Music with Math (Twinkle Twinkle Little Star) [1]

By Mitchell Rocha

Do you love music? Can you close your eyes and hear a song, or perhaps part of a song that you like? Maybe someone in your family sings or plays a musical instrument. Did you know that every song has Math behind it! Let's explore that idea.

Try these:

Clap four times at a steady pace and count with each clap: 1-2-3-4.

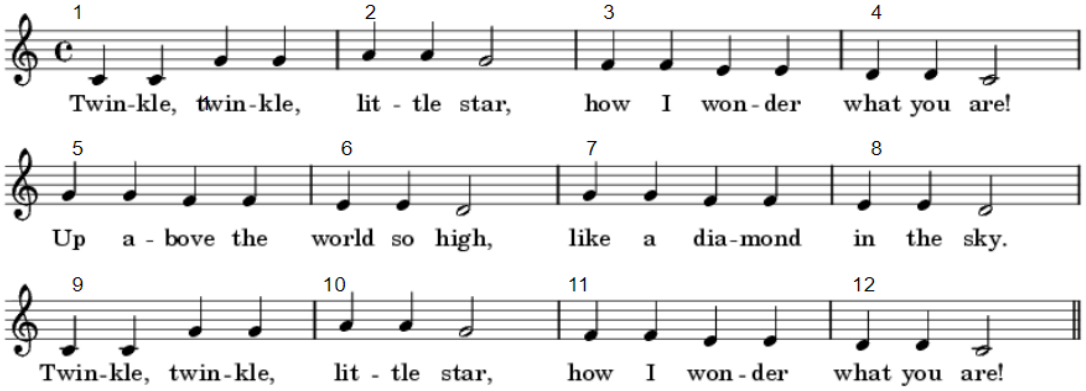
Do this a few times in a row at a steady pace: 1-2-3-4, 1-2-3-4, 1-2-3-4, and so on.

Music has a steady, repeating beat or pulse just as you are clapping with a steady beat. Can you feel the beat in your favorite song? The beat is something you feel – it makes you want to tap your feet or your hands at regular intervals.

Clap again as you did above, but try to go a little bit slower. Then do it but a little bit faster. It is important to NOT go too slow or TOO fast and PLEASE DO NOT lose the steady pace/rhythm. That is so important in music!

Now clap repeatedly at a steady pace again, but without counting, or you can count mentally.

Below is a song you may know: Twinkle, Twinkle little Star. The musical notation and words below are all that is needed for the song to be played by a musician on a piano, on a guitar, or on many other instruments. This is how music is written down and shared with people.



The vertical bars (going up and down) separate the music into measures. The music for this song is separated into measures numbered from 1 to 12. Although this written notation is enough for any musician to play a simple version of this song, almost all of the songs we hear on the radio were created by several musicians playing different instruments at the same time.

[1] Suggested Grades: 5 – 6 Skills: **NM Common Core Standards** Mathematics, Operations and Algebraic Thinking. Write and interpret numerical expressions, **MA.5.1.** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Starting from the left in Measure 1 above, the treble sign 𝄞 indicates that the notes that follow are played with the right hand on the piano. The **C** that follows the treble sign means that there are 4 quarter notes in every measure of this song. A quarter note is shown as a solid note: ♩. Each quarter note takes up one beat. Some measures have 4 quarter notes in them and some do not.

Which of the measures in the song have exactly 4 notes in them that must be played or sang?

Which of the measures in the song do NOT have exactly 4 notes in them that must be played or sang, ie., they contain 3 notes that must be played or sang rather than 4?

The empty notes are shown by 𝅗𝅥 and are called half notes. A half note takes up the time of two quarter notes. So, each half note must be held for TWO beats.

Each measure of this song has 4 beats. If a measure has 4 quarter notes in it, then the musician plays 4 notes. Importantly, every measure has 4 beats so you must clap a very steady 1-2-3-4 for each measure. Let's try it!

Clap four times repeatedly at a steady pace throughout the song as you sing. Do it VERY SLOWLY at first to make it easier. Here are the number of the claps and what you need to sing in the first measure.

Claps:	**1**	**2**	**3**	**4**	
Sing:	**Twin**	**kle**	**twin**	**kle**	**Sing "Twin" on 1st clap and "kle" on 2nd clap.**

Here are the clap numbers and what you need to sing in the second measure. Since the word "star" is associated with a half note, sing "star" and hold onto it until you clap two times. So "star" is drawn out to twice as long as say "Twin". Try it!

Claps:	**1**	**2**	**3**	**4**	
Sing:	**lit**	**tle**	**star**		**Sing "star" over 2 claps.**

Now sing the first 2 measures and clap with a steady beat as you sing.

Next, write the number of the claps and what you need to sing for the 3rd measure:

Claps:
Sing:

Do the same thing for the Measure 12.

Claps:
Sing:

Now, think about the math behind the song. The first measure (Measure 1) must contain 4 beats and it contains 4 quarter notes. Suppose the letter "q" stands for 1 quarter note. Then measure 1 can be shown as 4 quarter notes. We can show this idea in an equation. The left side must

equal the right side in an equation. In this situation, we are talking about the number of beats in Measure 1.

Measure 1 = q + q + q + q

This is a true equation since the 4 beats in Measure 1 equals the four beats associated with each of the 4 quarter notes in Measure 1.

The second measure contains two quarter notes and a half note. If we use the letter "h" to represent a half note, we can write the equation for the second measure as:

Measure 2 = q + q + h

The four beats in Measure 2 equal 2 beats from the 2 quarter notes plus the 2 beats from the half note.

Write an equation for Measure 3. **Measure 3 = _____**

Write an equation for Measure 7. _____

Choose any other measure in the song and write an equation for it. Do you need to tell your teacher which measure you are working on?

Now for something really **fun** which is to create your own song. Below are the blank lines to write music along with a treble clef. Go through these steps slowly and carefully.

1. **Add three vertical lines about 1 ½ or 2 inches apart to set up 3 different measures in your song. (See the song above to see how they did it.)**

2. **Add a C just a little to the right of the treble clef as in the song above to indicate the notes you will be playing (right hand on a piano) as well as 4 beats per measure.**

3. **Add either quarter notes or half notes with the circle part of the note either ON a line, or BETWEEN a line. Look at the song above to see how it is done. For now, do not worry about where you place the notes. Just put them either on a line or between two lines. Do this for all 3 measures. Remember you need 4 beats in each measure.**

4. **Now, make up words to your song and write them below the musical notes.**