Lesson Title: Probability with Mozart	**Big Idea & Learning Objectives** 1. Students will explore the compound probability of rolling each two-dice sum (2-12). 2. Students will create minuets through Mozart's dice game. 3. Students will create tables, tree diagrams, or use the counting principal to determine the number of combinations possible in creating a minuet with this method.
Content Area & Arts Discipline: Math and Music	**Overview of the Lesson** The students will discuss the difference between dependent and independent events. Students will determine the type of event (dependent or independent) rolling dice is classified as. Students will explore the probabilities of rolling different sums with a pair of dice. Students will create minuet's through the use of Mozart's dice game.
Grade Level: 7th Grade	**Procedures** **Engaging Students ("The Hook"):** The teacher will begin a discussion of how and why musicians compose their music. The teacher will play a selection by Wolfgang Amadeus Mozart (recommend: *Minuet and Trio in G, K1*). The teacher will ask students what they feel or think about when hearing the composition and how Mozart was able to evoke those emotions.

Proposed Time Frame: < 3 hours (3 class periods)	**Building Knowledge:** Students will be introduced to the concepts of a minuet and trio. The teacher will have the students listen to Mozart's *Minuet and Trio in G, K1* again and see if they can determine the change between the minuet piece and the trio. The teacher will have the students discuss why they think the change occurred there. Students can be shown the sheet music to this piece. The sheet music can be found at http://www.8notes.com/scores/11824.asp. Students will review the concept of probability and how to find it. Students will review dependent and independent probability. Students will review the steps to finding compound probability. Students will be introduced to the theory of Mozart's Dice Game: Musikalisches Würfelspiel, and how Mozart used the laws of probability to write various minuets.
Date Lesson Created: April 7, 2014	**Modeling the Experience:** The teacher will have the website pulled up for the the class to see and will play a previously programmed minuet from the program. This will allow students to see how many times the dice will need to be rolled and where to input information.
Lesson Author: Shasta Long -classroom teacher	**Guided Practice:** The teacher will work with students to list the possibilities of summing two dice (1 + 1, 1 + 2, 2 + 1, etc.). The teacher will work with students to determine the probability of each sum. The teacher will list the possibilities with each sum creating a bar graph that develops into a "bell curve." The teacher will allow students to discuss how the bell curve is used to determine where the majority of information will fall. The teacher will then re-introduce the website needed to create a minuet using Mozart's Dice Game. It is advised that the students write their sums on a piece of paper in order of occurrence because of time running out in class.
	Applying Understanding: Students will create and present compositions that were completed using Mozart's probability and the accompanying website (http://sunsite.univie.ac.at/Mozart/dice/).

Room Requirements & Arrangement:	Opportunities for Reflection (Closing):
classroom -students seated alone or with one partner	•Students will discuss why a musician might choose the unpredictability of rolling dice and the laws of probability in composing music. •Students will present compositions to the class. With their presentation, students will discuss the type of feelings or moods that their composition evokes in them. •Students will be a proper audience for classmates.
Material Equipment: •computer/laptop •paper (handouts) •pencil	**Assessing the Learning:** •Students will list all the possible outcomes of two dice and will determine the probability of each. •Students will discuss how the possible outcomes of the two dice resemble the "bell curve" and how it can be used to predict outcomes. •The teacher will observe students as they use dice and a website to create compositions. •Students can generate the score made through the website and transfer it by hand to sheet music and identify which measure belongs to each dice sum. •The students will also be graded on their participation in the audience.

Resources:	Standards & Principles
•Mozart's Musikalisches Würfelspiel website http://sunsite.univie.ac.at/Mozart/dice/ •https://www.teachervision.com/math/resource/5986.html?for_printing=1 •http://www.8notes.com/scores/11824.asp	**Common Core State Standards:** **7.SP.5 Statistics and Probability** Standard: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **7.SP.8 Statistics and Probability** Standard: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **Arts Standards:** **Music: Middle Level III** **2 - Compose and/or improvise vocal and/or instrumental music examples using major and minor scales, standard and syncopated rhythms, and written music notation. (CP)** **c.** Compose short original music selections employing melodies and rhythms using manuscript, instruments, or technology (e.g., MIDI, notation software, or sequencing software). **4 - Recognize the technical proficiency and expressive nature of successful performers and performances. (CA)** **a.** Identify characteristics that produce quality music performance. **7 - Describe aesthetic qualities in music from various cultures, times, and places. (A)** **a.** Describe and/or demonstrate the way elements of music evoke or represent moods or feelings. **8 - Describe common elements shared among music, the other arts, and other subjects. (C)** **c.** Recognize mathematical properties of music and music business.

| **Vocabulary (math):**

•compound events
•dependent events
•independent events
•probability

Vocabulary (music):

•compose
•composition
•measure
•minuet
•trio | **Principles of Universal Design for Learning**:

I. Provide Multiple Means of Representation
   1: Provide options for perception
     1.2 Offer alternatives for auditory information
   2: Provide options for language, mathematical expressions, and symbols
     2.1 Clarify vocabulary and symbols
   3: Provide options for comprehension
     3.1 Activate or supply background knowledge
     3.2 Highlight patterns, critical features, big ideas, and relationships
     3.4 Maximize transfer and generalization

II. Provide Multiple Means of Action and Expression
   4: Provide options for physical action
     4.2 Optimize access to tools and assistive technologies
   5: Provide options for expression and communication
     5.1 Use multiple media for communication

III. Provide Multiple means of engagement
   7: Provide options for recruiting interest
     7.3 Minimize threats and distractions
   8: Provide options for sustaining effort and persistence
     8.1 Heighten salience of goals and objectives
   9: Provide options for self-regulation
     9.1 Provide expectations and beliefs that optimize motivation |
| | **<u>Appendix</u>**

Extended Learning Activities:

•Students will research the sheet music to the different measures used to create their minuets and write their own sheet music -- this can be created on the website used for the dice game, but have students create the sheet music on their own staff paper

•Students will determine the number of combinations possible for creating a minuet of a specific number of measures.

TIPS/FAQs:

•Allow students to choose if they want to work alone or with a partner.

References:
•Mozart's Musikalisches Würfelspiel website http://sunsite.univie.ac.at/Mozart/dice/

•https://www.teachervision.com/math/resource/5986.html?for_printing=1

•http://www.8notes.com/scores/11824.asp |

Name _____ Date _____

Dice Combinations to Create Each Sum

2	3	4	5	6	7	8	9	10	11	12

Theoretical Probability of Each Sum

2 _____   6 _____   10 _____

3 _____   7 _____   11 _____

4 _____   8 _____   12 _____

5 _____   9 _____

Mozart's Probability Rolls

Minuet

Roll	Sum
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Trio

Roll	Sum
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	