

## ***Mathematics: The Language of STEM***

### **Lesson #1 - Year 3: Algo Rhythms**

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## **CONTENT AND TASK DECISIONS**

### **Grade Level(s): 5th**

**Description of the Task:** Using the music concepts of tempo, measure, and time signature, determine the length of a music composition

**Indiana Mathematics Content Standards:** 5.AT.5: Solve real-world problems involving addition, subtraction, multiplication, and division with decimals to hundredths, including problems that involve money in decimal notation (e.g. by using equations to represent the problem).

**Indiana Mathematics Process Standards:** PS.6: Attend to precision (They calculate accurately and efficiently and check the validity of their results in the context of the problem)

**Mathematics Content Goals:** Use algorithms to determine song length in music. Translate decimals into time

**Language Objectives:** Students will be able to use the mathematical terms minutes, seconds, rate, speed, time, and the musical terms tempo, measure, and time signature correctly

**Materials:** Paper, pencil, G-suite for education (Google Drawing and Google Sites)

## **THE LESSON**

**Before:** This phase of the lesson should be designed to get students ready for problem solving. It also provides an opportunity for you to find out what they already know about the topic. Describe how you will accomplish each of the following in this phase of the lesson:

- **Activate prior knowledge** Ask students how time in music is measured
  - How long is a second?
  - How many seconds are there in half a minute?
  - How many seconds are there in one quarter of a minute?
  - How can you determine time using fractions and decimals?
  - How many seconds is 5 and a half minutes?
  - How many seconds is 3.25 minutes?
  - How is beat measured?
  - If your heart beats one time per second? How many times does it beat in five minutes?
  - If you were to group your heart beats in sets of four, how many sets of heartbeats would there be in five minutes if your heart beats one time per second?
- **Be sure the problem is understood**
  - We are going to determine the length of a song based on its speed (tempo), time signature (beat groupings), and number of measures
- **Establish clear expectations**
  - Students will be able to calculate the length of a song based on its tempo, time signature, and number of measures

**During:**

- **Let go**, Students will work in small group to determine the length of the song “Tour the States” without the aid of an algorithm. Students will take turns explaining their solutions to the class
- **Listen actively**, Listen to and take notes of student responses. Note the different strategies used to solve the problem
- **Provide appropriate support** Guide children in their struggle to create a solution to a mathematic problem
- **Provide worthwhile extensions**. With the help of the class, create an algorithm to determine the length of a piece of music

**After:**

- **Promote a mathematical community of learners** Students will use an algorithm to determine the length of the song “Don’t Worry Be Happy”
- **Listen actively without evaluation** record the progress of each group through writing or filming
- **Make connections**
  - For the choir festival in Fort Wayne, I have 20 minutes to perform a group of songs. From a predetermined list of songs (with times known), can I use all for the program? Which ones should I cut? Which songs could be combined to make the longest program possible that is not over 20 minutes?
  - Pretend that you are a DJ at a radio station. You have a 30-minute block of commercial free airtime. Make a playlist from the following songs, get as close to 30 minutes as you can.
  - We are going to sing for 10 minutes straight. Which three songs should I pick?
  - How can you use algorithms to solve other problems in the real world?
  - How can you create your own algorithms to solve other problems?
- **Summarize main ideas** Great songs usually last a particular length of time, about 2 and half to 4 minutes. You can create a song of a certain length by using a mathematical algorithm.

**ASSESSMENT**

**Observe:** Students will show their mathematic thinking for a particular math problem related to time using Google drawing. They will post their work on a personal page from the music class website. I will go to the website to view the work and determine its precision.

**Ask:**

How can you use an algorithm to create a song?

Can you use an algorithm to create an E.P.?