2014-2015 Young People’s Concert Series

Presents

YPC I - The Planets°

Teacher’s Guide

November 19, 20 & 21, 2014 | 9:45 am & 11:10 am
H-E-B Performance Hall at the Tobin Center for the Performing Arts
# 2014-2015 Young People’s Concert Series
## YPC 1 - The Planets

### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEACHER’S GUIDELINES (1 page)</td>
<td>3</td>
</tr>
<tr>
<td>CONCERT PROGRAM (1 page)</td>
<td>4</td>
</tr>
<tr>
<td>COMPOSER BIOGRAPHY</td>
<td></td>
</tr>
<tr>
<td>Gustav Holst (1 page)</td>
<td>5</td>
</tr>
<tr>
<td>CONDUCTOR BIOGRAPHY</td>
<td></td>
</tr>
<tr>
<td>Akiko Fujimoto, Associate Conductor (1 page)</td>
<td>6</td>
</tr>
<tr>
<td>FOCUS ARTICLE</td>
<td></td>
</tr>
<tr>
<td><em>The Planets</em> Orchestral Suite (8 pages)</td>
<td>7-14</td>
</tr>
<tr>
<td>PREPARATORY CLASSROOM ACTIVITIES</td>
<td></td>
</tr>
<tr>
<td>Planets of our Solar System Activity – Handout and Quiz (5 pages)</td>
<td>15-19</td>
</tr>
<tr>
<td>My Exoplanet Activity (2 pages)</td>
<td>20-21</td>
</tr>
<tr>
<td>Orchestra Map Worksheet (1 page)</td>
<td>22</td>
</tr>
<tr>
<td>Concert Etiquette Activity (2 pages)</td>
<td>23-24</td>
</tr>
<tr>
<td>ADDITIONAL RESOURCES</td>
<td></td>
</tr>
<tr>
<td>Web-based Educational Resources (1 page)</td>
<td>25</td>
</tr>
<tr>
<td>Four Families of the Orchestra (1 page)</td>
<td>26</td>
</tr>
<tr>
<td>Instrument Families (2 pages)</td>
<td>27-28</td>
</tr>
<tr>
<td>CONCERT SPONSORS</td>
<td>29</td>
</tr>
</tbody>
</table>
YPC Teacher’s Guidelines

Before the Concert:
- Please prepare students using these Teacher Guide materials.
- You will receive an electronic ticket message via email approx. 1-2 weeks before the concert.
- Students should be briefed on concert etiquette in advance (see concert etiquette activity).
- Please contact Jeremy Brimhall at (210) 554-1006 at least ONE WEEK before the concert if you have any students that require special accommodations.

Day of the Concert (please read carefully!):
- Before leaving school, please allow time for students to visit the restroom.
- Clearly mark buses or cars for quick identification and memorize bus numbers.
- Know your bus driver’s name and be sure you can recognize him/her. TIP: exchange cell numbers!
- If possible, plan to arrive at the Tobin Center at least 30 minutes before the concert time.
- For any last-minute problems or questions please call:
  a. Jeremy Brimhall, Director of Education, on his cell phone at (210) 441-2858

Upon Arrival at the Tobin Center
- Busses for the 9:45 am performance should approach the Tobin Center from 4th STREET and turn onto AUDITORIUM CIRCLE for drop off onto the main Performing Arts Plaza.
- Busses for the 11:10 am performance should approach the Tobin Center from NAVARRO STREET and turn onto AUDITORIUM CIRCLE for drop off in front of the West Doors.
- There is a designated parking area for concert attendees not arriving by bus.
- For maps and bus plans, please visit http://www.sasymphony.org/2012/06/teachers-lounge/
- Check-in with a volunteer outside the building. The volunteer will guide you to your entrance.
- All students should be in their seats at least five minutes before the start of the program!
- No food or drink, including chewing gum is permitted in the concert hall.

During the Concert
- The use of cameras and recorders is prohibited; please turn off your cell phones.
- Students and teachers should remain in their seats for the entire concert.
- Restrooms are located on select levels only and should be used for urgent need only.
- If a student must visit the restroom, please have an adult accompany him or her.
- Students not maintaining acceptable behavior may be asked to leave.

After the Concert
- Please remain in your seats until your school is dismissed.
- You MAY NOT be exiting the same doors you entered.
- Upon dismissal, listen carefully and follow instructions for departing the building.

Back At School
- Please fill out the YPC online evaluation (to be sent by email following each concert)
- Student letters/artwork expressing reactions to the concert are greatly appreciated.
  Send Any Young People’s Concert related student work or Teacher evaluations to:

Education
San Antonio Symphony Orchestra
PO Box 658
San Antonio, TX 78293-0658

Fax: 210-554-1008
Email: brimhallj@sasymphony.org
2014-2015 Young People’s Concert Series
YPC I - The Planets°
Concert Program

The Planets orchestral suite, Op. 32 [excerpts]
I. Mars, the Bringer of War
II. Venus, the Bringer of Peace
III. Mercury, the Winged Messenger
IV. Neptune the Mystic
V. Uranus, the Magician
VI. Saturn, the Bringer of Old Age
VII. Jupiter, the Bringer of Jollity

Composer: Gustav Holst (1874 – 1934)
For more about Gustav Holst, see the Gustav Holst biography page!

Which planet or planets of our solar system are missing from the list above?

Why might the composer have left off some of the planets?

If you were going to write a piece of music about the solar system, which planets would you choose to write about, and why?

What is an orchestral suite?
An orchestral suite is a grouping of several individual pieces, called movements, written for orchestra. Suite movements can be performed individually or together as a set. Orchestral suites first became popular in the 17th and 18th centuries with composers like J.S. Bach.
Gustav Holst was an important British composer who lived around the turn of the 20th century. Born into a musical family, Holst wanted to become a great pianist and organist like his father. Nerve damage in his right arm, however, made playing keyboard instruments difficult. He started composing music when he was 12 and also began playing the trombone. Holst studied at the Royal College of Music in London where he met Ralph Vaughn Williams, who also became a famous composer and a lifelong friend. After college, Holst supported himself by working as a church organist, playing trombone in various orchestras and later teaching. Meanwhile, he kept composing. After some small successes and some failures, his orchestral suite *The Planets* quickly drew recognition and later, international fame. Orchestras in the United States began to play his music. Soon after he started receiving invitations to conduct and give lectures, including at Harvard University and the University of Michigan. While considered to be a great teacher, Holst was a private man and did not enjoy being famous. He suffered health problems his entire life that made traveling, performing and composing difficult. After *The Planets*, none of his other works achieved the same level of fame, although he did continue to get a number of important *commissions* to write new works. Today Holst is regarded as one of the greatest composers of the British Isles.
Akiko Fujimoto is the Associate Conductor of the San Antonio Symphony, where she conducts over 40 concerts annually including classical, baroque, ballet, pops, and education concerts and leads pre-concert lectures for the Classics series. Previously, Fujimoto was the Conducting Associate for the Virginia Symphony Orchestra where she made her debut on their Classics series conducting the world premiere of Behzad Ranjbaran’s *Double Concerto for Violin, Viola and Orchestra*.

A passionate advocate for young musicians, Fujimoto has served as the music director of orchestras at Harvard University, Stanford University and the College of William & Mary. She was also the Music Director of the Williamsburg Youth Orchestras in Virginia.

Outside of the U.S., Fujimoto conducted the National Arts Center Orchestra in Canada as part of their Young Conductors Programme, as well as the BBC Scottish Symphony Orchestra as part of St. Magnus Festival’s Orkney Conducting Institute. She also recently attended the Conductors Lab® in France and conducted members of the Berlin Philharmonic.

Born in Japan, Fujimoto graduated from Stanford University with a Bachelor of Arts in Music and Psychology and holds graduate degrees in conducting from the Boston University and the Eastman School of Music.
2014-2015 Young People’s Concert Series

YPC I - The Planets

The Planets orchestral suite, Op. 32

Written by composer Gustav Holst between 1914 and 1916, The Planets is a very popular orchestral suite for symphony orchestra. The entire piece is about 51 minutes long and is broken down into seven movements, or sections. Each movement of The Planets is named after a planet of our Solar System. Why, then, you might ask, are there only seven movements? The answer is that Pluto hadn’t been discovered yet, and Holst left Earth out of the suite on purpose. Holst’s interest in the planets and the basis for his composition however were more related to astrology than to astronomy. That is to say, Holst was more interested in the popular beliefs of horoscopes, the signs of the zodiac and how the planets and their motions might influence how people think and act on Earth. Let’s explore each movement below.

"Mars, the Bringer of War"

When the ancient Greeks spotted the Solar System’s dusty, red planet in the night sky, they named it after Ares, the Greek god of war. Later, the Romans came along and named it Mars, after their war god. Holst begins his “Mars” movement with what might sound like an army marching in from the distance [YPC 1 playlist, track 1]. The march is accompanied by the gong and timpani drums. The string instruments make scraping sounds, as if many feet are scraping over a stone road. They do this by hitting the backs of their bows against the strings, which is a technique called col legno. The march is a restless one, written in the uneven meter of $\frac{5}{4}$ time. This means there are five quarter-note beats in every bar, or measure:
Over this, a creeping, ominous theme rises through the brass and woodwinds. Eventually the marching comes into full view with thunderous climaxes.

“Venus, the Bringer of Peace”

In Roman mythology, Venus was the goddess of love, beauty and prosperity. To describe her in this movement, Holst wrote some of his most peaceful and beautiful music. The movement opens with one French horn playing a solo. The solo is a rising motive of just four notes that recurs throughout the movement:

The woodwinds respond with an opposite motive, starting high and moving downward like a sigh; then the horn repeats [YPC 1 playlist, track 2]. Eventually the gentle strumming of two harps takes over, accompanied by horns and woodwinds [0:45]. Later, an elegant violin solo glides over the top of this peaceful landscape [2:04], occasionally accompanied by the rest of the violins.

“The Venus de Milo (pictured above) is a famous depiction of the Roman goddess.”

“Mercury, the Winged Messenger”

The bubbly personality and unmatched speed of the Roman god Mercury can’t be missed in Holst’s movement dedicated to him. Marked “Vivace,” meaning “Fast and lively,” the movement gets off to a rapid start in 6/8 time with woodwinds and strings tossing around a rising and falling motive of six notes [YPC 1 playlist, track 3]. Holst brings the character’s playfulness alive with measure where some instruments seem to be counting “in 2,” while others count “in 3.”
The repeated, yearning theme of a middle or B section [1:02-2:09] might express the lesser-god Mercury’s sense of longing to be more than just a messenger:

“Jupiter, the Bringer of Jollity”

The largest planet in our solar system was named after the chief of the gods in Roman mythology: Jupiter. Jupiter, or Zeus, as he was known by the Greeks, was the stern god of the sky and of justice, with powerful symbols like a thunderbolt and the eagle. It was believed however that those born under his sign were more likely to be jolly, or “jovial,” in character. In fact, the word “jovial,” which means joyous or happy in English, actually comes from the Latin word “iovialis,” meaning “of Jupiter.” Thus Jupiter is the “Bringer of Jollity,” or joy.

Whether you prefer jolly, joyous or jovial, Holst’s famous Jupiter movement does a good job capturing this character right off the bat. The movement opens with the violins laying down a wash of energetic notes in an ostinato pattern [YPC 1 playlist, track 4]. Over this, the horns, violas and cellos introduce a catchy, syncopated melody. Then the higher woodwinds join in on the ostinato as the melody moves to the bass clarinet, bassoons, low brass and double bass [0:15].

The melody and ostinato pattern bounce around to different sections of the orchestra. Later, after a short pause for the whole orchestra, the horns and strings introduce a particularly jolly-sounding melody that might bring to mind the likes of Santa Claus [1:05]. Holst marks this melody molto pesante, or “very heavy,” and backs it up with heavy oom-pah offbeats in the trombones.
Less than a minute later, the horns introduce another theme that really gets the party started, this time in $\frac{3}{4}$ time and accompanied by big, beautiful chords in the strings [1:45].

A more serious-sounding, reflective B section features a gorgeous melody introduced by the horns and strings [3:11]. Holst marks this section “Andante maestoso,” or “majestically, at a walking pace.”

The jolliness of the A section returns in all its flair [5:01] and builds to a dramatic finish. Just before the end, the theme of the B section returns in the brass over a wash of sound – scales moving up and down – in the woodwinds and strings [7:26].

“Saturn, the Bringer of Old Age”

Holst’s favorite movement from his suite deals with the Roman lord of time, calendars and the seasons: Saturn. The passing of time is what brings us to old age and the movement’s title. The movement, marked “Adagio” (“Slowly, at ease”), opens with what might sound like a clock. The ticking of the clock however is slow and heavy. This is played by the flutes and harps plodding back and forth between two chords [YPC 1 playlist, track 5].

Underneath this, the double basses introduce a long, groaning motive which reappears in various instruments and throughout much of the movement. While this downcast music at first might lend itself to thoughts of doubt and despair, eventually the groaning motive is transformed into a gesture of defiance, with ringing chords in the brass [4:43]. There is still uncertainty however, made evident by conflicting beats in the bells and strings. The movement ends peacefully, with a feeling of acceptance.

Questions for reflection:

In what ways does the B section of “Jupiter” contrast with the A section? What musical tools does Holst use to show this change of character?

Why might Holst have wanted to evoke feelings of doubt and despair, defiance and then peacefulness and acceptance in this movement?
“Uranus, the Magician”

The ancient Romans held that their god Mars was the son of Jupiter and that Jupiter was the son of Saturn. But the next furthest planet in our Solar System beyond Saturn wasn’t discovered until long after the Romans. When it was first identified as a planet in the 1780s however, the name of Saturn’s father, Uranus [YUR – ah – nus], was chosen in keeping with the mythological names for the other planets. Uranus, or Ouranos, is actually the Greek name this time; in Roman mythology he was known as Caelus.

For the Romans, Uranus or Caelus was the lord of the sky. In the astrological world, he is associated with genius, individuality, discoveries and invention. As Holst’s “Magician,” this diety inspired the composer to write some very exciting music for the sixth movement of The Planets suite.

The music to “Uranus, Magician” might make you think of some sort of wizard who can transform himself into any animal or shape. If it does, you’ll probably imagine that he changes shape a lot! The movement opens suddenly with a frightfully powerful four-note motive, played in unison by the trumpets and trombones, then echoed by the tubas. As quickly as it appeared, the motive vanishes into silence with four strokes of the timpani [YPC 1 playlist, track 6].

A strange, lopsided dance emerges, where Holst has instruments playing different rhythm patterns at the same time [0:19]. This is called polyrhythm. Holst also substitutes groupings of four notes within counts of only three beats. The effect along with the melody might make you imagine our magician to be rather impulsive … and a little odd!

What is a polyrhythm?

Here’s an example: the movement “Uranus, the Magician” is written in \( \frac{6}{4} \) meter, which means that each measure will contain six, quarter-note beats. When the tempo is too fast to count out six beats in each measure however, musicians divide the measures into two or three counts. At the beginning of this dance-like section, it seems natural to divide each measure into two dotted-half-note counts of three beats each. We know that \( 2 \times 3 = 6 \), so there are still six beats in each measure. A little farther along in the music, there are other passages that suggest three counts in each measure. That is, three half-note counts of two beats each. We know that \( 3 \times 2 = 6 \) is also true, so Holst hasn’t added or taken away any beats. What he does do however is have some instruments playing in three counts while others play in two counts at the same time. This is a polyrhythm often referred to as “three against two” or 3:2 polyrhythm in music.
Finally the rhythms come into agreement and the dance builds until it is taken over by a boisterous, romping melody in the horns and strings [1:25]. The melody is modal, which might suggest our magician’s knowledge of some mysterious, ancient wisdom. Woodwind off-beats are reassuring evidence of the wizard’s confidence and pride.

The theme builds as more and more instruments join in until it finally reaches a flashpoint, where our magician must cut off whatever conjuring he had summoned [1:54]. We hear again the ominous four-note motive both as the magician retreats and as he prepares for his next spell [2:25]. With two sets of timpani rumbling below, Holst gives us the sense that the power of the full orchestra is about to be unleashed. It’s the tuba leading the charge this time, this time with a more resolute theme.

The tune builds to a wild and powerful full-orchestra theme [3:42], which ends triumphant with the magician’s complete disappearance [4:14]. You might thing the movement is over, but it’s not! The magician’s not gone; he’s only vanished for a time. He comes back in full force with his four-note motive and thundering drum rolls [4:52] to end the movement, but leaves no satisfying ending. The tragic chords and unsettling finish may relate back to the mythological story of Uranus, who was thrown down from his throne as mighty lord of the sky by his own son, Saturn.

“Neptune, the Mystic”

Holst ends his suite with the furthest known planet at that time, Neptune. A brother to Jupiter, Neptune was the god of the sea in Roman mythology. The Greeks knew him as Poseidon. His symbol is the trident. As lord of the deep waters, Neptune was regarded as the deep-thinker, or mystic – a god of the mind and imagination.
The movement begins with just flute and alto flute weaving a strange melody from the depths of their lowest registers [YPC 1 playlist, track 7].

Reaching a pair of high notes, they pass the sound off to chords played by the oboes and piccolo [0:12]. Here Holst has ingeniously scored the piccolo, a higher instrument, in the lower part of its middle range. Meanwhile, the oboes, which are lower instruments, strain to play notes that fall higher in their mid-range. The effect is an unusual color that might express the starkness of deep water or the vast stretches of spaces at the edge of the Solar System.

The melody continues its weaving and is joined by the celeste, harp and strings [1:06]. Soon the music becomes restless as more of the woodwinds chime in, and eventually the harp, violins and viola take off in a flurry of notes moving up and down [1:43]. Underneath this, the trumpets and trombones are feeling uneasy – Holst has them play a series of dissonant, unsettling chords in two opposing tonalities.

The celeste, harp and strings continue for a time to play wave-like patterns that might suggest ripples of water or the twinkling of stars in the far reaches of space.

A new section with a faster tempo, marked “Allegretto” (playful, at a medium pace), is ushered in by the cello [3:48]. Here the orchestra is joined by an offstage chorus that sings notes to a wordless “Ahh” until the end of the movement [4:04]. This section is dominated by two motives, one rising and one falling. The falling motive is just two notes, and is passed around between the flute, English horn and harp:
The rising motive is introduced in bits and pieces in the orchestra but then is brought together by the chorus.

The chorus repeats this motive at the ending, getting softer and softer [5:40]. Finally, the orchestra cuts out, and the chorus repeats just the last two chords of the motive over and over as they fade into complete silence [6:05].

The chorus in “Neptune, the Mystic” and its alluring motive might suggest sirens, those mythical island-beauties that lured sailors into dangerous waters with their enchanted voices. Surely Neptune, the sea-god, would have known all about them! On the other hand, the chorus and its fading human voices at the end of the movement might suggest the limits of our knowledge as a human race in what lies beyond the planet Neptune. At least this would have made sense in 1916 at the time that Holst wrote The Planets – when Neptune was the farthest known planet from Earth.

**Listening Adventure**

As you listen to the end of “Neptune, the Mystic,” close your eyes and imagine you’re an astronaut aboard NASA’s Voyager 2 spacecraft, which passed by and photographed the planet Neptune in 1989. The beautiful gas giant planet is a deep blue color, like the color of the ocean, or maybe even a little darker blue. As you look at Neptune out of a window of your spaceship, your mind wanders to what might be down there just below the surface. Slowly but surely, you fly in a straight line beyond Neptune and into the outer reaches of the solar system. From the window, Neptune grows smaller and smaller, until it is just a tiny blue speck in the distance. Finally, it fades from view altogether.

Today, 25 years after its Neptune flyby, Voyager 2 is still transmitting information back to Earth. It’s also still travelling at the same speed, moving deeper and deeper into the unchartered territory of space.
Interdisciplinary Themes:
Science, Planets, Solar System

Preparatory Activity:
Ask students how many planets are in our Solar System and if they can name them. Why is Pluto no longer included in this list (See page 7 for information about Pluto)? Can students put the planets in order from closest to the Sun to farthest away? Which planets are called the “rocky planets” and why? Which planets are the “gas giants”? How does Earth compare to other planets – in size, make up, distance from the Sun, temperature?

Culminating Activity:
Hand out copies of the following page with brief information about each planet of our Solar System. Give students an appropriate amount of time to read through the sheet carefully, or read through it together in class. Then hand out the following Activity Worksheet multiple choice quiz page (2 pages). Have students answer the questions individually or in class. Students should be able to refer back to the planets handout.

Answer Key:

Evaluation:
Were students able to answer the questions using information from the handout? What did students learn about the planets of our Solar System in the process of answering the questions?

Activity TEKS Objectives:
(b) Knowledge and Skills
3rd Grade – Science:
(8) Earth and space. The student knows there are recognizable patterns in the natural world and among objects in the sky. The student is expected to: (D) identify the planets in Earth's solar system and their position in relation to the Sun.

(continued on the following page)
3rd Grade – ELA and Reading:
(3) Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to read aloud grade-level appropriate text with fluency (rate, accuracy, expression, appropriate phrasing) and comprehension.
(4) Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing. Students are expected to: (B) use context to determine the relevant meaning of unfamiliar words or distinguish among multiple meaning words and homographs;
(13) Reading/Comprehension of Informational Text/Expository Text. Students analyze, make inferences and draw conclusions about expository text and provide evidence from text to support their understanding. Students are expected to: (A) identify the details or facts that support the main idea; (B) draw conclusions from the facts presented in text and support those assertions with textual evidence; (C) identify explicit cause and effect relationships among ideas in texts; and (D) use text features (e.g., bold print, captions, key words, italics) to locate information and make and verify predictions about contents of text.

4th Grade – Science:
(8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system.
4th Grade – ELA and Reading:
(1) Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to read aloud grade-level stories with fluency (rate, accuracy, expression, appropriate phrasing) and comprehension.
(2) Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing. Students are expected to: (B) use context of the sentence (e.g., in-sentence example or definition) to determine the meaning of unfamiliar words or multiple meaning words;
(11) Reading/Comprehension of Informational Text/Expository Text. Students analyze, make inferences and draw conclusions about expository text and provide evidence from text to support their understanding. Students are expected to: (D) use multiple text features (e.g., guide words, topic and concluding sentences) to gain an overview of the contents of text and to locate information.

5th Grade – Science:
(8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to:
(D) identify and compare the physical characteristics of the Sun, Earth, and Moon.
5th Grade – ELA and Reading:
(1) Reading/Fluency. Students read grade-level text with fluency and comprehension. Students are expected to read aloud grade-level stories with fluency (rate, accuracy, expression, appropriate phrasing) and comprehension.
(2) Reading/Vocabulary Development. Students understand new vocabulary and use it when reading and writing. Students are expected to: (B) use context (e.g., in-sentence restatement) to determine or clarify the meaning of unfamiliar or multiple meaning words;
(11) Reading/Comprehension of Informational Text/Expository Text. Students analyze, make inferences and draw conclusions about expository text and provide evidence from text to support their understanding. Students are expected to: (D) use multiple text features and graphics to gain an overview of the contents of text and to locate information;
### Mercury
Have you ever stood near an oven while an adult opened it to take out a pizza or a pan of cookies? The oven was probably set to a temperature of 350-400°F. Now imagine it’s twice that hot. That’s what a day on the surface of Mercury would feel like. As the closest planet to the sun, it gets scorched by the sun’s rays during the day. Because Mercury has almost no atmosphere, however, it gets very cold there too during it’s long night: down to -280°F! Mercury has the largest temperature range at its surface of any planet, and is also the smallest.

### Venus
Imagine it rains just about every day of the year. A 224.7-day year, that is. The rain isn’t the ordinary H₂O either, but rather sulfuric acid. Oh and by the way, it never hits the ground – rain here evaporates before it hits the surface. Welcome to Venus, the hottest planet in the Solar System, even hotter than Mercury. The reason for its heat is its extremely thick atmosphere, which creates a strong greenhouse effect that traps in solar energy. Although they are very different, Venus is sometimes called Earth’s “sister planet” because of their similar size. Also, Venus is the closest planet to Earth.

### Earth
Our Earth is the perfect place for life. Thanks to its liquid metal core, the Earth has a strong magnetic field that keeps the Earth’s atmosphere – and all of us – from being blown away by solar wind. The temperature is just right, too – just the right distance from the sun to allow for liquid water on our planet’s surface. Liquid water is so important for life, in fact, that when astronomers look for planets in other star systems that might support life, they look primarily for ones that could have liquid water on their surfaces! Earth is the largest “rocky planet” in the Solar System.

### Mars
Scientists seem to find this dusty red planet to be the most interesting besides Earth in the Solar System. This is for good reason, too: evidence suggests that Mars once had liquid water on its surface. It is also the most habitable place for humans to colonize. Still, there are many hurdles to overcome before colonization might be possible. Mars has two tiny moons, Phobos and Deimos, and is one of the “rocky planets,” along with Mercury, Venus and Earth.

### Jupiter
Although made up almost entirely of gas, this gas giant has an ultra-powerful magnetic field. The pressure of gravity at Jupiter’s core is so intense that hydrogen atoms line up like iron atoms and become magnetic. Jupiter’s magnetic field is so large, in fact, that if it were visible, it would be the size of the Sun as seen in the sky from Earth! Jupiter also has a “Great Red Spot” – a massive storm larger than Earth – and 67 confirmed moons, the most of any planet in the Solar System.

### Saturn
Certainly the most interesting features of Saturn are its rings and its many moons. Made up almost entirely of water ice, Saturn’s rings are only about 20 meters thick but extend over 70,000 miles into space! Saturn also has 62 known moons. It’s largest moon, Titan, is bigger than the planet Mercury and even has a substantial atmosphere. NASA scientists believe Titan’s “methane cycle” may be similar to Earth’s water cycle, and that it make have rivers, lakes and seas of liquid methane on its surface – as well as methane rain!

### Uranus
If human beings could survive on Uranus, most would not live to be one year old – one year in Uranus years, that is: 1 Uranus year = 84 Earth years. This means that for every time Uranus orbits the sun, Earth orbits the sun 84 times! Although of the planets in the Solar System rotate on a tilted axis, Uranus has a much greater tilt than the others – at 97.77° it lies almost flat in its orbital plane around the Sun. Uranus also has the coldest atmosphere of any planet in the Solar System, with temperatures as low as -371.5°F.

### Neptune
Hurricane-force wind speeds are no match for the winds on the surface of Neptune. The most intense hurricane on record had wind speeds of up to 190 mph, but winds on the surface of Neptune can reach over 1,300 mph. That’s almost seven times as fast! Like Jupiter, Saturn and Uranus, Neptune is a “gas giant.” Because of their make up, Neptune and Uranus are sometimes called the “ice giants.” Similar to Saturn and Uranus, Neptune also has a ring system, although it is not nearly as substantial as Saturn’s.
Name

YPC 1 - The Planets
Planets of our Solar System - Worksheet

Instructions: Your teacher will hand out a sheet showing information about the planets of our Solar System. Read the information about each planet carefully and then answer the questions below.

1. Which planet has the coldest atmosphere in the Solar System?
   a. Mars.
   b. Neptune.
   c. Uranus.
   d. Mercury.

2. What are the four “gas giant” planets?
   a. Saturn, Uranus, Neptune and Mars.
   b. Mercury, Jupiter, Venus and Saturn.
   c. Uranus, Neptune, Saturn and Jupiter.
   d. Jupiter, Saturn, Venus and Neptune.

3. The surface of Venus is hotter than that of Mercury because
   ____________________ .
   a. Venus is closer to the Sun than Mercury.
   b. Its thick atmosphere creates a strong greenhouse effect.
   c. Mercury rotates faster.
   d. Metals in Mercury’s rocks reflect most of the Sun’s energy.

4. Which planet has the largest temperature range at its surface?
   a. Earth.
   b. Uranus.
   c. Jupiter.
   d. Mercury.

5. One characteristic of Jupiter’s surface is a massive storm called ____________________ .
   a. the Great Red Spot.
   b. Hurricane Katrina.
   c. Typhoon Tip.
   d. The Perfect Storm.

6. Which planet has wind speeds of over 1,300 mph at its surface?
   a. Mars.
   b. Earth.
   c. Saturn.
   d. Neptune.

7. Which planetary moon is larger than Mercury?
   a. Phobos.
   b. Deimos.
   c. Earth’s Moon.
   d. Titan.

8. Which planet has rings that extend over 70,000 miles into space?
   a. Uranus.
   b. Jupiter.
   c. Saturn.
   d. Neptune.

9. Which planet has a gigantic magnetic field?
   b. Mars.
   c. Saturn.
   d. Uranus.
10. What are the four “rocky planets”?
   a. Earth, Mars, Jupiter, Mercury.
   b. Venus, Mercury, Mars and Saturn.
   d. Uranus, Saturn, Mars and Jupiter.

11. Which planet orbits the Sun every 84 Earth years?
   a. Uranus.
   b. Saturn.
   c. Venus.
   d. Mars.

12. Rain on Venus is made up largely of ____________.
   a. water.
   b. methane.
   c. sulfuric acid.
   d. nitrogen.

13. One reason Earth is just right for life as we know it is that ________________.
   a. it has liquid water on the surface.
   b. there is plenty of food to eat.
   c. it is relatively far from the Sun.
   d. there are few diseases.

14. If visible, this planet’s magnetic field would appear the same size as the Sun in Earth’s sky.
   a. Mars.
   b. Venus.
   c. Jupiter.
   d. Saturn.

15. Which planet is the largest of the “rocky planets”?
   a. Venus.
   b. Earth.
   c. Mercury.
   d. Neptune.

16. Scientists believe this planet once had liquid water on its surface.
   a. Venus.
   b. Mercury.
   c. Mars.
   d. Jupiter.

17. Which two planets are sometimes called the “ice giants”?
   a. Neptune and Uranus.
   b. Neptune and Saturn.
   c. Earth and Jupiter.
   d. Mars and Venus.

18. Saturn’s moon Titan has a “methane cycle” that may be similar to ____________.
    a. Venus’ sulfuric acid cycle.
    b. Earth’s water cycle.
    c. Jupiter’s hydrogen cycle.
    d. Saturn’s ammonia cycle.

19. Which planet has 67 confirmed moons, the most of any planet in the Solar System?
   a. Venus.
   b. Saturn.
   c. Mars.
   d. Jupiter.

20. Which planet might be a good place for human beings to build a colony in the future?
    a. Mars.
    b. Venus.
    c. Titan.
    d. Jupiter.

21. Venus is sometimes called Earth’s “sister planet” because ________________.
    a. it looks like Earth from a distance.
    b. it is the closest planet to Earth and has a similar size.
    c. it has a similar atmosphere.
    d. both planets came from the same parent planet.
Interdisciplinary Themes:
Exoplanets, Science and Discovery, Expository Writing

Preparatory Activity:
Ask students if they know what an exoplanet is or to guess at its meaning. Hand out copies of the following My Exoplanet activity page. Read through the DID YOU KNOW? section aloud with students. Ask students to imagine they are scientists who have just discovered an exoplanet. What is it like? How does it compare to Earth?

Culminating Activity:
Read through the activity Instructions with students. If possible, make available crayons or colored pencils for Part 1 of the activity. Students should at least sketch the drawing first in pencil. Be sure to save sufficient class time (suggestion: half of your class period) for Part 2 of the activity.

Evaluation:
Ask students to share about their exoplanets to the class. How were the exoplanets that the class came up with similar? How where they different? What were some of the most interesting characteristics from the drawings or press reports?

Follow-up Activities:
See kepler.nasa.gov

Activity TEKS Objectives:
(b) Knowledge and Skills
3rd Grade – Art:
(2) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill.

3rd Grade – ELA and Reading:
(20) Writing/Expository and Procedural Texts. Students write expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes.

4th and 5th Grade – Art:
(2) Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill.

4th and 5th Grade – ELA and Reading:
(18) Writing/Expository and Procedural Texts. Students write expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes.
DID YOU KNOW? There are many, many planets outside of our Solar System that orbit other stars. These are called extrasolar planets, or exoplanets, and scientists are working hard to identify them using powerful telescopes and new technologies. Since 1992, over 1,800 exoplanets have been discovered. Scientists believe however that our galaxy, the Milky Way, may contain as many as 400 billion exoplanets. That’s a 4 with 11 zeroes: 4,000,000,000 exoplanets! In addition, it’s believed that about 40 billion of these exoplanets could be Earth-sized and in the “habitable zone” – an area where temperatures could be right for liquid water on the surface, a key ingredient for life.

Instructions: Imagine you are a scientist working on NASA’s Kepler Mission: A Search for Habitable Planets. You have just discovered an interesting exoplanet in a nearby star system, and you want to share the news with the world. Part 1: On the back of this sheet or on another sheet of blank paper, draw a detailed picture of your exoplanet. Keep in mind the following questions as you draw: What color does it appear from space? What substances make up your exoplanet? What features does it have on its surface? Does it have rings? Does it have any moons? How close is it to a star or stars? Are there other exoplanets nearby? Is it habitable? Part 2: After you have finished your drawing, take a sheet of ruled notebook paper. Write a half-page report about your exoplanet for the press. Be sure to give your exoplanet a name and use complete sentences. Include any details in your report that you think people would be interested to know, such as: What is your exoplanet like on the surface? Is it rocky or gaseous? Are there mountains, volcanoes or oceans? Is there a thick atmosphere? What is the star like that your exoplanet orbits? What is the temperature range in degrees Fahrenheit on the surface? Is it bigger or smaller than Earth? Is there liquid water at the surface? How long is a day (one complete rotation) on your exoplanet compared to Earth? How long is a year (one complete orbit/revolution)? Is your exoplanet habitable? Is there life on your exoplanet? Does it have any moons? How far in light-years is your exoplanet from Earth?
2014-2015 Young People’s Concert Series
Orchestra Map Worksheet

Can you match each instrument with where they sit in the orchestra? Draw lines to connect each instrument to their place in the orchestra. Use RED for woodwinds, GREEN for strings, BLUE for percussion, ORANGE for brass, and PURPLE for the conductor.
Teaching Objective:
Students will examine, discuss and practice appropriate concert behavior in different settings.

Preparatory Activities:
1. Ask the students to list places or situations where they might be part of an audience. Solicit examples such as a rock concert, tennis match, football game, golf tournament, sitting at home watching television with the family. Create a list of answers where everyone can see them.
2. Discuss the way audience behavior in various settings would be different. Discuss how different venues or activities have different expectations for audience behavior. Discuss how an audience can positively or negatively affect the performer/athlete.

Teaching Sequence:
1. Assign a group of two or more students to act out behavior that would occur at various venues at the front of the classroom. For example, have two students pretend to be playing tennis.
2. Instruct the rest of the class to pretend that they are the audience for the event being portrayed. Instruct the “audience” to show their appreciation for the performers/athletes pretending in front of the class.
3. Critique the “audience” behavior and discuss why certain behavior was appropriate or inappropriate for the situation. Talk about audience reactions such as applause, yelling or whistling and when it is appropriate or inappropriate.
4. Ask the performers to tell the class how the “audience” behavior affected their efforts.

Culminating Activity:
Talk to the students about the upcoming San Antonio Symphony concert. Discuss with them what they should expect to happen and how they can appropriately show their appreciation for the symphony.
Evaluation:
Were students able to understand how and why audience behavior might be different in different settings and venues? Did they understand the importance of their role as an audience member?

Activity TEKS objectives:
(b) Knowledge and Skills

3rd Grade – Music:
(6) Response/evaluation. The student responds to and evaluates music and musical performance. The student is expected to: (B) exhibit audience etiquette during live performances.

3rd Grade – Theatre:
(2) Creative expression/performance. The student interprets characters, using the voice and body expressively, and creates dramatizations. The student is expected to: (A) demonstrate safe use of movement and voice; (B) participate in a variety of roles in real life and imaginative situations through narrative pantomime, dramatic play, and story dramatization;

4th Grade – Music:
(6) Response/evaluation. The student responds to and evaluates music and musical performance. The student is expected to: (C) practice concert etiquette as an actively involved listener during live performances.

4th Grade – Theatre:
(2) Creative expression/performance. The student interprets characters, using the voice and body expressively, and creates dramatizations. The student is expected to: (A) demonstrate safe use of the voice and body; (5) Response/evaluation. The student responds to and evaluates theatre and theatrical performances. The student is expected to: (A) identify and apply appropriate audience behavior at performances;

5th Grade – Music:
(6) Response/evaluation. The student responds to and evaluates music and musical performance. The student is expected to: (C) exhibit concert etiquette as an actively involved listener during varied live performances.

5th Grade – Theatre:
(1) Perception. The student develops concepts about self, human relationships, and the environment, using elements of drama and conventions of theatre. The student is expected to: (F) portray environment, characterization, and actions. (5) Response/evaluation. The student responds to and evaluates theatre and theatrical performances. The student is expected to: (A) analyze and apply appropriate audience behavior at a variety of performances.
2014-2015 Young People’s Concert Series

YPC I - The Planets

Web-based Educational Resources

Science Pages

♩ National Aeronautics and Space Administration (NASA) Solar System Exploration Page – This page has many great resources with regard to learning about the Solar System, including a catalog of lesson plans and a kids pages with lots of information and games. [http://solarsystem.nasa.gov/index.cfm]

These activities are especially recommended:

♫ Red Nickel Scale Model [http://solarsystem.nasa.gov/index.cfm]

♫ NASA Kids Club – This site has a number of interactive games for kids about space and space exploration [http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html#.VCRBKJRdXE0]

♫ NASA’s general education page – NASA also has a great general education page with many resources for educators and students. [http://www.nasa.gov/offices/education/about/index.html#.U7RYnpRdXE0]

♫ Planets for Kids – This site presents great basic information for kids about each planets. Also of interest is “The Solar System Song” YouTube video. [http://www.planetsforkids.org/]

♫ European Space Agency (ESA) – This site also has many great resources for educators. [http://www.esa.int/Education]

♫ ESA Kids – A great introduction to the Solar System. [http://www.esa.int/esaKIDsen/SEMF8WVLWFE_OurUniverse_0.html]


Music Pages

♪ Dallas Symphony Orchestra Kids (DSO Kids) – [http://www.dsokids.com/]

♪ Arts Alive Canada–See tabs for music resources, instrument lab, great composers, activities and games. [http://www.artsalive.ca/en/mus/instrumentlab/]

♪ Classics for Kids – This page contains great concise composer biographies and other educational resources. [http://www.classicsforkids.com/composers/bio.asp?id=28]

♪ NYPhilKids – This page contains a number of activities related to learning the instruments of an orchestra and also a composer gallery with biography information. [http://www.nyphilkids.org/main.phtml]
Four Families of an Orchestra

**BRASS FAMILY**
- French Horn
- Trumpet
- Trombone
- Tuba

**WOODWIND FAMILY**
- Clarinet
- Bassoon
- Flute
- Oboe

**STRING FAMILY**
- Violin
- Viola
- Harp
- Cello
- Bass

**PERCUSSION FAMILY**
- Timpani
- Bass Drum
- Triangle
- Snare Drum
- Xylophone
The **BRASS** family is one of the oldest families of the orchestra and includes the trumpet, French horn, tuba, trombone, which are all made of brass! Sound is produced when a brass player buzzes his or her lips into a cup-shaped mouthpiece to produce vibrating air. The vibrating air then travels through a long metal tube that modifies and amplifies the vibrations.

In order to change pitch, brass players use two techniques. One is to change the speed that they buzz their lips. The other is to change the length of the tubing that they are blowing air through. They are able to change the length of tubing either by pressing a key to open a valve, as with a trumpet, or using a slide to physically increase or decrease the length of tubing, as with a trombone. Brass instruments have a very sweet and round sound. Then can also play very loudly and are often used in the most exciting parts of a piece.

The **Woodwind** family includes the flute, clarinet, oboe and bassoon. This family produces sound by blowing a vibrating column of air inside some form of tube. In the past, woodwind instruments were all made out of wood, but now some instruments, such as the flute, are made out of metal. Woodwinds create the vibrating column of air in different ways. Flutes blow across the top of an open hole. Clarinets blow between a reed – usually a small, flat piece of bamboo – against a fixed surface. That is why clarinets are sometimes called “single-reed” instruments. Bassoons and oboes blow between two reeds that vibrate against each other. That is why bassoons and oboes are sometimes called “double-reed” instruments. Woodwinds usually change the pitch of their instruments by changing the length of the tube they are blowing the vibrating air through. They most often change the length by opening and closing holes using keys on their instruments. Woodwind instruments have very a beautiful, singing sound. They are often used to play solo parts during symphonies when their unique tonal qualities can be heard even if the entire orchestra is playing.
The **String** family is made up of the violin, viola, cello and bass. Instruments in this family produce sound by (you guessed it!) vibrating strings! The strings are vibrated in two ways. One way to produce vibrations is to use a bow made out horsehair stretched on a wood stick, to rub the strings and produce vibrations. The other way is to pluck the string, usually with the hand. This is called “Pizzicato.” String instruments change pitch by adjusting the length of the string. This is usually accomplished by putting fingers down at some point on the string to shorten the length of the vibrating string. String instruments have a very mellow, rich sound. There are many string players in an orchestra because each instrument alone does not have a very loud sound compared to other instrument families. Often strings will play a beautiful melody, but sometimes the strings play the harmony parts.

The **Percussion** family is probably the most varied family in the orchestra. Percussion instruments create sound by physically hitting, rubbing or shaking either a solid material, like a metal triangle, or a membrane, like the top of a snare drum. The membranes used to be made out of animal skins, but today most drums use a synthetic material. Only a few percussion instruments produce a specific pitch. Pitched percussion instruments that use a solid material, like a xylophone, change pitches by hitting different sized materials. Pitched percussion instruments that use a membrane, like a timpani, change pitch by changing the tension of the membrane. There are many different kinds of percussion instruments used in an orchestra, including the snare drum, maracas, and even sometimes even metal parts from a car! Percussion instruments produce many different types of sounds, but they are usually used in an orchestra to provide rhythm for the music. Often at the most exciting part of a piece there are many percussion instruments playing.
Young People’s Concerts Presenting Partner

Tobin Center®
FOR THE PERFORMING ARTS

Young People’s Concerts Major Funders and Supporters

Mr. and Mrs. Buddy Gardner
Alfred S. Gage Foundation
Ewing Halsell Endowment Fund of the SAAF
Saint Susie Charitable Foundation

Ann and Gordon Getty Foundation
Howard and Betty Halff Fund of the SAAF
Carol Lee Jones Education & Cultural Fund of the SAAF
Louis J. and Millie M. Kocurek Charitable Foundation

Martha Mares Lebo Children’s Education Fund of the SAAF
Minnie Stevens Piper Foundation
David and Betty Sacks Charitable Trust
Louis H. and Mary Patricia Stumberg Foundation
Tuesday Musical Club