

# SAN FRANCISCO WALDORF SCHOOL

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## Mayfaire & Field Day

WELCOME NEW FAMILIES!

Sunday, May 3, 2015  
9am - 3pm

NEW LOCATION

Parade Grounds (Between Hostel & Community Gardens)  
Upper Fort Mason

[www.sfwaldorf.org/may-faire](http://www.sfwaldorf.org/may-faire)

### Grade School Athletics: Sacramento Tournament

Every year, on the weekend following February Break, the Sacramento Waldorf School hosts the Carmen Farr Memorial Basketball Tournament. The tournament began as a way for 7th and 8th grade girls and boys basketball teams from Waldorf schools in Northern California to come together to compete and interact as a community.

This year SFWS sent four teams to the tournament. In an impressive showing, each team won their first round game, setting up head-to-head match-ups between our 7th and 8th grade teams.

Both games showcased elevated team play and enthusiasm with

*Continued on page 5 "ATHLETICS"*

### Grade School Mathematics

#### The First Days of First Grade: A Foundation for Mathematics

It's the first day of first grade. With much anticipation, the children meet their teacher, Mary Barhydt. They receive a rose from an eighth grader, marking the start of their journey through the grades. They begin their first Main Lesson: an exploration of straight and curved lines.

There is a current of energy and excitement in the classroom as the children take up their work: they identify a curved row of teeth, a straight tree trunk, the bend in a flower petal. The children recognize the lines and curves everywhere in the world around them, then put crayon to paper to draw one straight and one curved line, a simple yet profound movement that provides a foundation for literacy, and the numerical and spatial relationships of mathematics and geometry.

The days progress with movement, handwork, music, and stories. The children are introduced to the quality of each whole number from one to twelve. One is for the world, two for day and night, and so forth. Pictorial representations of numbers, both Roman and Hindu-Arabic, are carefully drawn into a Main Lesson book. Colorful illustrations which characterize the quality of each number complete the books.

*Continued on page 3 "GRADE SCHOOL MATH"*

### High School Mathematics:

#### Moving Beyond, Yet All the Way Back

At San Francisco Waldorf High School, all students continue to progress mathematically, at least as far as Projective Geometry and Introductory Calculus and Chaos Theory, and often as far as AP Calculus. Just as it is "normal" for everyone to sing or play an instrument, move to a poem or strike a volleyball, it is likewise "normal" to apply pure reason or to sketch a tesseract. The goal is for students to develop the capacity for mathematical thinking in a creative, rigorous, and comprehensive way, via a program that is unique in breadth and depth. Is there another school in San Francisco where you might find tenth graders enthusiastically studying Trigonometry, both plane and spherical, for two hours in the morning, then Honors Algebra 2 for an hour in the afternoon?

More specifically, in grades 9-11, all SF Waldorf High students take both a year-long math track class and a shorter-term, but intensive math Main Lesson. All twelfth graders take one last math main lesson, and about two-thirds of the class elects to take an additional math track class. Each year's track class can either be a college-prep or an honors course.

*Continued on page 2 "HS MATH"*

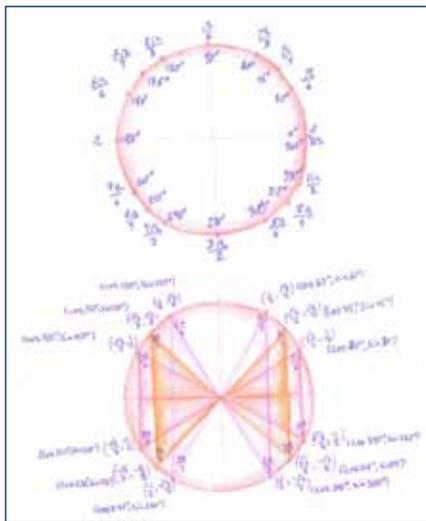
Grade School: 2938 Washington Street, SF, CA 94115; tel. (415) 931-2750; [info@sfwaldorf.org](mailto:info@sfwaldorf.org)  
 High School: 470 West Portal Avenue, SF, CA 94127; tel. (415) 431-2736; [highschool@sfwaldorf.org](mailto:highschool@sfwaldorf.org)  
 San Francisco Waldorf School: [www.sfwaldorf.org](http://www.sfwaldorf.org). Editorial Staff: Seraph White, Kim Hopper, and Cory Powers. Email [newsletter@sfwaldorf.org](mailto:newsletter@sfwaldorf.org) with question or comments.



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Honors math classes are primarily taught using an integrated curriculum developed at Phillips Exeter Academy. Other classes combine aspects of the Exeter method with a more traditional topic-centered curriculum.

The Exeter approach is problem-centered, meaning that students receive a series of carefully composed math problems in lieu of a textbook or set of lectures. All pertinent information is contained in the problems themselves

and math is studied seminar-style: students present the majority of the content through well-reasoned explanations. Such active participation requires students to ask effective questions, to answer other students' inquiries, and to critically assess and present their own work. Using this approach, students are the source of mathematical knowledge – not the teacher or textbook. They learn to live with uncertainty, puzzle over a problem, and work collaboratively -- an approach that complements our school's educational philosophy.

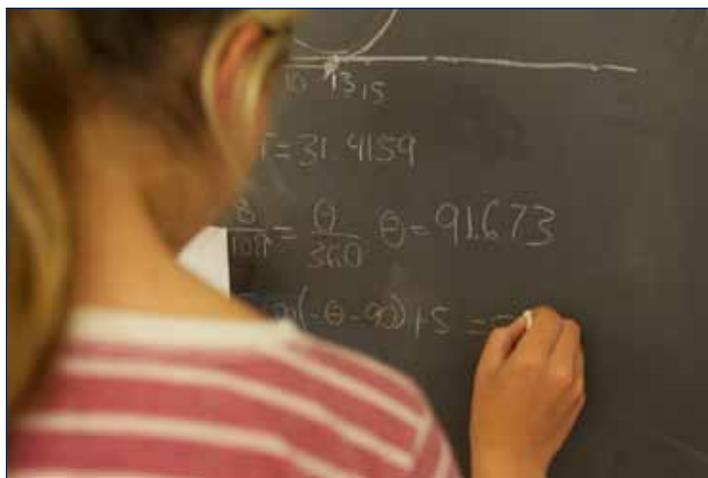
The following year-long math track offerings are taught by Dr. Cynthia Renegar, Kevin Farey, and John Jackson.

Ninth Grade	Tenth Grade	Eleventh Grade	Twelfth Grade
Algebra I	Geometry	Algebra II	Precalculus
Honors Geometry	Honors Algebra II	Honors Precalculus	AP Calculus

In the three-and-a-half to four week Main Lesson blocks, students explore mathematical ideas in a more conceptual and creative way, and within a historical context.

Ninth graders begin with Permutations and Combinations, an exploration of the many faces of chance: fate, destiny, randomness, and risk. In the mathematics of chance, randomness is not a synonym for haphazard but rather a kind of order that emerges only in the long run. This block introduces the fundamentals of probability theory: definitions, the Law of Large Numbers, expected value, applications, and the historical development of the subject.

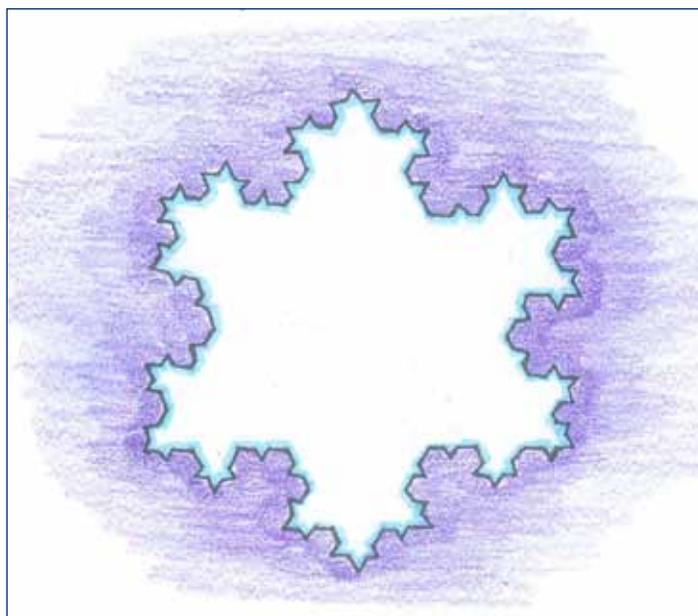
The tenth grade block is Trigonometry. Students begin by using similar triangles to ascertain the sizes of inaccessible heights and distances, as did such luminaries as Thales (about 600 B.C.) and Aristarchus (about 300 B.C.). Students go on to use the modern versions of the sine, cosine, and tangent functions, as well as the Law of Sines and the Law of Cosines, to calculate, for example, the height of Mt. Davidson, then the size of the earth, then the distance from the earth to the moon, and at last, using a method developed by Edmond Halley (1656-1742), the distance from the earth to the sun. In addition to work in trigonometry, the students read *Flatland* by Edwin A. Abbott (1838-1926). This imaginative mathematical classic introduces the concept of multiple dimensions (including dimension four) of space. Just as there is more to the universe than "A. Square" of Flatland originally thought, so too can trigonometry be applied to more than just triangles with straight sides. Trigonometric formulae for "triangles" whose sides are arcs of great circles on a sphere can also be derived. Such "triangles" are the ones early astronomer-geographer-mathematicians were the most interested in. They can also be



used to explain why a flight from San Francisco to London might pass over Greenland. By the end of the course, students (in one experimental section this year, but hopefully all sections the following year) were calculating lengths and compass headings for such journeys.

In the eleventh grade, the Projective Geometry block formalizes one of the central principles of perspective art: parallel lines meet at infinity. This block includes elements at infinity, the principle of duality, perspectivities and projectivities, projective generation of point and line conics, cross-ratio and invariance, and, more specifically, study of the theorems of Desargues, Pascal, Brianchon, and Pappus. Outside of the Waldorf movement, Projective Geometry is rarely offered as anything but an upper division college course taken mostly by math majors. As a Waldorf course, it unfolds in a way that engages minds to envision the infinite (and more!) in new ways, and hands to draw ... slowly, carefully, persistently ... line after line after line after line ... until images rich in beauty and depth take form.

In the twelfth grade, the Calculus/Chaos Theory block introduces the historical and mathematical development of calculus, the study of rates of change via the use of infinitesimals. The class explores elementary aspects of both differential and integral calculus. The contemporary mathematics of chaos theory is also introduced, a field that some came close to developing in the late 19th and early 20th centuries, but that had to wait for the invention of computers before it truly could be fully



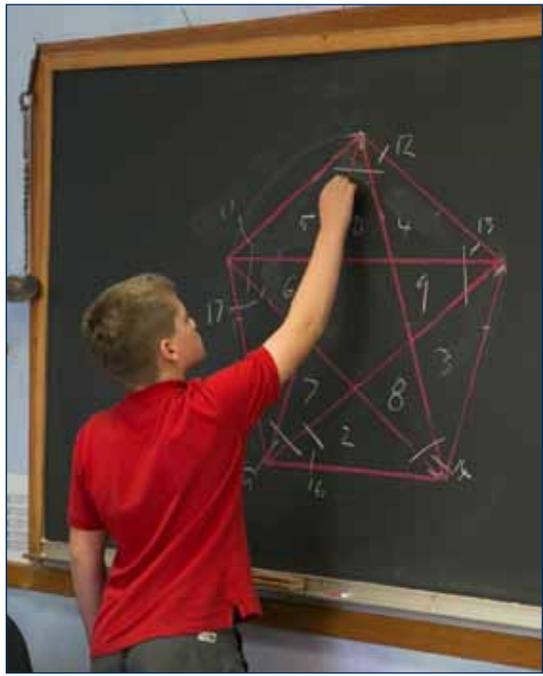


Photo Credit: Scott Chernis

With the arrival of fall comes a special morning story—a unique creation from the teacher with a captivating set of characters: Paul Plus, Minerva Minus, Tommy Times, and Daphne Divide. In this story, the friends take up the task of gathering and organizing a snack. There are challenges, and plot twists and turns: lively Tommy cartwheels right past the meeting spot, while Minerva, dressed in blue, laments the apples that slipped from her saggy sack. Still the friends, each a reflection of the temperaments within the children of first grade class, help each other throughout and in the end, the delicious snacks are shared equally. The simple story provides a delightful foundation from which students practice the four operations and their interrelationships in the days ahead. In future math blocks in first grade, simple computation exercises are introduced with a brief image or story.

In Waldorf education, whole numbers are introduced before moving to parts, reflecting the children's feeling of unity with the world. In addition, for example, is a number sum that is broken into addenda: eight is four plus four; ten is five plus five, and so on. Much of this practice is done in "circle" with stepping and clapping, forward and backward.

At their seats, the children learn to use their fingers (and toes!), as well as glass jewels, beads, and shells, to count and compute, developing mental agility from manual dexterity and physical movement. At San Francisco Waldorf School, the introduction of the four processes is completed in first grade, and practice continues, with gradually increased difficulty, through second and into third grade.

Also in second grade, the algorithms of column addition and subtraction are introduced along with the concept of place value. Most third graders are interested in really big numbers, even beyond the billions. At this time, multiplication and long division are introduced. Weights and measures, distance, time, and money are subjects also for third grade.

The fourth grade emphasis is on fractions while fifth graders master decimals; word or situation problems are part of the curriculum throughout these years. Fifth grade is the final year for form drawing, solidifying a foundation for geometric drawings of sixth grade.

Photo Credit: Scott Chernis

## Thursday Math Club: An SFWS Tradition

Capable and enthusiastic, middle school-aged students are ready for additional instruction in math – a year-long course taught by math specialist Stacey Hubbard that complements the math Main Lesson blocks taught by the Class Teacher.

They also have the opportunity to join Math Club. This group meets weekly after school to explore math topics and, in the fall, focus on preparation for the AMC 8, a national exam sponsored by the Mathematics Association of America. The AMC 8 is designed to promote enthusiasm for math through "fun competition" and encourage students to go beyond the minimum math requirements when they reach high school. It is in these years, the organization wisely notes, that students begin to solidify their perceptions of themselves as math students; and it is essential to keep the doors open.

After the fall exam, Ms. Hubbard focuses the club on individual problem-sets and math games. Students work in small groups or initiate activities. The atmosphere is lively and productive, and offers students a unique opportunity to work together across grades.

Math club is consistently popular! Year in and year out, students grab a quick snack at the Thursday bake sale then head off for math club. It is one small but significant piece of a comprehensive program that keeps our students engaged in math through the grades.

## Middle School Mathematics: Moving Toward Abstraction

As students move into the middle school years, they begin to function on a new intellectual level, no longer needing visible, concrete examples for every new concept. Mathematics instruction expands: in addition to the math Main Lesson blocks taught by the Class Teacher, students take a year-long math track course taught by Stacey Hubbard.

In sixth grade, students are introduced to probability and statistics, exponents and roots, number theory, order of operations, and area and perimeter of polygons. They study standard and metric unit measurements. Main Lesson blocks include business math and geometry.

Algebra is introduced in a seventh grade Main Lesson block. In the year-long math class, students learn the square root algorithm and more advanced power and root techniques, as well as simple and compound interest. They are introduced to one and two variable linear equations, squaring a binomial, and the four different properties of algebra.

Eighth grade math class is Algebra I. Topics include formulas, functions, linear equations in one and two variables, systems of equations, exponents, polynomials, factoring, quadratics, rational functions, sequences, and series. In a Main Lesson geometry block, students explore the construction of the five regular solids. Through these years, daily mental math is practiced and homework is assigned and collected daily. Regularly scheduled quizzes and tests are used to assess students understanding of the material.



## Alumni Corner

### An Interview with Trevor Sargent (SFWS 2012)



#### *Computer Science and Waldorf Education*

##### Tell us about your college experience thus far.

I arrived at Lewis & Clark knowing that there were many graduates of SFWHS waiting for me. I also knew that I wanted to pursue my love of technical theater and design, and explore another area of study. I took an intro level computer science class, and was instantly sold – I quickly declared a double major in computer science and theatre (concentration: design/tech), and under the watchful eye of both departments, have been making my way up through the classes since that first month on campus.

The computer science classes rely heavily on practice and implementation. A lecture is almost always followed by a project. Classes are kept small so that everyone has access to the labs when they need them, and so that strong in-class group dynamics can be cultivated. The classes are demanding. The project turnaround time is short, and those projects often require a significant amount of research, resourcefulness, and ingenuity. We are encouraged to practice skills on personal projects outside of class. To help facilitate this, I was a founding member of the LC Programming Club which is going strong. There are regular ‘hackathons’ on campus and people are always looking for opportunities to practice.

##### How did your high school experience prepare you for college?

I was surprised at the similarities in my college and high school classes. In high school, I invested hours into each and every one of the things I loved, and worked very hard not to let any of those endeavors fall flat. I took the Honors Physics Course and AP Calculus while working on design for the Drama Club production of “One Flew Over the Cuckoo’s Nest.” I joined the Eurythmy Troupe and took Algebra II in my lunch period sophomore year to maintain the balance of subjects important to me.

When I got to Lewis & Clark, I realized how well the SF Waldorf High School math program had prepared me. Specifically, I was delighted and confused when I seemed to have a very firm grasp on concepts like infinity and imaginary numbers while my classmates were tangled up in ‘sigma’s and ‘i’s. I was able to recall the beautiful, simple, and direct explanations offered both in my track classes and the Main Lesson blocks that helped launch my work in Calc II second semester and bypass several math requirements.

Having respect for the beauty and simplicity of Calculus (both Main Lesson and AP), the dynamic movement and flexibility of space provided by the Projective Geometry block, and even the ground-up, geometrical, and concrete approach to Trigonometry have helped me reason through problems, even when the endless sets of numbers that I have been asked to memorize mysteriously leave my head.

This problem-solving approach was greatly enhanced by the high school’s Exeter method (specifically in AP Calculus). My participation in that course, exposure to the rigor of that structure, and my consequential score on the AP test allowed me to excel in the mathematical sciences in college, leaving time (both in the short and long term) for all my other pursuits.

##### What are your plans after college?

I don’t have any specific post-graduation plans as of yet, but thankfully that is still more than a year away. I plan to stay in Portland, for a while then move to find a job that merges technical theater and computer science. What will that be? I have no idea. And will I have to create it for myself? Quite possibly, but I’m ready for that challenge.

##### What else would you like to share about your high school or college experience?

I am always very forthcoming with my educational history, and often people have many questions. I get to dispel many Waldorf myths, and I may have even steered a couple of people towards the teacher training program. I’m pleased to be able to be an ambassador for the school, and do not plan on retiring that role anytime soon.

## Alumni Updates

**Portia Diwa (SFWS 2001)** is teaching the young harpists at the SF Waldorf School, and is the Healing Harp Clinical Faculty at California Pacific Medical Center’s Institute for Health & Healing.

**Charlotte Markle (SFWS 2011)** directed *The Actor’s Nightmare* by Christopher Durang for her senior thesis at Lewis and Clark College.



## Alumni News

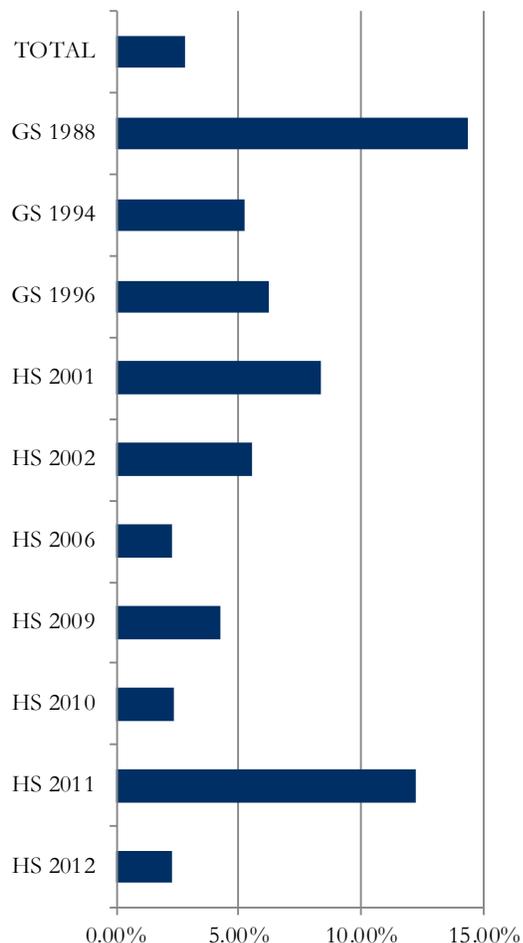
### Save the Date!

- GS Class of 1990 25-year Reunion: May TBA
- Summer Alumni Reunion: Saturday, June 20, 2015 at Smokestack

## Alumni Giving Race Participation

We are more than halfway to our participation goal for the 2015 Alumni Giving Race that ends at the end of May. Prizes will be given to the class with the most participation at the Alumni Reunion on June 20.

Thank you to everyone who has given so far.





the 8th grade inching out victories over their 7th grade schoolmates. One of the biggest standouts of the weekend was the number of San Francisco Waldorf parents who made the trip to Sacramento to cheer on the teams. Our community support was nothing short of inspirational.

The 7th grade boys played extremely well throughout the tournament, winning multiple games before being handed their second loss. With their performance this year they look to be one of the clear favorites to challenge for the championship in next year's tournament.

The 8th grade boys, after winning their early games, squared off against Sacramento Prep. This game turned out to be the most exciting of the tournament, ending in a double overtime, this one a "sudden death." The excitement in the gym went through the roof as the teams played back and forth, stopping each other with great defense. Then point guard Ryan Moon raced the length of the court, jumped between two defenders, and shot to make the winning basket that would send the 8th grade boys to the championship game. Our students rushed the court to celebrate and the whole gym resounded with electricity and excitement at this incredibly dramatic finish.



In the end, the 7th grade girls and 8th grade boys took runner-up. Our 8th grade girls, who were just starting their season, displayed amazing team play and were able to earn another championship to go along with their titles in both CYO basketball and volleyball. Congratulations also to 7th grader Zuzu Orr, who played exceptionally well during the tournament and received the Sportsmanship Award.

Our students played with great heart and togetherness and our parents created a joyous and exciting environment inside the gym for every one of our schools games. It was a weekend that made me so proud to call the San Francisco Waldorf community my home.

Go Wildcats!

*-Josh Allain, GS Assistant Athletic Director*



realized. The topics introduced here include the logistic map, period doubling, Feigenbaum diagrams, classical fractals, and the Mandelbrot set. But Calculus and Chaos are not studied in isolation from each other. How they each explore the world by looking infinitely inward is discussed, for example, as well as how the former can be applied, with great success, to the "smooth" trajectory of a tossed pebble or orbiting planet, but not to a snowflake's edge. The latter, by contrast, embraces what mathematicians once called "monsters" by seeing the "jagged" as repetitions of particular patterns on various scales. Behind Calculus and Chaos, having motivated their development, are differing scientific and philosophical paradigms.

And now it's the last day of this year's twelfth grade math main lesson. Today, having just finished presenting their chaos-related artistic projects to each other (songs, paintings, computer programs, research papers, and even some fractal cookies), students are putting the finishing touches on the final math main lesson books of their Waldorf careers. These books contain, among other things, diagrams showing how as you zoom in both visually and mathematically on the smooth curve of a parabola (or

circle or ellipse, etc.), the curve becomes, to our eyes, indistinguishable from a line. They also include, though probably without mentioning Paul, Minerva, Tommy, or Daphne (characters from our First Grade article) by name, "difference quotients," calculations involving exponents, multiplication, addition, subtraction, division, and a breakthrough calculus notion called limits, all carefully arranged so that one can compute, for example, the velocity, at different times, of the pebble Mr. Farey tossed on the first day of class. On one of the last pages in each book, a four to five iteration Koch Curve or Snowflake has been neatly, and often colorfully, rendered. This curve, one of the aforementioned "monsters," though comprised entirely of straight segments, cannot be made to look like a line by the infinite lens of calculus. A chalkboard, by now normally filled with calculations, curves, and lines, contains only the daily quote, this one from T.S. Eliot.

"We shall not cease from exploration  
And the end of all our exploring  
Will be to arrive where we started  
And know the place for the first time."

## Upcoming Public Events

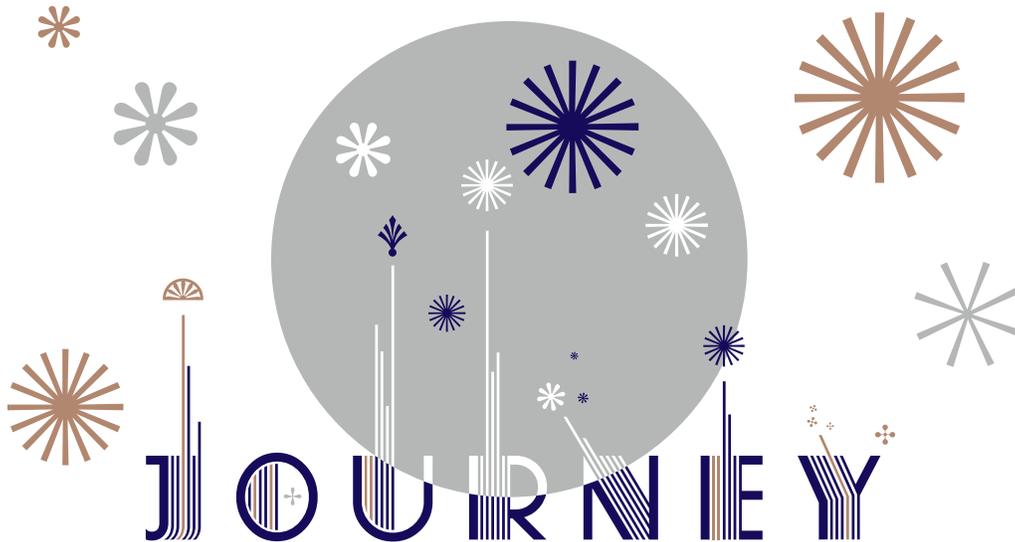
- Wednesday, April 29, 6:30-8pm **Grade School Spring Orchestra Concert** calvary presbyterian  
Sunday, May 3, 9am-3pm **May Faire** parade grounds, upper fort mason  
Saturday, May 9, 5:30-11pm **Spring Night Benefit Auction** general's residence  
Friday, May 15, 5-9pm **Founders' Night** high school campus  
Friday, May 29 - Saturday, May 30 **Senior Play: Argonautika** scottish rite masonic center  
Friday, May 29 - Sunday, May 31 **8th Grade Play: A Midsummer Night's Dream** grade school campus  
Monday, June 1, 8am **100% Participation Donut Day at the High School** high school campus  
Friday, June 12, 8am **100% Participation Donut Day at the Grade School** grade school campus  
Saturday, June 13 **High School Commencement, Class of 2015** scottish rite masonic center  
Saturday, June 20, 6:30-10:30pm **Summer Alumni Reunion** smokestack

Visit our online calendars and news pages at [www.sfwaldorf.org](http://www.sfwaldorf.org).

SAN FRANCISCO WALDORF SCHOOL BENEFIT AUCTION

SPRING NIGHT MAY 9, 2015

ONLINE AUCTION MAY 1-14



SATURDAY, MAY 9TH 5:30 - 11:00 PM

THE GENERAL'S RESIDENCE

UPPER FORT MASON

BAY STREET AT FRANKLIN STREET

RSVP BY FRIDAY, MAY 1

DONATE AUCTION ITEMS BY MONDAY, APRIL 27

I soon realized that no journey carries one far unless, as it extends into the world around us,  
it goes an equal distance into the world within.  
- Lillian Smith