
Thank you for choosing to participate in the 2019/20 Margre Durham Concerts for Youth production. We applaud and appreciate your decision to engage your students in this exciting musical experience with the Omaha Symphony.

We hope this packet will serve as a resource as you and your students prepare for the concert. The packet is divided into sections covering each facet of the concert program. Each video resource can be presented separately, or entire segments can be explored at once. Most segments are about 20 minutes’ worth of material. Each segment contains links to video clips selected to motivate students to make connections between math and the arts.

Really short on time? Watch the first video in the each of the first 3 segments, and then focus on the entirety of segments 5 & 6 exploring the orchestra, concert etiquette, and the concert hall.

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Concert Overview

Working with the conductor and a host, students will explore all the places fractions and ratios appear in music. Concepts will be introduced through the explosive sounds of Tchaikovsky and Holst, the cool tunes of Bernstein, and the timeless themes of Britten.

This concert has been designed to provide your students with an integrated curriculum experience, addressing learning in both music and math. Throughout the concert, your students will be asked to compete in a fun and fast-paced game show.

Preparing for the Concert - Segment Teaching Sequence

Segment 1 – Octaves & Ratios

- **The Science Behind the Arts:** The Math Behind Music (4 min)
  - This video is a great introduction to all the concepts in the concert from the Santa Fe Institute.
- **Music + Math:** Ratios (5 min)
  - This video explores ratios through PVC instruments and the piano from the Sante Fe Institute.
- **The Golden Ratio** (10 min)
  - The irrational number Phi, and the Fibonacci sequence, exists in nature, in art, and in music as this PBS “It’s OK to be Smart” episode.
- **Guitar Frets** image
  - This image illustrates the math behind the placements of the frets on a guitar.

Segment 2 – Time Signatures

- **Time Signatures Explained** (3 min)
  - This video is a simple introduction to time signatures.
- **Conducting in 4/4 Time** (7 min)
  - This video explains the 4/4 conducting pattern. In addition to the video, this link contains the visual guide of the pattern.
- **Conducting in 3/4 Time** (4 min)
  - The 3/4 video is below the 4/4 video.
- **Conducting in 2/2 and 6/8 time** (4 min)
  - The 2/2 and 6/8 video is below the 4/4 video.
Segment 3 – Fractions & Meter

- **Ancient Math and Music** (6 min)
  - This PBS video features jazz bassist Esperanza Spalding demonstrates common ratios in music.
  - This resource comes with an activity and discussion questions.

- **Ratios and Fractions** (4 min)
  - A PBS clip from the Center for Asian American Media, this video also comes with activities and other support materials.
  - Have time to dive in deeper? Jake Shimabukuro also has great videos on frequencies and inverse relationships, which you can access through this link.

- **Dividing Fractions Rap** (3 min.)
  - Animated song about dividing fractions “Keep, Change, Flip”
  - This PBS clip also comes with additional activities and support materials

- **Cyberchase Introduction to Fractions** (2 min)
  - A great resource for younger students, or to reinforce basic fraction concepts, this video comes with additional support materials. Similar clips introducing fractions appear on the right hand side of the link.

- **Music Composed to the Fibonacci Sequence** (3 min)
  - This video scores instrument entrances according to the Fibonacci Sequence.

- **Time Signature Worksheet**
  - This activity allows students to explore how rhythm is expressed as a fraction

- **Not Just Numbers: frequency/ratios** (3 min)
  - Maestro demonstrates how math is pattern and sound is vibration.

- **Music + Math: Symmetry** (8 min)
  - A continuation of the “Not Just Numbers” conversation, Maestro goes deeper into patterns, fractals, and fugues.

- **Koch Snowflake, Fractal Activity**
  - Printable worksheet with the equilateral triangle grid marked
Segment 4 – Selections from the Concert

- **Candide Overture** (5 min)
  - One of Bernstein’s most often played overtures, *Candide* was a project that was worked on in earnest in 1956, the same time he wrote *West Side Story*. Both featured on the concert, these works are a stunning example to Bernstein’s versatility as a composer.

- **“Cool” Westside Story** (4 min)
  - Broadway cast performs “Cool” on the Ed Sullivan show.

- **“Mars”** (7 min)
  - A BBC recording of the movement written about the God of War in Gustav Holst’s *The Planets Suite*

- **“Stars and Stripes Forever”** (5 min)
  - The US Marine Band explains and plays Sousa’s most famous march

Segment 5 – The Orchestra & Conductor

- **PROJECT SYMPHONY WEBISODE EP1 (4 min.)**
  - Quick review of the families of a symphony orchestra and the acoustics of a concert hall.

- **“What Does a Conductor Do?”** (6:35)

Segment 6 – Concert Etiquette and the Amazing Hall

- **A short guide to concert etiquette...learn how to attend concerts like a pro!**
  - This 4-minute video will appeal to Middle School Age with demos of what not to do. Discuss behavior expectations and procedures.

- Information about the Holland Center
  - [https://www.omahaperformingarts.org/our-venues/holland](https://www.omahaperformingarts.org/our-venues/holland)
  - [Omaha Performing Arts Celebrates 5 Years of the Holland Center](https://www.omahaperformingarts.org/our-venues/holland)
    - Video discussing the beginnings & construction of the Holland Center

Education Standards

- **Overview of Educational Standards & Objectives to be Addressed:**
  - Nebraska Standards for Education, Music: FA 5.4.3, FA 8.4.3
  - Nebraska Standards for Education, Math: MA 4.1, 4.4.1, MA 4.4.2, MA 5.5.1, MA 5.1.2
  - Iowa Core Alignment, Music: 5, 7
  - Iowa Core Alignment, Math: 5.NF.A, 5.NF.B, 5.MD.B
• Nebraska Music Education Standards:
  - FA 5.4.3: Students will identify and describe elements of music to discern how music is appropriate for specific purposes/settings (intent of music).
  - FA 8.4.3: Students will examine and evaluate elements of music (glossary) to explain how music conveys mood or context (effect of music).

• Nebraska Math Standards:
  - MA 4.1 & MA 5.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.
  - MA 4.4.1: Represent data using line plots where the horizontal scale is marked off in appropriate units (e.g. whole numbers, halves, quarters, or eighths.)
  - MA 4.4.2: Solve problems involving addition or subtraction of fractions using information presented in line plots.
  - MA 5.1.2: Students will demonstrate the meaning of operations and compute accurately with whole numbers, fractions, and decimals.

• Iowa Core Alignment, Music:
  - 5. Listens, responds, describes, analyzes and evaluates music critically.
    o Identifies specified musical concepts while listening to the music
    o Listens discriminately and makes informed musical judgments while accepting that the aesthetic response is unique to all individuals
    o Uses appropriate vocabulary, media, tools, and processes required to evaluate music
  - 7. Connects music with other disciplines while preserving the integrity of authentic musical learning experiences demonstrates knowledge of technology in the area of music.
    o Identifies musical concepts through computer assisted instruction
    o Communicates ways that music can be integrated into the life of an adult or community

• Iowa Core Alignment, Math:
  - 5.NF.A Use equivalent fractions as a strategy to add and subtract fractions
  - 5.NF.B Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
  - 5.MD.B Represent and interpret data. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8.)