

A MUSIC - SCIENCE CONNECTION

(Instruments of the Orchestra)

Grade Level or Special Area: Music (Grade 3)

Written by: Lois R. Sandberg, John C. Diehl Elementary School, Erie, PA

Length of Unit: 6 lessons

I. ABSTRACT

This unit will review and introduce the families of musical instruments. We will review and increase our knowledge of the string and percussion families previously introduced in Grades 1 and 2. Students will be introduced to the woodwind and brass families of instruments. We will link this to the study of sound found in the science area of the Grade 3 sequence. Through listening, viewing, singing, experimentation and the creation of their own instruments, students will make the connection of music and the science of sound.

II. OVERVIEW

A. Concept Objectives:

1. The students will review the string and percussion instruments previously presented in Grades 1 and 2.
2. The students will become familiar with the brass and woodwind families.
3. The students will identify by sight and sound the different instruments of the four families.
4. The students will understand how sound is produced, and the qualities of sound such as pitch and intensity.
5. The students will respond to the music-science connection by making their own musical instruments.

B. Content:

1. Review the families of instruments: strings and percussion.
2. Become familiar with brass instruments - trumpet, French horn, trombone, and the tuba.
3. Become familiar with woodwind instruments - flute and piccolo (no reeds), clarinet, oboe and bassoon (with reeds).
4. Discover through experimentation and observation that sound is caused by an object vibrating rapidly.
5. Discover through experimentation and observation the qualities of sound: pitch and intensity.

C. Skill Objectives:

1. Identify by sight and sound the instruments of the orchestra.
2. Understand how the instruments are divided into families.
3. Discover how the sound is produced on the different instruments and how and why the sound changes from one instrument to the next.
4. Experiment to discover how to change the pitch and intensity of sound.
5. Each student will respond to what they have learned by creating an instrument to play in an "orchestra".

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. Levine, Robert, *The Story of the Orchestra*. New York: Black Dog & Leventhal Publishers, 2001. ISBN: 1-57912-148-9.
2. O'Brien, Eileen, *The Usborne Introduction to Music* (Internet-linked). Tulsa: EDC Publishing, Co., 2000. ISBN: 0-7460-3769-4.

3. Randolph, David, *A Demonstration of the Instruments of the Orchestra*. New York: Vanguard Classics, 1996. (2 CDs and Booklet)
- B. For Students
1. Names of the orchestral instrument families.
 2. Knowledge of the string instrument family.
 3. Knowledge of the percussion instrument family

IV. RESOURCES

- A. Various music examples, CD and tape player
- B. Posters of instrument families
- C. Posters of individual instruments
- D. Printed copies of ‘Meet the Symphony’ Rap
- E. Orchestra section puzzle
- F. Available instruments
- G. Appendix A-B

V. LESSONS

Lesson One: REVIEW OF INSTRUMENTS

- A. *Daily Objectives*
1. Concept Objectives
 - a. The students will review the names of the orchestral instrument families as learned in grade 1 and 2.
 - b. The students will identify by sight and sound the orchestral instruments of the string family.
 - c. The students will understand how sound is produced.
 2. Lesson Content
 - a. Review the string orchestral instruments.
 - b. Discover through experimentation and observation that sound is produced when an object vibrates rapidly.
 3. Skill Objectives
 - a. Identify by sight and sound the string orchestral instruments.
 - b. Discover how sound is produced.
 - c. Experiment to discover how to change the pitch of sound.
- B. *Materials*
1. Posters of the instrument families
 2. Posters of the individual string orchestral instruments
 3. CD or tape player
 4. The string section of the orchestra section puzzle (from Appendix A)
 5. On bulletin board - outline of orchestra onto which the section puzzle pieces will be placed as we study each family
 6. Several sizes of rubber bands
 7. Ruler
 8. Available string instruments with bows
 9. Recorded examples: “Carnival of the Animals” by C. Saint-Saens: “The Swan” (cello) and “The Elephants” (string bass) movements, and “The Four Seasons” by Vivaldi, 1st movement
- C. *Key Vocabulary*
1. Family - how musical instruments are grouped together
 2. String family (violin, viola, cello, string bass) - instruments that use strings to produce sound

3. Bow - a wooden rod with horsehair stretched from end to end that is used to play a string instrument
 4. Pizzicato - plucking the string with a finger
 5. Vibration - moving back and forth rapidly
 6. Pitch - indicates highness or lowness of sound
 7. Rosin - a resin substance that is used on the bow so the bow hair slightly sticks to the string to vibrate it
 8. High pitch - sound made by a smaller, shorter, or thinner instrument (string)
 9. Low pitch - sound made by a larger, longer, or thicker instrument(string)
- D. *Procedures/Activities*
1. Display pictures of instrumental families.
 2. Review what an “instrument family” is (from grades 1 and 2).
 3. Review string orchestral instruments (from grade 2) using pictures and/or available instruments.
 4. Demonstrate a high sound and a low sound by using a violin and a cello.
 5. Explain that the string bass is the largest instrument in the string family
 6. Which instrument produces the highest and lowest sounds? Why? (violin, smallest; string bass, largest)
 7. What changes occur to cause the pitch to change? (make the string shorter for a higher pitch)
 8. Demonstrate two ways to play the string instruments (bowing and pizzicato).
 9. Demonstrate vibration by placing the ruler half on/half off a table edge. Push the free end down and watch it vibrate.
 10. Using the larger rubber band: Stretch the larger rubber band so that when you pluck it all can see the vibrating of it. Listen to the sound.
 11. Stretch the smaller rubber band and pluck it. Listen to the sound. (higher sound than the larger rubber band)
 12. How does the sound get to our ears? (it moves, or vibrates through the air)
 13. Place the string section puzzle piece on the orchestra outline and explain to students that the whole orchestra will be filled in as we study each family of the orchestral instruments.
 14. Listen to: “Carnival of the Animals”, “The Swan” (cello) and “The Elephants” (string bass).
 15. Give the students the opportunity to play available instruments.
- E. *Assessment/Evaluation*
1. Play Vivaldi, “The Four Seasons”, movement 1, as the students prepare to leave class. To review today’s lesson on string orchestral instruments, ask questions on the material, such as: What instruments do you hear? How do you change the pitch on these instruments? How is the sound produced? Assess through teacher observation.

Lesson Two: PERCUSSION FUN

- A. *Daily Objectives*
1. Concept Objectives
 - a. The students will review the names of the orchestral families.
 - b. The students will identify by sight and sound the percussion family.
 - c. The students will review how sound is produced.
 2. Lesson Content
 - a. Review the percussion instruments as learned in grade two and add to the knowledge of this family
 - b. Discover how sound is produced on these instruments.
 3. Skill Objectives

- a. Identify by sight and sound the percussion instruments.
 - b. Learn to use these instruments to accompany a recorded piece of music.
- B. *Materials*
1. Posters of instrument families
 2. Posters of individual percussion instruments
 3. CD or tape player
 4. The percussion section to add to the string section of the orchestra section puzzle
 5. Available percussion instruments (such as: tambourine, wood block, claves, hand drum, triangle, finger cymbals, rhythm sticks, maracas, guiro, xylophone, etc.)
 6. Music examples: “Toccatà for Percussion”, third movement, by Carlos Chavez, “Stars and Stripes Forever,” by John P. Sousa
- C. *Key Vocabulary*
1. Percussion instruments - instruments that you shake, or hit with hand, stick or mallet. They can be made of skin (timpani, snare drum), metal (triangle, cowbell, cymbals), or wood (maracas, xylophone, wood block, claves, guiro, etc.).
 2. Tuned percussion instruments - instruments of the percussion family that have several pitches. They are tuned similar to a piano.
 3. Untuned percussion instruments - instruments of the percussion family that have only one pitch.
 4. Drum sticks - usually wooden sticks that are tapered at one end, used to play percussion instruments.
 5. Mallet - a stick with a padded head at one end used to strike percussion instruments.
 6. Section - family group seated together in the orchestra
 7. Four- measure block - rhythm pattern for students to play (appendix)
- D. *Procedures/Activities*
1. Display posters of the instrument families.
 2. On the board put two four- measure blocks of rhythm.
 3. Review what a ‘family’ is.
 4. Review percussion instruments (timpani, snare drum, wood block, maracas, cymbals, triangle, tambourine, and xylophone) as learned in grade 2.
 5. Add percussion piece of orchestra seating puzzle. (Appendix A)
 6. Demonstrate the different percussion instruments: tuned and untuned.
 7. Review high pitch and low pitch by using different sizes of drums or bars of the xylophone.
 8. Distribute the available untuned instruments, one to each student, keeping duplicate instruments in a section.
 9. All practice together the four-measure blocks.
 10. Divide the class into two sections; each section will play one of the rhythm patterns separately, then each play its own pattern together.
 11. Play with the musical selection, “Stars and Stripes Forever.”
 12. Put the instruments under the chairs.
 13. Listen to “Toccatà for Percussion,” third movement, by Carlos Chavez; point to the instrument picture when it is heard.
- E. *Assessment/Evaluation*
1. To collect instruments: Call the students forward by individual instruments. Ask them to show correct playing technique while walking to the front of the room. Have the class repeat the name of the instrument as it is placed on the table. Assess using teacher observation.

Lesson Three: THE LOUD SOUNDING BRASS

A. *Daily Objectives*

1. Concept Objectives
 - a. The students will become familiar with the brass family of the orchestra.
 - b. The students will understand how the sound is produced on the brass instruments.
2. Lesson Content
 - a. Learn about the brass family: trumpet, trombone, French horn, and tuba.
3. Skill Objectives
 - a. Identify by sight and sound the brass instruments.
 - b. Discover how the sound is produced in the brass instruments.
 - c. Discover how to change the intensity of the sound.

B. *Materials*

1. Posters of instrument families
2. Posters of individual brass instruments
3. CD or tape player
4. The brass section of the orchestra seating puzzle (Appendix A)
5. Available brass instruments (to show only)
6. "Meet the Symphony" rap (from Schoolhouse Rap CD) printed paper, and CD
7. Music examples: "Seventy Six Trombones" from "The Music Man," by Meredith Wilson and "The William Tell Overture," finale, by Rossini

C. *Key Vocabulary*

1. Brass instruments - wind instruments made of coiled tubes of metal with a cupped mouthpiece such as: trumpet, trombone, French horn, and tuba.
2. Cupped mouthpiece - shaped opening, against which the player must adjust the shape of his lips and air pressure to produce a sound.
3. Valves - keys or levers that lengthen the distance the air must travel in the instrument.
4. Slide - the two-foot section that moves back and forth in the trombone to change the length of the tube with changes the pitch
5. Orchestra - symphony - interchangeable words to mean a large group of instruments playing together

D. *Procedures/Activities*

1. Review the posters of the instrument families.
2. Display the posters of individual brass instruments.
3. Describe the brass instruments, why they are grouped together in this family and why they are in the back of the orchestra. (they are louder, higher intensity)
4. Add the brass section to the orchestra puzzle.
5. Demonstrate how the sound is produced on the brass instruments.
6. Ask the students to 'buzz' their lips (like a 'raspberry').
7. Explain how pitch changes in the different instruments - mouthpiece (change lips), valves and slide. (changes length of tube)
8. Why are these instruments grouped together in a family? (cupped mouthpiece)
9. Which brass instrument plays the highest sound? (trumpet) Why? (smallest)
10. Which brass instrument plays the lowest sound? (tuba) Why? (largest)
11. Lead the students in keeping the beat and playing the trombone while listening to "Seventy Six Trombones" from The Music Man.
12. Explain the 'brassy' sound of the trumpet by playing "The William Tell Overture" Finale.
13. Why are there only a few brass instruments in the orchestra? (louder sound)
14. Pass out the words to "Meet the Symphony" Rap.
15. Play the entire song once.

16. Explain that symphony is an interchangeable word for orchestra.
 17. Slowly say the words in rhythm as the students follow along.
 18. Have the students listen to section one of the CD and follow along.
 19. All say the words together in a slow tempo.
 20. Now all say the first verse with the CD.
- E. *Assessment/Evaluation*
1. While collecting the papers, ask the students about the sections of the orchestra that have been learned so far. Sample questions: Why does the brass section sit in the back? Why is the brass section so small? Why is the string section so big? Which family is the largest and why? How is the sound produced in the brass instruments? Use teacher observation to assess.

Lesson Four: THE MELLOW WOODWINDS

A. *Daily Objectives*

1. Concept Objective
 - a. The students will review the string, percussion and brass families of the orchestra.
 - b. The students will become familiar with the woodwind family.
 - c. The students will understand how the sound is produced on these instruments.
2. Lesson Content
 - a. Learn about the woodwind orchestra family: piccolo, and flute (no reeds), clarinet, oboe and bassoon (with reeds).
3. Skill Objective
 - a. Discover how sound is produced on the woodwind instruments.

B. *Materials*

1. Posters of instrument families
2. Posters of the individual woodwind instruments
3. CD or tape player
4. The woodwind section of the orchestra section puzzle
5. "Meet the Symphony Rap" printed papers, and CD
6. Available woodwind instruments
7. A clarinet reed
8. A bassoon reed
9. Music examples: The Instruments of the Orchestra, by Randolph, CD I, The Woodwinds; Rhapsody in Blue, by George Gershwin; and The Prelude to the Afternoon of the Faun, by Debussy

C. *Key Vocabulary*

1. Woodwind family instruments - Instruments that are cylindrical or conical tubes of wood or metal. They use levers or keys to change the pitch, and air vibrates in the tubes to make the sound. Instruments include flute, piccolo, clarinet, oboe, and bassoon
2. Reed - A piece of cane or fiberglass that is placed on some of the woodwind mouthpieces. When the player blows into the mouthpiece the reed will vibrate and make the air vibrate in the instrument producing a sound. Used on clarinet.
3. Double reed - two reeds together that vibrate against each other with in turn make the air vibrate in the instrument. Used on the oboe and bassoon.

D. *Procedures/Activities*

1. Display the posters of the four instrument families.
2. Review the three families already studied.
3. Review the three sections using the orchestra section puzzle.
4. Display the individual posters of the woodwind instruments

5. Add the last section of the orchestral puzzle.
 6. Listen to a recording of ‘The Prelude to the Afternoon of a Faun’
 7. Which woodwind instrument do you hear at the beginning? (flute)
 8. Show and explain the flute.
 9. Did you ever play a pop bottle? (blow across the opening just like a flute)
 10. Show and tell about the other instruments of this family.
 11. The flute (piccolo) is different than the other woodwind instruments.
 12. Show and explain about the mouthpiece and reed of the clarinet.
 13. Show the double reed and show how it is different from a reed (or single reed).
 14. Show how this reed can play a ‘sound’ even when not attached to the instrument.
 15. Show the clarinet, oboe and bassoon, if available or by using pictures.
 16. Explain these instruments.
 17. How is the sound produced in these instruments?
 18. Which instrument in this family plays the highest sound? (piccolo)
 19. Which instrument in this family plays the lowest sound? (bassoon)
 20. Listen to music: Examples of these instruments from the Randolph CD.
 21. Pass out the rap and say all the verses slowly for review.
 22. Rap with the CD.
- E. *Assessment/Evaluation*
1. Play Rhapsody in Blue. What instrument is this? (clarinet) Ask students to tell characteristics of the woodwind family and list them on the board. How is the sound produced? What is a reed?

Lesson Five: PUTTING IT ALL TOGETHER

- A. *Daily Objectives*
1. Concept Objectives
 - a. The students will identify by sight and sound the instruments of the four families.
 - b. The students will understand how sound is made.
 - c. The students will respond to the music-science connection by making their own musical instruments.
 2. Lesson Content
 - a. Discover through experimentation and observation the qualities of sound.
 3. Skill Objectives
 - a. Understand how the instruments are divided into families.
 - b. Each student will respond to what they have learned by creating an instrument to play in an “orchestra”.
- B. *Materials*
1. Instrument family names
 2. Posters of individual instruments
 3. CD or tape player
 4. Orchestra section puzzle
 5. Examples of created instruments
 6. Examples of materials that could be used.
 7. Pictures of created instruments or resource books which the teacher has compiled
 8. ‘Meet the Symphony’ Rap printed papers and CD
- C. *Key Vocabulary*
1. Review all previous vocabulary.
- D. *Procedures/Activities*
1. Display the instrument family names.
 2. Have the students place the individual instrument pictures in the proper families.
 3. Ask the students to identify the sections in the orchestral seating puzzle.

4. Why do the strings have the largest section? (they are not as loud, less intensity)
 5. Show examples of created instruments. In which family does each belong?
 6. Have students list on the board some materials that can be used to create musical instruments.
 7. Divide class into small groups.
 8. Give each group some pictures of created instruments. (which teacher has compiled and resource books on making instruments)
 9. Each group is to discuss what kind of instruments each would like to make.
 10. All come back together and review the characteristics of each family.
 11. Discuss what materials and/or instruments that can be made to fit into each instrument family.
 12. Next week in class - bring in your instrument.
 13. Pass out 'Meet the Symphony' Rap.
 14. Rap with the CD.
 15. Before class leaves remind them to make their musical instruments for next week's class and join our 'orchestra'.
- E. *Assessment/Evaluation*
1. Participation of students in discussion of materials and ideas for creating instruments and how they would be placed in the correct section.
 2. Put away the family pictures. List names of instrument families on the board. Play examples from the Randolph CD, have students identify by sound the instruments they hear. Have one student pick out the correct picture and place it in the under the correct family name.
 3. Assessment of students' understanding of this unit will continue with the culminating activity.

VI. CULMINATING ACTIVITY

WEEK SIX: OUR ORCHESTRA - Before the students come to class, have the orchestra seating chart mapped out on the floor of the room. (using tape or placement of chairs). Each student will sit in the section that his/her instrument best illustrates. Have each section look at the instruments and tell why each instrument is in their section. Have students show different ways of playing the instruments. (If a student forgets or was absent when assignment was made, give him/her a teacher created instrument.) Have each section play its instruments together. Pass out 'Meet the Symphony' Rap. As each family is presented in the rap, have that section play and the other sections rap the words.

VII. HANDOUTS/WORKSHEETS

1. Appendix A - Sample seating chart for the orchestra
2. Appendix B - Sample four-measure block

VIII. BIBLIOGRAPHY

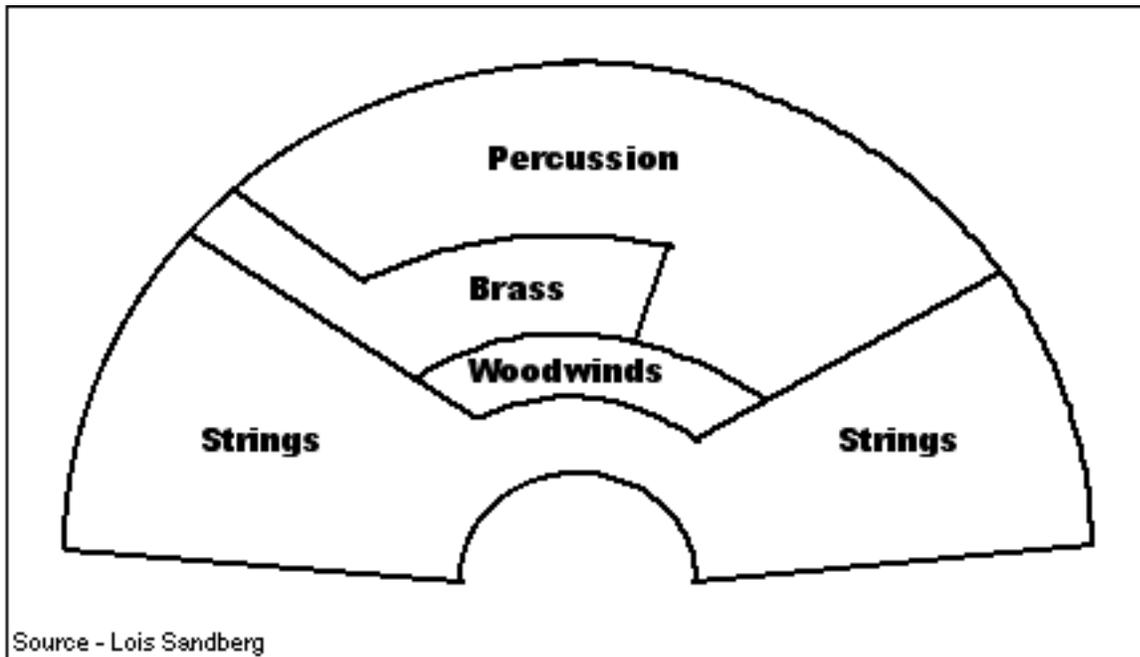
- A. Albrecht, Sally K., & Smith, Melinda B. *Schoolhouse Raps*. Van Nuys, CA; Alfred Pub. Co., Inc., 1996. ISBN 0-7390-0083-7.
- B. Ardley, Neil, *Music*. New York: Knopf Pub. Co., 1989. ISBN: 0-394-82259-5.
- C. Bowmar, Edith M., *Meet the Instruments*. Belwin Mills Publishing Corp. Musical Instrument Posters.
- D. Dunleavy, Deborah *The Jumbo book of Music*. Canada: Kids Can Press, Ltd., 2001. ISBN: 1-55074-723-1.
- E. Hart, Avery, & Mantell, Paul *Kids Make Music*. Charlotte: Williamson Pub. Co., 1993. ISBN 0-91-3589-69-1.

- F. Hirsch, Jr., E. D. *Books to Build On*. New York: Dell Publishing, 1996. ISBN: 0-385-31640-2.
- G. Hirsch, Jr., E. D. *What your 1st Grader needs to Know*. New York: Dell Publishing Co., 1991. ISBN: 0-385-31026-9.
- H. Hirsch, Jr., E. D. *What your 2nd Grader needs to Know*. New York: Dell Publishing Co., 1991. ISBN: 0-385-31843-X.
- I. Hirsch, Jr., E. D. *What your 3rd Grader needs to Know*. New York: Dell Publishing Co., 1992. ISBN: 0-385-31257-1.
- J. Kingsley, Ben *The Young Person's Guide to the Orchestra*. San Diego: Harcourt Brace & Co., 1996. ISBN 0-15-201304-0.
- K. Koscielniak, Bruce *The Story of the Incredible Orchestra*. Boston: Houghton Mifflin Co., 2000. ISBN 0-395-96052-5.
- L. Levine, Robert *The Story of the Orchestra* (CD included). New York: Workman Pub. Co., 2001. ISBN: 1-57912-146-9.
- M. Mandell, Muriel, & Wood, Robert E., *Make your own Musical Instruments*. New York: Sterling Publishing Co., Inc., 1957. ISBN: 0-8069-5022-6.
- N. O'Brien, Eileen, *The Usborne Introduction to Music* (Internet-linked). Tulsa: EDC Publishing, Co., 2000. ISBN: 0-7460-3769-4.
- O. Paker, Josephine *Music from Strings*. Wiltshire: Merlion Pub. Co., Ltd, 1992. ISBN 1-85737-033-3.
- P. Turner, Barrie Carson, *Carnival of the Animals* (Music by Camille Saint-Saens) New York: Holt and Company, Inc., 1998.. ISBN: 0-8050-6180-0. (Book and CD)
- Q. Van der Meer, Ron, & Berkeley, Micheal *The Music Pack*. NY: Knopf Pub., 1994. ISBN 0-679-43098-9.

Music (CD's and tapes) Recordings of your choice of the following examples:

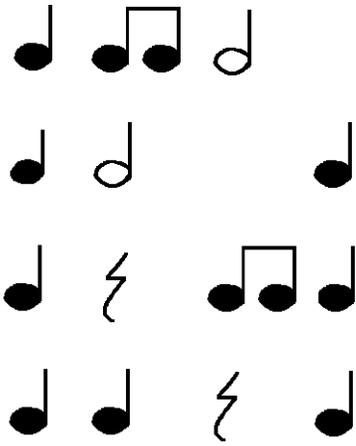
- R. Chavez, Carlos, Toccata for Percussion
- S. Debussy, Claude, The Prelude to the Afternoon of a Faun
- T. Gershwin, George, Rhapsody in Blue
- U. Rossini, Giaocchino, The William Tell Overture
- V. Sousa, John Philip, The Stars and Stripes Forever
- W. Vivaldi, Antonio, The Four Seasons
- X. Wilson, Meredith, Seventy Six Trombones from The Music Man
- Y. The Core Music Collection for the following:
 Grade 1: Carnival of the Animals
 Grade 2: The Four Seasons and Toccata for Percussion
 Grade 3: The Stars and strips Forever and Rhapsody in Blue. Randolph, David, "A Demonstration of the Instruments of the Orchestra". New York: Vanguard Classics, 1996. (CDs and booklet)

Appendix A



Appendix B

Block 1



Block 2

