team leader, team recorder, time keeper, and errand monitor. All group members will present the group's finished work to the class. Groups can be modified to fit class sizes.

Inform scholars that they will be taking on the role of an audio/music engineer. Their objective is to conduct research on their instrument (origin and background of instrument), explain in detail how different fractional wavelengths effect the sound of their instrument (scholars should use benchmark fractions to show representations), use charts and graphs to express changes in wavelength and sound frequencies, and showcase possible notes that can fit into a specified wavelength and how many (this allows scholars to apply their knowledge of dividing fractions). Scholars will present their findings to the class with a PowerPoint presentation and a one page typed paper. Scholars will also be allowed to create a tri-fold board to present their findings.

Scholars will be allowed to use netbooks to conduct research on their musical instrument, and to identify the various fractional wavelengths, frequencies, and the sound that they omit. Scholars are also allowed to use TI-73 calculators to ensure that mathematical computation is accurate. As scholars are working on this project, the teacher should circulate around the classroom to ensure that all scholars are on task and working. This activity should be taught on a Thursday or Friday so that scholars can use the weekend to work on finishing their presentations.

Upon completion of the project, scholars will present their findings to the class. Scholars will display their tri-fold or PowerPoint presentation, and inform the class what they learned about their musical instrument. Scholars will also explain how various fractional wavelengths affect the sound of their instrument.

Day Six

Prior to the unit test, the scholars will engage in one last cooperative group activity where they will become the experts in the multiplication and division of fractions. Using the Jigsaw strategy, scholars will be placed into groups of four where they will create a product using the multiplication and division of fractions. The teacher will give each scholar a post it note with a number ranging from one to four. Scholars with the number

one will be the expert on multiplying fractions while scholars with the number two will be the expert on dividing fractions. Scholars with the number three will be the novice on multiplying fractions with mixed AND whole numbers and the fourth scholar will take the lead on the division of fractions of mixed AND whole numbers. Each group member will read and work out three fraction problems and two word problems, on their topic, by themselves prior to meeting with the other experts from their original group.

Each scholar will meet with the other experts of the same number who are learning the same concept. The sub groups will have twenty to thirty seconds to discuss how to best teach their concept through the use of explanations, visual representations, or manipulatives. Each person will have to create a three to five minute presentation with a visual of at least two numerical sentences and one word problem to bring back to their original group. As scholars are discussing ways to peer teach it is important that the teacher circulate around the classroom serving as a facilitator. During this time, the teacher should play music as a time management and noise level indicator strategy. The noise level in the classroom is not to surpass the volume of the music being played. Once the music has stopped playing, scholars know that it is time to wrap up their activity, and proceed to their original group.

After the allotted time, the experts will return to their original group to present their findings. Each member will have three to five minutes to present their topic and visual or manipulatives. The scholars listening to the presenter will complete the "Multiplying and Dividing Fractions Jigsaw" activity sheet (See attachment 7). During the presentations, it is important that the teacher play five minute instrumental pieces of music to serve as a time management strategy as well as have an online timer displayed on the projector so that presenters do not go over there allotted time.

Upon successful completion of this activity, it is important that the teacher have a whole group wrap-up session. The teacher will asks experts from each sub-topic area to share one piece of information that they brought back to their group that was beneficial for the teaching and learning of the multiplying and dividing of fractions. On the other hand, the teacher will ask group members what is one thing they learned from the experts that was made clear or that they understood better. Have scholars from each group share something.

Day Seven

The culminating group activity has scholars moving around the classroom in an effort to be the last one standing. Scholars will take part in mathematical musical chairs in which they will solve mathematical equations that will involve the multiplication and division of fractions. Prior to the activity, it is important the teacher go over classroom rules such as yelling and running to minimize disruptions to the learning activity.

Begin the activity by placing chairs (or desks) in a circle formation. The number of chairs (or desks) should be two less than the number of scholars playing the game. Have the scholars stand in a circle around the chairs before the music begins. Have the PowerPoint with corresponding questions (See Attachment 8) displayed on the projector on the cover slide screen. Once the music starts, scholars should move in circular rotation around the perimeter of the chairs.

The teacher will play the music for twenty to thirty seconds and then stop the music abruptly, and all scholars must try to find a seat (or desk) closest to them. The two players left without a chair will go up to the board. The teacher will display the first question on the PowerPoint, and the first scholar to correctly answer the question will be able to return to the game while the other scholar cheers on the remainder of his/her peers. If both scholars do not get the answer correct, both scholars are out the game. Remove another chair and continue the game until there is only one scholar standing! Award the last scholar standing with a prize. Modifications of this game can be made to fit scholar and teacher needs.

Day Eight

The end of the proposed curriculum unit calls for the teacher to assess the scholars on material taught over the past seven days. Scholars will have the entirety of the class period to take the assessment that has thirteen questions which range from multiple choice to short answer (See Attachment 9). Encourage scholars to explain steps of the mathematical process as well as draw pictures to formulate their answers.

Prior to the test, the teacher can go over the homework study guide to answer last minute questions involving the multiplication and division of fractions. The teacher is encouraged to re-teach any material that scholars are not showing a proficiency level in.

Corresponding Activity Attachments

Dividing Fractions Pre-Assessment (Attachment 1)

Grade 6 Math

Quiz #1

Name: _____Date: _____

6. NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions

Calculate the answers to the following fractional division problems.

1) $\frac{5}{6} \div \frac{3}{4}$

a. 21/4 b.10/9 c. 4/3 d. 8/9

2) $2\frac{3}{4} \div \frac{1}{2}$

a. 11/2 b. 2/11 c. 5 d. 8/11

Answer the following word problems, using pictures or numbers.

3) Kia has a birthday party. She uses 6 pints of ice-cream and gives each guest ¼ of a pint. How many guests can she serve? (Hint: Draw a picture)

a. 24 b. 29 c. 6/1 d. 15

4) Eva has a birthday party. She uses 4 pints of ice-cream and gives each guest ¾ pint of ice-cream. How many guests can Kendra serve?

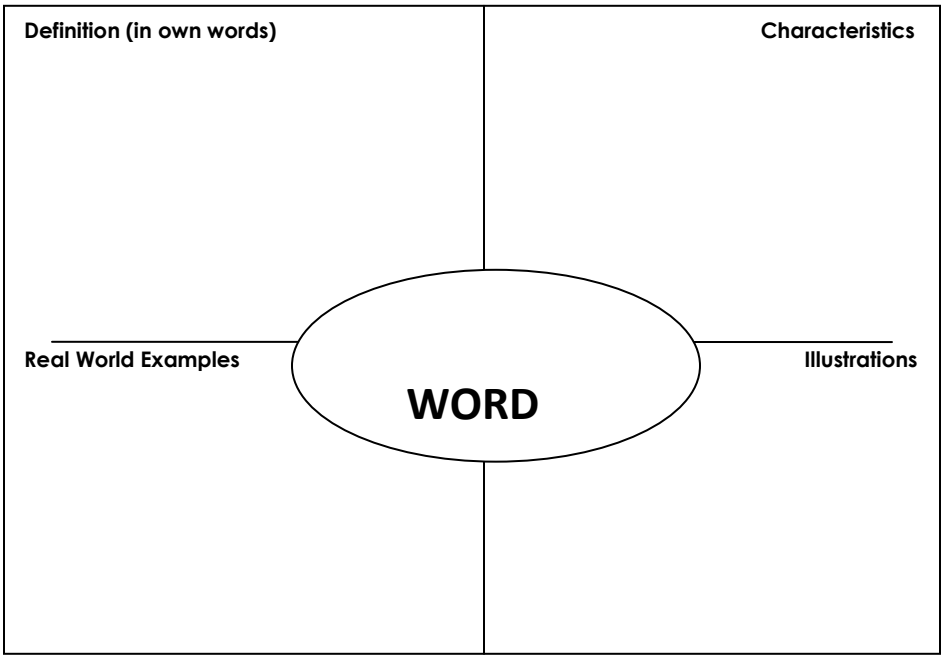
a. 14/5 b. 16/3 c. 8/9 d. 11/4

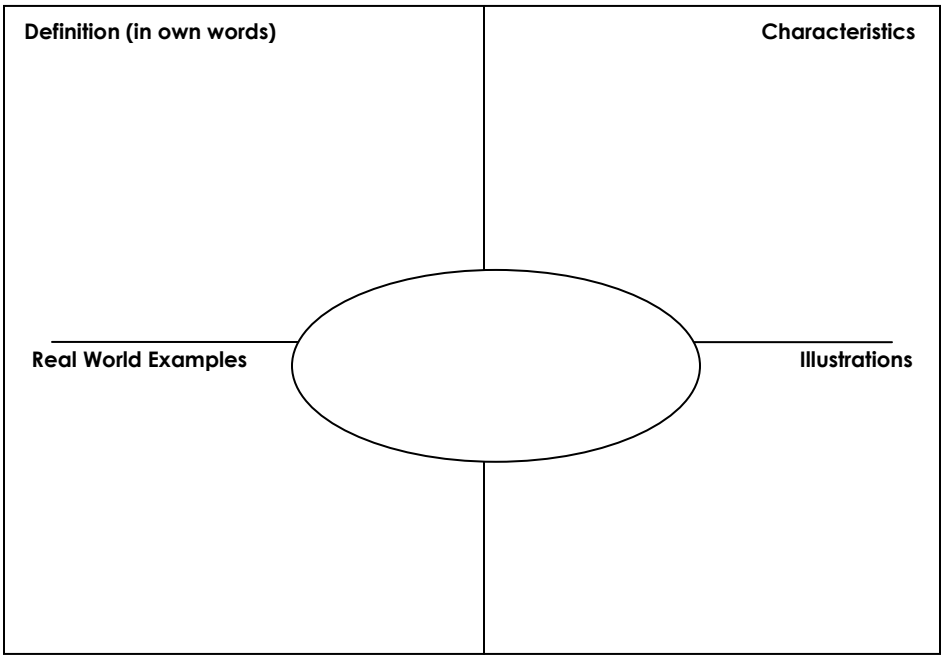
5) Colby found that if he walks very fast, he can cover 2 ½ miles in ¾ of an hour. How fast is he walking in miles per hour? (Hint: make sure to convert your mixed number into an improper fraction!)

a. ¾ b. 8/9 c. 10/3 d. 10/5

Frayer Model Vocabulary Cards (Attachment 2)

Name _____ Period # _____ Date _____ Mr. /s: _____

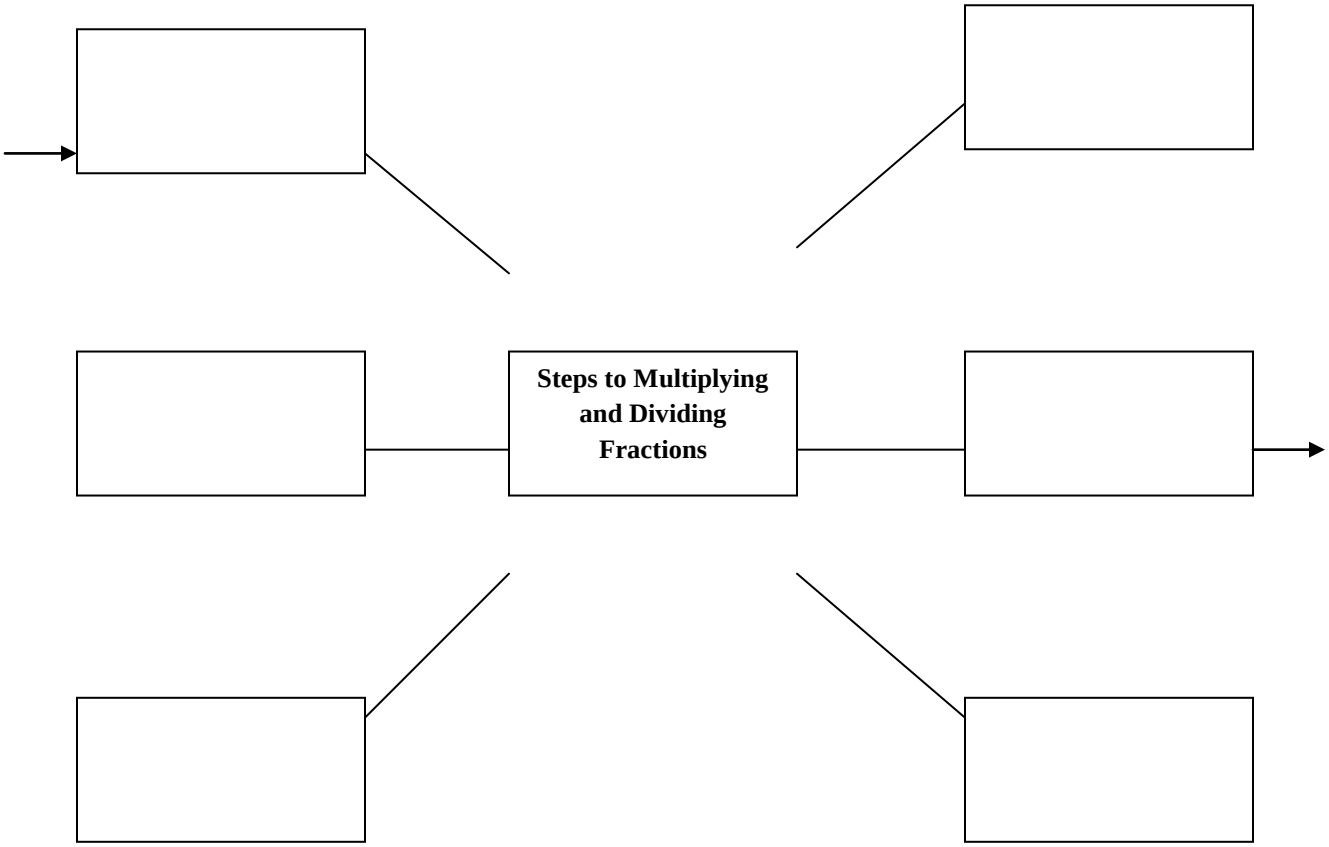




Multi Flow Map (Attachment 3)

Name _____ Period # _____ Date _____ Mr. /s: _____

Multiplying Fractions **Dividing Fractions**



Cornell Notes: Multiplication of Fractions (Attachment 4)

Multiplying Fractions

Questions	***Notes***
Multiply Fractions by Whole Numbers:	1.) _____ the _____ number as a _____ by placing it over _____. *(it is still equal to the whole number because any number divided by 1 is that number)* 2.) _____ _____ …. 3.) _____ numerator times numerator. 4.) Multiply denominator times _____. 5a.) Change _____ fractions to _____ _____. 5b.) Make sure your final _____ is in _____ form.
Multiplying Fractions by Fractions:	1.) CROSS _____! 2.) _____ numerator times numerator. 3.) _____ denominator times denominator. 4.) Make sure your final answer is in _____ *** Don't leave your final answer as an improper fraction!

Summary

The Dancing Musical Note (Attachment 5)

Wavelength and Frequency (Attachment 6)

The Mathematical Sound of Music Rubric

Name _____ Period # _____ Date _____ Mr. /s: _____
Group Members _____

	Beginning **10**	**Developing** **15**	**Accomplished** **20**	**Exemplary** **25**	**Score**
Musical Instrument History	Group barely read or wrote about the origin of their musical instrument	Group has read and highlighted 2-3 important facts regarding their music instrument (origin, instrument family, how instrument works, parts of instrument, evolution of instrument over time)	Group has read and highlighted 3-4 important facts regarding their music instrument (origin, instrument family, how instrument works, parts of instrument, evolution of instrument over time)	Group has read and highlighted important facts regarding their music instrument (origin, instrument family, how instrument works, parts of instrument, evolution of instrument over time)	
Mathematica l Proficiency	Group has NOT shown correct usage of the multiplication and division of fractions	Group shows a developing usage of the multiplication and division of fractions	Group has shown correct usage of the multiplication and division of fractions but with a few minor errors	Group has shown correct usage of the multiplication and division of fractions	
Use of charts, pictures, and graphs	Group uses NO charts, pictures, and graphs to display fractional representations of wavelengths and frequencies	Group uses 1-2 charts, pictures, and graphs to display fractional representations of wavelengths and frequencies	Group uses 3-4 charts, pictures, and graphs to display fractional representations of wavelengths and frequencies	Group uses 4 or more charts, pictures, and graphs to display fractional representations of wavelengths and frequencies	
Writing Conventions	Group has NOT completed a PowerPoint OR typed a one page paper	Group has completed a PowerPoint OR typed a one page paper with few grammatical errors	Group has completed a PowerPoint and one page typed paper with few grammatical errors	Group has completed a PowerPoint Presentation and one page typed paper with no grammatical errors	

Literacy Integration: Math Jigsaw Activity Sheet (Attachment 7)

Name _____ Period # _____ Date _____ Mr. /s: _____
Group Members _____

Multiplying and Dividing Fractions Jigsaw

Topic	Notes/Steps	Examples and Word Problems	Pictures
Multiplying Fractions			
Multiplying Improper Fractions and Whole Numbers			
Dividing Fractions			
Dividing Improper Fractions and Whole Numbers			

Math Musical Chairs (Attachment 8)

Directions: Place chairs in a circle formation, and have two less chairs than the number of scholars. Scholars will walk around the outside of the circle to music and once the music stops, will find a desk closest to them. The two scholars outside of the circle will have to compete for a chance to remain in the game. The winning scholar will return to the game while the other scholar cheers on the remainder of his/her peers. The following questions will be asked as scholars play musical chairs (questions put into PowerPoint presentation or on the Promethean board will prove most beneficial as scholar can see them as they are presented.)

1. Solve the following: $\frac{1}{2} \div \frac{1}{4}$	12. For a family party, Jemima made ⅖ of the desserts. If a total of 40 desserts were brought to the party, how many did Jemima supply?	23. Solve the following: $6\frac{1}{4} \div 2\frac{1}{2}$
2. List the steps for multiplying a fraction by a fraction.	13. Reciprocal means to…	24. When finding the reciprocal of a fraction, which fraction (first or second) do you flip?
3. How many pieces of $10\frac{5}{16}$ inch bar can be cut from a stock 20 foot bar?	14. Solve the following: $2\frac{2}{3} \times 4\frac{3}{8}$	25. Marx purchased a box of candy at the store. On his way home he ate ¼ of the candy in the box. At dinner with friends later that night he served ½ of what was left. If there are 6 chocolates now left in the box, how many did the box contain to start with?
4. When asked to find a product, you…	15. List the steps for multiplying a fraction by a whole number.	26. How does one convert a mixed number to an improper fraction?
5. Solve the following: $\frac{15}{64} \times \frac{1}{12}$	16. Solve the following: $3\frac{1}{5} \div 1\frac{5}{7}$	27. Solve the following: $\frac{2}{3} \div 4$
6. Explain how to divide a fraction by a whole number.	17. When asked to find the quotient, you…	28. When multiplying or dividing by a whole number, you place this number as a denominator.
7. Solve the following: $3\frac{1}{8} \times 2\frac{2}{5}$	18. While riding her bike, Jazmine burns 450 calories every ½ hour. Based on this rate, how many calories will Jazmine burn if she rides the bike for 1¾?	29. List the steps for dividing a fraction by a fraction.

8. List the steps for dividing a fraction by a mixed number.	19. Solve the following: $\frac{4}{11} \div \frac{1}{11}$	30. Darmel has a birthday party. She uses 6 pints of ice-cream and gives each guest ¼ of a pint. How many guests can she serve?
9. Solve the following: $\frac{1}{9} \times \frac{1}{2}$	20. Eva has a birthday party. She uses 4 pints of ice-cream and gives each guest ¾ pint of ice-cream. How many guests can Eva serve?	31. Solve the following: $9 \div \frac{3}{4}$
10. Solve the following: $\frac{3}{4} \times 10$	21. Mariah found that if she walks very fast, she can cover 2 ½ miles in ¾ of an hour. How fast is she walking in miles per hour? (Hint: make sure to convert your mixed number into an improper fraction!)	32. A recipe for French toast that serves 6 calls for ¾ cup granulated sugar, 1 cup of evaporated milk, ⅓ teaspoon of vanilla, and 12 thick slices of French bread. How much of each ingredient is needed to serve only three?
11. Explain how to convert a mixed number into an improper fraction.	22. Solve the following: $1\frac{1}{2} \times \frac{5}{6}$	33. Solve the following: $14 \times \frac{3}{8}$

Post Assessment (Attachment 9)

6th Grade Multiplying and Dividing Fractions Assessment

Name: _____ Block: ___ Date _____ Score ___/13

1. $15 \bullet \frac{4}{5}$

Correct Work_____ Correct Answer_____

2. $2\frac{3}{4} \div \frac{1}{2}$

b. 11/2 b. 2/11 c. 5 d. 8/11

Correct Work_____ Correct Answer_____

3. Marx found that if he walks very fast, he can cover 2 ½ miles in ¾ of an hour. How fast is he walking in miles per hour? (Hint: make sure to convert your mixed number into an improper fraction!)

b. ¾ b. 8/9 c. 10/3 d. 10/5

Correct Work_____ Correct Answer_____

4. $3\frac{2}{3} \bullet 5\frac{1}{4}$

Correct Work_____ Correct Answer_____

5. $\frac{5}{6} \div \frac{3}{4}$

b. 21/4 b.10/9 c. 4/3 d. 8/9

Correct Work_____ Correct Answer_____

6. For a family party, Taylor made ⅖ of the desserts. If a total of 40 desserts were brought to the party, how many did Taylor supply?

Correct Work_____ Correct Answer_____

7. Kendra has a birthday party. She uses 4 pints of ice-cream and gives each guest ¾ pint of ice-cream. How many guests can Kendra serve?

b. 14/5 b. 16/3 c. 8/9 d. 11/4

Correct Work_____ Correct Answer_____

8. $1\frac{1}{2} \times \frac{5}{6}$

Correct Work_____ Correct Answer_____

9. Ralph has a birthday party. He uses 6 pints of ice-cream and gives each guest ¼ of a pint. How many guests can he serve?

b. 24 b. 29 c. 6/1 d. 15

Correct Work_____ Correct Answer_____

10. A recipe for French toast that serves 6 calls for ¾ cup granulated sugar, 1 cup of evaporated milk, ⅓ teaspoon of vanilla, and 12 thick slices of French bread. How much of each ingredient is needed to serve only three?

Correct Work_____ Correct Answer_____

11. Demonstrate your knowledge by giving a clear, concise explanation to the question. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem:
Explain how to multiply a fraction by another fraction.

Correct Work_____ Correct Answer_____

12. Demonstrate your knowledge by giving a clear, concise explanation to the question. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem:
Explain how to divide a fraction by another fraction.

Correct Work_____ Correct Answer_____

13. Demonstrate your knowledge by giving a clear, concise explanation to the question. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem:
Explain how to multiply a fraction by a whole number.

Correct Work_____ Correct Answer_____