Do you recognize these mathematicians?

Hypatia	Sofia Kovalesky
Maria Agnesi	Mary Somerville
Sophie Germain	Emmy Noether
Émilie du Châtelet	Marjorie Rice

The Daughters of Hypatia **tells the stories of the lives and struggles of these and many others with exciting dance and theater, and entertains with surprising audience interactions, young girls' rhythm and rhyming games, colorful multimedia, and more!**

School matinees
Mon-Fri., Apr. 7-12

School matinees are currently scheduled as follows - some changes possible to accomodate large school groups:

Mon./Wed./Fri. 10 AM and 12 noon
Tue./Thu. 10 AM and 11:30 AM

Seating is limited, reserve now!
Tickets: $9, discounts for large groups
Reservations/info:
karl_schaffer@yahoo.com
831-480-5114
Sponsored by West End Studio Theatre

Public performances:
Friday, Apr. 11, 8 PM
Saturday, Apr. 12, 2 PM and 8 PM
Sunday, April 13, 2 PM
$15 general
$12 students/seniors
$9 children under 12
in advance
($2 more at door)
Tickets: Hypatia.TicketLeap.com

MoveSpeakSpin
POB 8055
Santa Cruz, CA 95061

THE DAUGHTERS OF HYPATIA
CIRCLES OF MATHEMATICAL WOMEN

A performance to inspire all of us that mathematics is for everyone!

Sponsored by West End Studio Theatre

Funded in part by a grant from the Arts Council Santa Cruz County

ARTS COUNCIL SANTA CRUZ COUNTY
PROUD SUPPORTER

Photos by Steve DiBartolomeo

THE DAUGHTERS OF HYPATIA
CIRCLES OF MATHEMATICAL WOMEN

The Daughters of Hypatia
Circles of Mathematical Women

"*Hypatia* is more than a beautifully danced and choreographed dance experience - a fascinating breakthrough in dance performance theater which speaks of history of women in mathematics, demonstrates basic rhythmic values, and the joy of playing with dance movement and words. Interweaving visual projections and story line spoken and danced by four highly trained women dancers, it is an unforgettable evening for all age groups." - *Roberta Bristol, Emeritus Dance Department Chairman, Cabrillo College*

Women's contributions to mathematics have historically been given short shrift. For centuries women were denied access to the study of mathematics, their intellectual powers denigrated, and their accomplishments downplayed. However, women, often self taught, made marvelous mathematical discoveries, despite these obstacles. The earliest known female mathematician was Hypatia, a leading intellectual in ancient Alexandria who was murdered by a mob. Later mathematicians disguised their identities: Émilie du Châtelet dressed as a man in order to attend lectures, Sophie Germain published under a male pseudonym, and Emmy Noether gave lectures under the name of a male colleague. Their stories are sobering, yet inspiring.

The historical sections of the show are drawn together by dances exploring circular motifs, suggesting the circles of support that have nurtured women in this field. The dancers recount intriguing stories from the women's lives and perform patterns suggestive of their mathematical work.

Accolades for the 2012 premiere performance of *Hypatia*:

"A tremendously important celebration of the many women who have not only triumphed in the mathematical field, but whose work has changed the course of mathematical understanding. In today's culture where girl's t-shirts proclaim, "allergic to algebra" or and "Girls can't do Math" - we all need to be reminded of the extraordinary contributions females have made to this field. *Daughters of Hypatia* exceeds all expectations to create a fast paced and exceptional program of entertainment and vital information." - *Ann Simonton, Coordinator and Founder of Media Watch*

"Girls growing up in our society are under tremendous social pressure to avoid math because they hear that math isn't something girls do. One of the best ways to change the social stigma around girls and math is to celebrate female math heroes. Throughout history women have always been part of the mathematical world, but none of their names are well known. The *Daughters of Hypatia* is a highly entertaining and informative show that cleverly grabs the traditional image of women gracefully dancing in a circle and turns it into a symbol of mathematical power and collegial support. Not only do we hear the personal stories of dozens of women mathematicians, we see them acted out by skilled female dancers, who themselves embody the idea that mathematics is women's work, completely intertwined with the arts and women's lives. I can't think of a better way to introduce children and adults to the history of women in mathematics." - *Scott Kim, Mathematician and Game Designer*

Background

For 25 years choreographer of *Hypatia* Karl Schaffer, the Dr. Schaffer and Mr. Stern Dance Ensemble, and umbrella organization MoveSpeakSpin have been creating groundbreaking dance concerts linking mathematics and dance, with humor, playfulness, and physicality. The Ensemble has performed throughout North America, recently at the new Museum of Mathematics in New York, in Buffalo, at TEDx, in Madison, and in Columbus, and will perform in Seoul next summer. Schaffer and Erik Stern are on the Teaching Artist Roster of the Kennedy Center for the Performing Arts for their work integrating dance and mathematics.

Hypatia includes live projection of video mosaics of dancers with software created by Kevin Lee, tessellation designs by self-taught mathematician and artist Marjorie Rice, guest choreography by sarah-marie belcastro, and uses musical compositions by Santa Cruz women's a capella world music ensemble Zambra, Vi Hart, and Victor Spiegel.

Sample Class Activities

A set of pre- and post-performance class activities for all grade levels will be provided free of charge to educators bringng students to the performance. Examples:

Sophie Germain Primes

Sophie Germain (1776-1831) discovered that prime numbers (numbers with no factors other than 1 and themselves) with the property that 1 more than twice the number is also prime hold special importance. These are now used in coding systems that make the sending of information like credit card numbers over the internet safe and efficient.

5 is a Sophie Germain Prime, because $2 \times 5 + 1 = 11$ is also a prime number. Is 7 a Sophie Germain Prime? Is 11 a Sophie Germain prime? Can a number with last digit 7 ever be a Sophie Germain prime?

Marjorie Rice's Tiling Patterns

Marjorie Rice (born 1923) discovered new ways to "tile the plane" with multiple copies of certain pentagons, and then used them to create beautiful Escher-like designs. One of her pentagon tilings and her flower design based on it are shown below. Below them is a brick tile pattern. Have you ever seen this pattern in a wall? What other brick patterns have you seen? On the bottom right, connect the dots to make a pattern of your own using 1 by 2 "domino" bricks. How might similar patterns be used when creating dances?