

Math & Rhythm

7th Grade Math and Music

CORE SUBJECT AREA

Math

ART FORM + ELEMENTS

Rhythm
Form
Music

MSCCR STANDARDS

7.RP.1 Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

MSCCR CREATIVE ARTS STANDARDS

MU: Pr4.2.7 Select, analyze, and interpret artistic work for presentation. Analyze the structure and context of varied musical works and their implications for performance.

- Explain and demonstrate the structure of contrasting pieces of music selected for performance and how elements of music are used.
- When analyzing selected music, read and identify by name or function standard symbols for rhythm, pitch articulation, dynamics, tempo, and form.
- Identify how cultural and historical context inform performances and result in different music interpretations.

DURATION

4-5 (30-45 minute) class periods

OBJECTIVES

Math: I can calculate my heart rate in beats per minute at rest and after exercise. I can calculate the tempo of a piece of recorded music in beats per minute and describe it using rate language.

Arts and Humanities: I can define tempo. I can define the terms adagio, moderato, allegro, and presto. I can recognize if a piece of music would be adagio, moderato, allegro, or presto by counting beats. I can determine the BPM (beats per minute) of a piece of music. I can distinguish between adagio, moderato, allegro, and presto. I can describe how tempo can express ideas or emotions in music.

MATERIALS NEEDED

Stopwatch (online or handheld)

"Steady Beat" handout.

Music files selected by the teacher or the students.
Sticky Notes

Tempo Terms Handout

Music Log Handout.

VOCABULARY

Ratio, Rate, Adagio, Moderato, Allegro, Presto, Tempo BOM, Rhythm, Rate, Language

RECOMMENDED RESOURCES

'What is Music' <https://www.youtube.com/watch?v=XRjVioW3uxA>

'How to Calculate BPM' https://www.youtube.com/watch?v=P0_GKq5Kgr0

'Finding the Tempo of a Track in Pro Tools' <https://www.youtube.com/watch?v=vW-fwX5LSUk>

Example #1 Adagio from PBS Learning Media: "Exploring Excellence: Kimani Grin" Alternate

Example #1: <https://www.youtube.com/watch?v=kn1gcjuhlhg>

Example #2 Moderato from PBS Learning Media: "Found Sound: Joshua Jones" Alternate

Example #2: https://www.youtube.com/watch?v=G_udv5o47f8

Example #3 Allegro from PBS Learning Media: "Cluck Old Hen/I Had a Rooster" Alternate

Example #3: <https://www.youtube.com/watch?v=eVTXPUF4Oz4>

Example #4 Presto: YouTube: Blue Highway performing "Riding the Danville Pike" Alternate

Example #4: <https://www.youtube.com/watch?v=V70paQsA5oY>

LESSON SEQUENCE

Students will need to know what musical beats are and how to calculate a unit rate. Students will also need to know how to convert a time measured in seconds to minutes.

Ask students to write a definition for the musical terms tempo and rhythm on a sticky note. Tell them, as they watch the video, to decide if they want to change their definition. Show the 'What is Music' video. Allow students to rewrite their definitions if they want. Ask a few students to share their pre and post viewing definitions. *This could serve as a form of assessment/ 'Exit Ticket' for the class.

Begin by distributing the "Steady Beat" (you will only need the first page) handouts and have students calculate their pulses at rest, this time counting for 15 seconds and solving the ratio problem. Discuss how you can get the same result when counting for 15 seconds as when counting for 30 seconds by using ratios. If needed, have them repeat the activity counting for 30 seconds to see that the results are approximately the same. TS should come to the conclusion that their pulse should have an approximate unit rate range.*You could also have them perform a form of exercise, i.e. jumping jacks, and then take their pulse again at 15 seconds, and then again at 30 seconds.

TTW begin the lesson by walking through the 'Tempo Terms' Handout with TS. TTW then ask TS if they know how to calculate BPM (beats per minute). Answers should vary. TTW then show the video 'How to calculate BPM' to TS. She will discuss the different styles of music by using the 'Alternate Example' pieces. TTW clap through the BPM with TS.

Project: In the 'Finding the Tempo of a Track in Pro Tools' video, the students see how the beats in the music are represented visually in the music software being used. To extend this program, students can use "Audacity" to measure the length of a segment of a song selected by the student or the teacher and "see" the beats in the spectrum analyzer, much like was done in the video. See the accompanying software guide for more detailed instructions.

Example #1 Adagio; Example #2 Moderato; Example #3 Allegro; Example #4 Presto

Activities Using provided samples of music, answer the following for each:

- What is the BPM (beats per minute) of this piece of music? You can use your hands to clap along with the beat. Count how many beats occur in one minute and you'll know an approximate BPM.

- What tempo would this song most closely be (adagio, moderato, allegro, presto)?
 - What kind of mood does this piece of music have?
 - How was tempo used to create the mood of the piece? Have students complete the "Music Log." Teacher Reference Sheet: For the terms, you could use the following forms of assessment:
 - Oral questioning with class • Bell Ringer Quiz
 - Crossword Puzzle (attached as a pdf)
 - Matching
 - Post Lesson Quiz Activities Sample Answers Use the examples provided in the lesson plan. The terms adagio, moderato, allegro, and presto are not bound to specific BPM. The examples provided are in an approximate tempo. What is the BPM (beats per minute) of this piece of music? You can use your hands to clap along with the beat. Count how many beats occur in one minute, and you'll know an approximate BPM. What tempo would this song most closely be (adagio, moderato, allegro, presto)?
 - Example #1 is adagio. (approx. 70 BPM, clap pattern 1-2-3, 1-2-3)
- Example #2 is moderato. (approx. 112 BPM)
- Example #3 is allegro. (approx. 120 BPM) (Use first part of video "Cluck Old Hen")
 - Example #4 is presto. (approx. 183 BPM) You can play these examples in any order you'd like. Try mixing it up for fun. What kind of emotion does this music express? Answers will vary. Students may say the slower pieces are more somber or sad while the faster pieces are happier and fun. How was tempo used to help express the emotion of the piece? Answers will vary. Students will most likely associate slower tempos with more tranquil emotions, even sadness or peace. Faster songs will usually get more "happy, fun, exciting" adjectives. You may want to have students create a list of adjectives to describe the mood of the music.

EXTENDED LEARNING ACTIVITIES

<https://mpb.pbslearningmedia.org/resource/ket-6dance/drum-beating-foot-stomping/?#.Ww9cUu4vzIV>. This is a dance lesson on BPM.

SOURCES

<https://mpb.pbslearningmedia.org/resource/ket-6dance/drum-beating-foot-stomping/?#.Ww7Nde4vzIU> (pulled the BPM heart rate activity). <https://mpb.pbslearningmedia.org/resource/ket-6music/calculating-musical-tempo/?#.Ww7dGO4vzIU>; edited by Jessica Jarman Teachers-pay-Teachers.

TIPS + FREQUENTLY ASKED QUESTIONS

- Audacity is not an approved audio site. Any metronome app or site would be a great tool to illustrate BPM. "Pro Metronome" is an app that you can download to your phone for free.
- TT should practice clapping the BPM through each musical piece before implementing this lesson. Students will need to know what musical beats are and how to calculate a unit rate.
- Students will also need to know how to convert a time measured in seconds to minutes.