Title:	**Grade(s): 6**	**BIG Idea:**
Breaking Up The Beat	**Author(s)**: Angeleque Borom & Mary Lou Wilson	Equivalent Fractions

Real-World Connection:

Music producers, rappers and lyricists use fractions while creating music beats and rhythms. Basic rhythm patterns can be used to help students explore the set model of fractions, equivalent fractions, and fraction addition.

A **time signature** is a fraction found at the beginning of a piece of music. It signifies how many and what kind of notes are in each measure of music.

The top number indicates how many **beats** are in a **measure.** For example, the 4/4 time signature tells you four beats occur in each measure so you can count to four while you play each measure.

The bottom number indicates the **note** that gets that beat. For example, 4/4 time means that there are 4 quarter notes played in each measure compared to 9/8 time which means that there are 9 eighth notes played in each measure.

How Students will Experience the Connection:

Video Clip	Photo	Podcast
Print Media (article, ad, etc.)	Vodcast	Other

GPS Standards:

M6N1
Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.

M6P1
Students will solve problems (using appropriate technology).

M6P4
Students will make connections among mathematical ideas and to other disciplines.

M6P5
Students will represent mathematics in multiple ways.

Objectives:

1. Students will identify equivalent fractions using a set model (i.e. four beats = one measure of music).
2. Students will create addition sentences for fractions with unlike denominators.
3. Students will correctly model fractions using music symbols and fraction notation.

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Materials:

Teacher

Computer w/ Projector

Video-The Rhythm Track (approx 6.5 min):
http://www.thefutureschannel.com/dockets/realworld/the_rhythm_track/

Interactive Music Tools

- **Playing Fraction Pies** (http://www.philtulga.com/pie.html)
  Students drag fractional pieces of a circle that represent note values to a music staff and then press "play" for their creation to be performed.
- **Counting Music** (http://www.philtulga.com/counter.html)
  The Counting Music activity shows you how to count rhythms, and connects your knowledge of fractions and length to musical notes. Simply enter the notes and it counts the music with you.

Students

Breaking Up The Beat Handout
Pencil/Markers

Related Task:

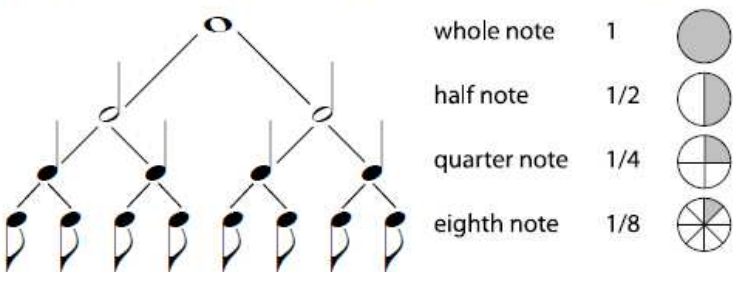
Initial Questions:

1. How many of you like to work with fractions?
2. How many of you like music?
3. Do you think fractions and music are related?

Students will most likely have some experience with counting rhythms from their music classes. Watch the Video-The Rhythm Track (approx 6.5 min) to see how music and fractions are related. Then ask questions to make certain that students understand how the notes are related.

Remember that in this context, the **WHOLE** (or measure) is represented by **4 beats/counts**. If the measure represents the whole set, each beat is a fraction of the whole. You can also use Playing Fraction Pies (http://www.philtulga.com/pie.html) or Counting Music (http://www.philtulga.com/counter.html) to help students note the relationships between the notes.

Just like fractions in Math, 4/4 =1, one 4/4 measure has 4 beats. Using the Note Tree, observe how a whole note (4 beats), can be divided into 2 half notes (2 beats each) and then 4 quarter notes (1 beat each) and then 8 eighth notes (½ beat each)



From http://www.emcnotes.com/pdf/Bang-A-Gong_sample.pdf

Questions for Students:

1. How many half notes does it take to make a whole note? Quarter notes? Eighth notes? (Answers: 2 half notes; 4 quarter notes; 8 eighth notes)
2. How many quarter notes does it take to make a half note? (Answer: 2 quarter notes) Eighth notes? (Answer: 4 eighth notes)
3. How many eighth notes does it take to make a quarter note? (Answer: 2 eighth notes)

When you feel that students understand the notes and corresponding fractions, challenge them to create their own beats. Complete the handout. Students can share the measures they created with the class.

Now students can perform their measures using claps, tapping on the desks, or the interactive websites (*Playing Fraction Pies / Counting Music)*.

Handout (*Breaking Up the Beat*) notes:

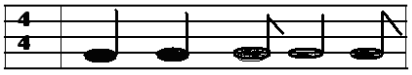
Help students bridge the connection between the meanings of the values in the table. In this context, the $\frac{part}{whole}$ refers to $\frac{beats/notes}{measure}$. Refer to the Note Tree as needed to emphasize:

1 measure = 4 beats = 1 whole note

For example, a half note has a value that is one-half of a whole note or ½ x 1 = ½. Two half notes equal the value of a whole note and would "pulse" for two beats. A sixteenth note has a value that is one-sixteenth of a whole note or 1/16 x 1 = 1/16. It takes sixteen, sixteenth notes to equal to whole note. One sixteenth note would pulse for one-fourth of *one* beat. Since one beat represents one-fourth of a whole note, ¼ of ¼ represents 1/16, hence its fractional name.

Answers will vary—students must show a total of 1 measure or 4 beats

$1=\frac{1}{4}+\frac{1}{4}+\frac{1}{2}$



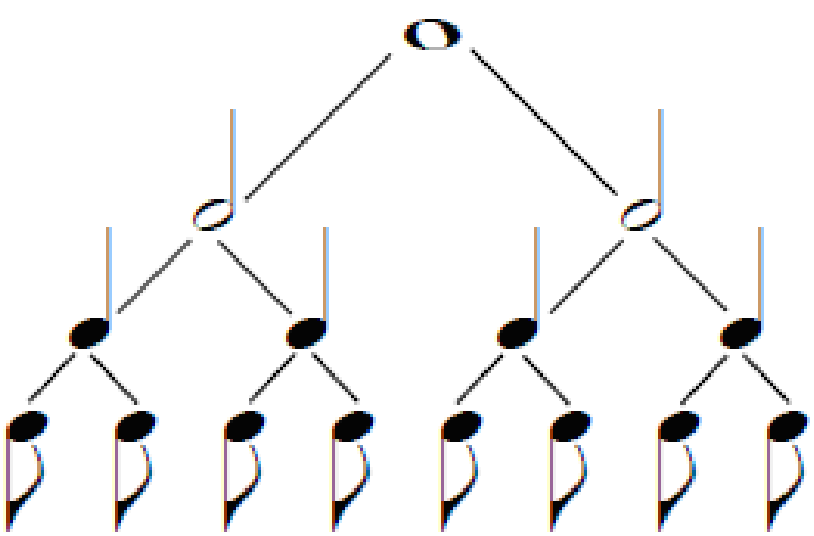
$1=\frac{1}{4}+\frac{1}{4}+\frac{1}{8}+\frac{1}{4}+\frac{1}{8}$

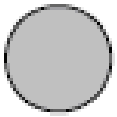
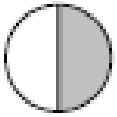
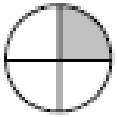
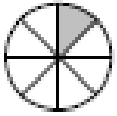
Learn More:

Bang a Gong: Let's Create a Song:
http://www.emcnotes.com/pdf/Bang-A-Gong_sample.pdf

Rhythm Symbols and Names:
http://www.classicsforkids.com/teachers/training/rchart.asp

Transparency: **NOTE TREE**



whole note	1	
half note	1/2	
quarter note	1/4	
eighth note	1/8	

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Breaking Up the Beat

A **time signature** is a fraction found at the beginning of a piece of music. It signifies how many and what kind of notes are in each measure of music. You can use the time signature to help you break up the. beat in a variety of ways

1 measure = 4 beats = 1 whole note

Music Symbol	Note Name	Fraction Name	How Many Beats/Counts ?
	Whole Note	$1\ measure$	$4\ beats$
	Half Note	$\frac{1}{2} measure$	$2\ beats$
	Quarter Note	$\frac{1}{4} measure$	$1\ beat$
	Eighth Note	$\frac{1}{8} measure$	$\frac{1}{2} beat$
	Sixteenth Note	$\frac{1}{16} measure$	$\frac{1}{4} beat$

How many half notes does it take to make a whole note?

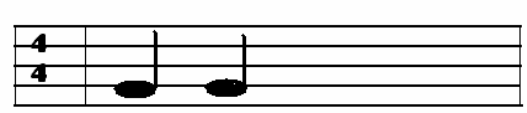
How many quarter notes does it take to make a whole note?

How many eighth notes does it take to make a quarter note?

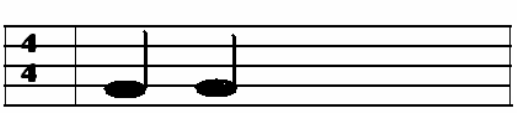
How many eighth notes does it take to make a whole note?

Created as part of *Making Real-World Connections in Mathematics*, an IMPROVING TEACHER QUALITY Higher Education Project at the Columbus Regional Mathematics Collaborative at Columbus State University.

Show two ways to finish the measure below. Then write the number sentence that corresponds to each measure:



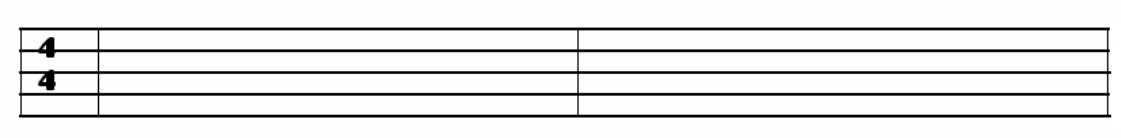
$1 = \frac{1}{4} + \frac{1}{4} + \_\_\_\_\_$



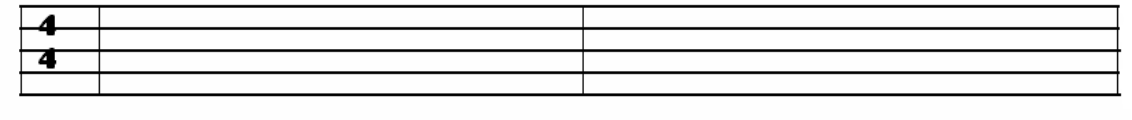
$1 = \frac{1}{4} + \frac{1}{4} + \_\_\_\_\_$

Create your own rhythm. Record 4 measures in the space below.

A B



C D



Write the number sentences that correspond to each measure that you created.

A	B
C	D

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