

Minnesota Sinfonia: 2024/2025 Music in the Schools

Introducing the Orchestra - the Science Behind the Sound

Teacher's Guide

Dear Teachers,

I am excited to work with you this year and present **Introducing the Orchestra- the Science Behind the Sound**, the Minnesota Sinfonia's Music in the Schools offering for 2024/25.

This year's program focuses on "the science of the sounds created by the orchestra"—how we as musicians produce the lovely sounds you hear in the audience. *Introducing the Orchestra* relates our music making to the core subject of science. This curriculum guide was created using Minnesota state academic science standards for grade levels K-8 and includes age-appropriate activities to help meet those standards.

Music to be performed will be selected from:

- Ludwig van Beethoven – *Symphony No. 5, first movement*
- Samuel Coleridge Taylor – *Novelletten No. 1*
- Peter Tchaikovsky – *Pizzicato* opening from the third movement of *Symphony No. 4*
- Erik Satie - *Gymnopedies*
- Jay Fishman– *The Text Messenger Fanfare*
- Angel Villoldo– *Yunta Bravo Tango*
- Antonin Dvorak – *Slavonic Dance op. 46, #7*
- Paul Schulz – *Makin' Music Together*
- Jay and Bernard Fishman – *The Field Trip*
- Scott Joplin – *Fig Leaf Rag*

Songs for students to sing:

- *The More We Get Together*
- *The Orchestra Song*

Sinfonia will play excerpts from the the Beethoven and Tchaikovsky symphonies, the Satie Gymnopedies, and complete renditions of the other works on this program. YouTube links for full performances of the Satie, Beethoven and Tchaikovsky symphony movements and for the other orchestral works to be performed are listed under their titles below. Unfortunately, there are no recordings for *Making Music Together*, *The Text Messenger Fanfare* and *The Field Trip*. **Please make sure to play some of the music daily**, so your students become very familiar with the music.

Music for student choirs to sing, orchestras to play: *The More We Get Together* and *The Orchestra Song*. These are songs that your school choir will perform on concert day with Sinfonia. For the schools without choirs, students in one or two grades can/should serve as the choir. Included in this guide are downloads for simple accompaniments for teachers who can play piano, and for those who do not, there are links for computer-generated accompaniments. For school orchestras, a conductor's score and parts can be downloaded for *All Strings Attached*, which also will be played with Sinfonia musicians on concert day. Depending on the proficiency level of the players, parts for advanced and less advanced students are included.

Sinfonia Needs for the Concert Day

- 32 straight back (folding chairs)
- 1 speaking pa system for Jay to talk to the students
- Choral risers (optional) for the student choirs
- 22 music stands for the Sinfonia's use (if available)
- For morning performances – please good strong coffee and treats.....

All the materials for this program can be found on the Sinfonia's website:

<https://www.mnsinfonia.org/education/music-in-the-schools>

If at any time you have questions about the curriculum, the music, or how to get started with the activities, please call or e-mail me, and I will be happy to help you. My cell is 614-440-7661 and my personal email jfishmanmusic@gmail.com

Thank you
Jay Fishman,
Minnesota Sinfonia Artistic Director

Concert Day Activities

Musician Visits. Prior to the Sinfonia performance(s), one or two students from each classroom should come to the gym/auditorium to escort a musician back to their classroom for a 10–15-minute visit. Normally we can send 20-22 musicians to the classrooms. During this time the students can ask questions and get to know their musician.

Concerts. After the classroom visits, the orchestra will perform two times—once for each half of the student body. If possible, please group the students by age, with the younger students in one group and older students in the second.

Choir/Orchestra Rehearsal. During the classroom visits, choir members should report to the gym/auditorium to rehearse for the concert. Mr. Fishman and a few Sinfonia musicians will rehearse with them prior to the assemblies. For schools with a string orchestra program, string students should also report to the performance space during classroom visits, so they can rehearse with Mr. Fishman and the Sinfonia string players. In this case, just 7-8 Sinfonia wind players will do the classroom visits.

Evaluations. During the concert, please remember to keep notes on the reactions of your students for the follow-up evaluation. Gather feedback from them after the concert as well.

Science standards:

Grade K

1. Some objects occur in nature; others have been designed and processed by people. Objects can be described in terms of materials they are made of and their physical properties.

Activities:

Using the pictures (sent separately as color pictures), distinguish instruments made of wood (nature) – violins, violas, cellos, basses, oboes, clarinets and bassoon, and those made of brass (manmade) trumpets and French Horns. Then sort by colors:

- Violins, violas, cellos and bass are reddish brown.
- Flute is silver.
- Oboes and clarinets are black.
- Bassoon is reddish brown.
- Trumpet and French Horns are gold.

Then sort by shapes -strings are all curvy, woodwinds are all straight, and brass are all twisted and wrapped around.

Grade I

1. Scientists work as individuals and in groups to investigate the natural world, emphasizing evidence and communicating with others.

Activity:

Experiment: Fill three glass small neck bottles with different levels water. Blow into each of them to create sound. How is the sound made? Which bottle has the higher sound – the one with more or less water?

Second part of the experiment. Blow into two different sized penny whistles. Which whistle makes the higher sound – the smaller or larger whistle?

From these 2 experiments, determine what causes the sounds. Is it the water in the bottles, or the air in the bottles? Is it the size of the penny whistle, and how does the size affect the sound?

Transfer this information to the instruments. Would you expect the violin to produce a higher or lower sound than the cello and why?

Grade 2

1. Objects can be described in terms of materials they are made of and their physical properties.

Activity:

Start with the same experiment as for grade one, then put different food coloring in each of the bottles. Does the color affect the sound in the bottles? From this, would you expect the color of the string instruments to affect the sound? Ask the same question about the winds, and brass.

Note the different materials that the instruments are made of – the strings wood, the winds, wood, the brass, brass.

Activity:

Take two bowls of water. Fill them both halfway with dark colored water. Put a popsicle stick in one, and a metal soup can without the label in the other. Let them soak for a day. Take out the popsicle stick and note that it changed color. What happened to the soup can? Why would the wood absorb the colored water, and the can does not? The wood is not as dense, and the can is very dense.

Transferring this information to our instruments, how does the wood of violins make the sound different from the brass of the trumpet? The wood of the violin, like the wood of the popsicle stick is porous (less dense), and just like the popsicle stick absorbs some of the water (which in this case would be like the wind) the violin absorbs some of the sound as it reverberates around in the belly of the violin. When the sound comes out of the violin, we hear influence of the wood, just like we see the influence of the colored water on the popsicle stick

Brass on the other hand is much denser, and like the metal soup can, does not absorb sound (water for the can). Hence, the air that is blown into the trumpet is not get absorbed by the brass, and it simply bounces around, causing the brass to vibrate, and producing the “brassy” sound.

Grade 3

1. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

Activity:

Observe that when a science investigation is done the way it was done at an earlier time, or even in a different place, a similar result is expected.

Repeat the experiments above, using different colors for the water, and different amounts of water in the bottles. Keep a log of the different observations and come up with good explanations to the changes and the non-changes.

Grade 4

1. Identify and investigate a design solution and describe how it was used to solve an everyday problem.

Activity:

Can you make an instrument from everyday materials? Find different size metal cans, metal lids to cans, etc. Also, find plastic cans, etc. Suspend (hang) the “instruments” and then strike them with a drumstick or some other object - a non-lethal club. Note the changes in pitch. Why? Is the difference caused by the size of the “instrument,” or its composition?

Grade 5

1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.

Activity:

Do the same experiment as grade 4 but do an in-depth analysis as to what and why. Use other materials, and compare sizes of the instruments, versus the materials. Use the same size instruments made from the same materials, but different thicknesses.

Grade 6

1. Forces have magnitude and direction and govern the motion of objects.

Activity:

Stretch a good rubber band and pluck it. Note that you can see it vibrate. Stretch it more and pluck again. Note that the pitch gets higher. Why? Now think of a violin, versus a cello. Violin strings are thinner and shorter than cello strings. They are stretched tighter, yielding a higher pitch. The cello strings are thicker and longer - they will vibrate more slowly than the violin strings.

Grade 7

2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.

Activity:

Take the activity of Grade 6, and instead of using a rubber band, find other types of “strings,” and investigate what kind of (if any sounds) can be created, heard, and if yes, why and if not, why not?

Grade 8

1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.

Note that the standards for several of the grades are similar, and that as the students get older, the analysis and experiments they undertake, even if they start from the same place, must be done with a broader and more encompassing scope.

Introduction:

Sound can be defined as vibrations of energy that travel through the air or water and can be heard by people and animals. Sounds have different qualities, depending on what creates them. For instance, basketballs bouncing, dogs barking, car tires screeching and people speaking (or screaming) are all different because of their sources. Similarly, musical instruments sound the way they do because of what they are made from, and how the vibrations are created. For the woodwinds (aside from the flute, they are all made of wood), musicians blow into their instruments (some use reeds), the breath (air waves) bounce inside the instrument very quickly which then creates the notes. A good example is when the orchestra tunes, the oboist plays an “A” which vibrates the air at 440 times per second!

Brass instruments (trumpets, French horns, trombones, etc.) have a different physical make-up, but the process is the same. The musicians use mouthpieces and buzz (instead of blows) into the instrument, the air bounces around, etc.

For string instruments (violins, violas, cellos and basses), instead of blowing, the musicians either pluck or pull a bow over the strings, which makes the strings vibrate and creates the sound.

I will explain the above with demonstrations in the program.

The concert program Full Orchestra first:

• Ludwig van Beethoven (1770-1827) – *Symphony No. 5, movement 1*

YouTube link: <https://www.google.com/search?client=safari&rls=en&q=Beethoven+symphony+no.+5+movement+I+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:c8663b55,vid:W2qW6fOtAMY,st:0>

<https://www.google.com/search?client=safari&rls=en&q=Beethoven+symphony+no.+5+movement+I+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:c8663b55,vid:W2qW6fOtAMY,st:0>

- Born 1770 in Bonn, Germany and died 1827 in Vienna, Austria
- He lost his hearing at an early age, and still composed some of the most famous music of all time.
- His music has been performed at some of the most important political and historical events in the world, including the fall of the Berlin Wall and President John F. Kennedy's funeral.
- He believed in making the world a better place. He expressed these beliefs in two of his most important works: the third and ninth symphonies. Beethoven dedicated his Third Symphony to Napoleon who promised democratic reform. But when Napoleon declared himself a dictator, Beethoven was so distraught that he destroyed the dedication!
- The Fifth Symphony is one of Beethoven's most famous works. It was composed in the key of c minor, which is the key of drama and pathos.
- The theme of the first movement is only four notes, but very like the four most famous notes in the entire. Orchestral repertoire.

Strings: violins, violas, cellos and basses

- These instruments have strings that vibrate to create their sounds.
- Sounds can be generated by plucking the strings (pizzicato), or by drawing the bow across the strings.
- The bows are made of wood and horse tail hair. The hair has little barbs on them that grab the string, hence making the strings vibrate.
- Rosin (the same thing that baseball pitchers use to better their grip on the ball) is placed on the bow hair to make it stickier, thus allowing it to “grab” the strings better.
- The smaller the instruments (violins), have shorter the strings, hence these instruments sound higher.
- The larger the instruments (cellos and basses), have longer the strings, hence they sound lower.

String orchestra, using the bow

Samuel Coleridge Taylor (1875-1912) – *Novelletten No. 1*

YouTube link:

<https://www.google.com/search?client=safari&rls=en&q=coleridge+taylor+novelletten+No.+1+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:986f6fa2,vid:3KeRdybk22E,st:0>

- English biracial composer, whose father was an African (black) doctor, and his mother was English and white.
- He was named after the famous English poet, Samuel Taylor Coleridge.
- Harmonically and melodically, his musical output was very typical of English music of the time – it had no relationship to his black heritage, until....
- In 1873 the Fisk Jubilee Singers toured England, and Samuel was introduced to black American spirituals. He became fascinated with the genre and incorporated some of them into his work.
- He toured America, and while there he conducted the Marine band and met Booker T. Washington and President Theodore Roosevelt.

Pizzicato [plucking]

Peter Tchaikovsky (1840 – 1893) - *Symphony No. 4, Third Movement*

YouTube link:

<https://www.google.com/search?client=safari&rls=en&q=tchaikovsky+symphony%234+movement+3+YouTube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:029741d3,vid:e90IXc4gaII,st:0>

- Russian composer who is considered to be one of the greatest “romantic” (lush beautiful melodies) and nationalistic (incorporated some of his native folk songs and harmonies in his music) composers.
- Famous for symphonies, concertos chamber music, music that tells stories including

Fantasy Overture on Romeo and Juliet, and the ballets *The Nutcracker* and *Sleeping Beauty* (used by Walt Disney in an excellent full length animated film).

- His Fourth Symphony is now considered to be the first of his most popular symphonies.
- In the opening section of the Fourth Symphony's third movement, the strings are plucked with the right hand (pizzicato), instead of using the bow.

Wind Instruments: Woodwinds

- Woodwind instruments are all made from wood (the flute is now silver but used to be wood) and have different widths and lengths, all which define their individual sounds.
- All wind players blow into the instruments, which makes the air vibrate inside the instruments to create the sound.
- All woodwind instruments have holes in their shafts that can be covered by keys. Pitch is controlled by pressing down or lifting the keys, thereby covering or uncovering the holes. The pitches are defined by how far the air travels before escaping via the uncovered holes. The longer the journey, the lower the pitch.
- Oboes, clarinets, saxophones and bassoons all use reeds – pieces of cane that are specially shaped so that they can be placed into the mouth. The player then blows into the reed, which makes the reed vibrate, after which the air proceeds into the shafts.

Erik Satie (1884 – 1925) *Gymnopedies*

YouTube link:

<https://www.youtube.com/watch?v=S-Xm7s9eGxU>

- French composer and pianist who was known for his eccentricities and original musical style.
- His compositional style influenced many young composers, six of whom became known as *Les Six* (the six).
- Famous composers who also were influenced by his work included Claude Debussy, Maurice Ravel and Francis Poulenc.
- Most of his musical output was for piano, and many of those works have been arranged for a variety of instrumental combinations, including the first of the three *Gymnopedies*, which conductor Jay Fishman arranged for this program.
- *Gymnopedies* is defined as a religious choral dance originally performed at Greek Festivals.

Wind Instruments: Brass

- Brass instruments are made from brass, which defines the sound.
- Brass instruments are long pipes that are wrapped up so they can be easily managed – the longer the pipe, the lower the sound.
- Trumpets are shorter (4 feet) in length than French horns (8 feet), which in turn are shorter in length than tubas.
- Musicians buzz [blow] into special mouthpieces that are connected to the body of the instruments. Pressing or lifting valves that are attached to the body (pipe) determines how much air is allowed to circulate thereby creating the pitch. The more air that is circulated, the lower the note will sound.

Jay Fishman (born 1947)

- Conductor, composer and arranger was born and raised on the north side of Minneapolis.
- Founded the Minnesota Sinfonia in 1989 with the expressed purpose of serving audiences with limited financial means and inner-city children.
- Created the Sinfonia's Music in the Schools that works with 18-22 public schools and up to 10,000 children every year.
- As a composer and arranger, he has published nearly 300 works which include original compositions and arrangements for small orchestra.
- The *Text-messenger Fanfare* is a short excerpt from *Cinderella Updated!* which is one of many stories that he and his son Bernie created for Sinfonia's Music in the Schools.

Percussion:

- Percussion players tap, hit and strike a variety of objects (instruments) that have different compositions (some are metal, some have coverings, other are wood, etc.) to create a wide range of sounds.

Chamber Orchestra

- The Chamber Orchestra is smaller than a symphony orchestra – generally 18-30 musicians, versus 55-100 for a Symphony.
- The Chamber Orchestra has fewer types of instruments than the symphony orchestra. It generally does not have trombones, tubas, etc.
- Most of the music for chamber orchestra was composed in the 17th and 18th centuries, with some (more romantic) in the 19th and a bit more in the 20th and 21st centuries.
- Because of the small size of the Chamber Orchestra, its sound is small(er), when compared to that of the larger symphony orchestra.

Angel Villoldo (1861-1919)– *Yunta Bravo Tango*

YouTube link: <https://www.google.com/search?client=safari&rls=en&q=yunta+brava+tango+villoldo+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:488d33f4,vid:ZaisxqwzP1c,st:0>

- Argentinian musician who was one of the creators of tango music.
- He played the guitar and harmonica in cafes and bars, and when performing he often told stories to accompany his music.
- In 1889 he published a compilation of Creole folk songs, and in 1916 he published a set of Argentine Popular Songs which celebrated the 100-year anniversary of the Argentine Declaration of Independence.
- He wrote a modern (new) method of learning guitar with symbols which was published in 1917.
- He created many unusual names for his tangos including *Pineral* [a cocktail], *El Persequido* [the persecuted], *La Ley del Barrio* [the law of the neighborhood] and *Yunta Brava* [Excellent girlfriend/wife]

Yunta Brava

- The *Yunta Brava* is a tango (dance) that was arranged for the Sinfonia by Jay Fishman.
- This piece and most tangos have a very distinctive rhythmic pattern in the accompaniment – a long note (dotted eighth note), a short note (sixteenth note) followed by two medium notes (eighth notes)
- The tango dance is filled with aggressive movements, acting out despair and difficult relationships. It was considered indecent for proper society.

Symphony Orchestra Music (but arranged for the Sinfonia' size)

Antonin Dvorak (1841-1904) – *Slavonic Dance No. 7*

YouTube link: [https://www.google.com/search?](https://www.google.com/search?client=safari&rls=en&q=slavonic+dance+%237+outube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:4c85f859,vid:4poPlPxzO9E,st:0)

[client=safari&rls=en&q=slavonic+dance+%237+outube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:4c85f859,vid:4poPlPxzO9E,st:0](https://www.google.com/search?client=safari&rls=en&q=slavonic+dance+%237+outube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:4c85f859,vid:4poPlPxzO9E,st:0)

- Czech romantic and nationalist composer who remains one of the most popular composers of his generation.
- Incorporated Czech harmonies, rhythms and music forms in his music.
- Created some of the loveliest, sing-able music in the entire romantic repertoire.

Slavonic Dance No. 7

- Originally, the Slavonic Dances were composed for piano four hands - two pianists sitting on the same bench, and playing on the same piano.
- The dances became so popular that Dvorak orchestrated them for full orchestra.
- The full orchestra versions became so popular that they have since been arranged for many instrumental combinations, including for Chamber Orchestra.
- Dvorak incorporated many of his native (Czech) harmonies and folk rhythms into his music, giving it a unique character and sound.
- Dance number 7 is a *skocna*, which is a leaping dance.

Scott Joplin (between 1867/68 – 1917) – *Fig Leaf Rag*

YouTube link: [https://www.google.com/search?](https://www.google.com/search?client=safari&rls=en&q=Scott+Joplin+Fig+Leaf+Rag+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:df167455,vid:WHNIHqiG PM,st:0)

[client=safari&rls=en&q=Scott+Joplin+Fig+Leaf+Rag+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:df167455,vid:WHNIHqiG PM,st:0](https://www.google.com/search?client=safari&rls=en&q=Scott+Joplin+Fig+Leaf+Rag+youtube&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:df167455,vid:WHNIHqiG PM,st:0)

- African American composer known mostly for his piano music and composing in the style of “ragtime.”
- Most of his rags were composed in a form like the march but were distinguished by a constant syncopated rhythmic pattern (also to be found in jazz).
- The title *ragtime* is short for the “ragged rhythm” just described.
- Joplin was very fond trees and flowers and named many of his rags for flowers and plants (Maple Reaf, Fig Leaf, Rose Leaf, etc.).
- Rag time was very popular in the early part of the 20th century.

Bernie Fishman (b. 1982)

- Started learning piano at age 5.
- At age sixteen started collecting vinyl records of hip hop and jazz and studying psychology.
- In his twenties he started writing children's stories to be set to music for Sinfonia, and to date has authored and published contemporary versions or *Cinderella Updated! The Ugly Duckling*, new stories such as *The Life and Times of Benjamin Franklin*, *Bears*, *The Field Trip* (heard in this program) and several others.
- Now lives in San Diego, CA where he owns Beat Box Records, DJ's and creates CD's.

The Field Trip is a story set way into the future, where school children take a field trip back a couple of thousand years (to our time) which as luck would have it, gets all fouled up, and becomes a fun, entertaining and educational adventure.