# Puget Soundings 

Don't miss our next dinners!

Winter dinner
February 12, 2018

## Spring dinner

May 14, 2018


December 8, 2017
Joyce Frost, Editor


## Calendar

Winter<br>Dinner<br>Dr. Gini<br>Stimpson<br>Bishop Blanchet HS<br>Monday, Feb 12 ${ }^{\text {th }}$<br>5-8:30 pm<br>Challenged in Kenya<br>- What Makes a Good<br>Math Teacher or<br>Student?

$\begin{array}{cl}\text { March 12 }{ }^{\text {th }} & \text { Board Meetings } \\ \text { April 16 } 6^{\text {th }} & \text { 5:30-7:30 pm }\end{array}$
PSCTM Monday, May 14
Spring
5-8:30 pm.

First I want to thank the council for allowing me to serve as President and be a part of an organization that not only gives knowledge back, but also allows friendships to be created within the teaching community. I am following in the footsteps of some great leaders in the organization.

We have already been enjoying some great math events this fall with the 2017 Northwest Mathematics Conference in Portland, Oregon, the Mathematical Problem Solving Workshop at the University of Puget Sound, our quarterly dinner meeting at Bishop Blanchet High School (learning about Benford's Law), the monthly TI-84 workshops at Mercer Island HS and the always eclectic Northwest Math Institute hosted at Lynnwood High School, to name a few. These and upcoming events offer clock hours, professional development, and camaraderie. I have been a member of PSCTM for many years. The networking made possible through this membership has given me opportunities and friendships, which are, quite frankly, priceless.

I invite you to take part in additional opportunities this year, especially our Winter Dinner on February 12, 2018 and Spring Dinner on May 14, 2018. A longer-term commitment, is joining the committee to host the 2019 Northwest Conference. Or, join us on the PSCTM board; we have an opening for a program chair. Contact me if any of these opportunities sound enticing.

I realize you have a lot of demands on your time. Take the opportunity to carve out time for some of our future events; view them not as demands but as a refuge to talk with fellow travelers and pick up tidbits of knowledge along the way. See you at our next dinner. Come and say, "hi", I would love to get a chance to know you better.



Enjoy the photos above from the Friday evening IGNITE talks featuring Annie Fetter, Graham Fletcher, Robert Kaplinsky, Chris Shore, and Kim Sutton. On the left, is Annie Fetter (with Joe and Joyce Frost). Photos to right are heroes of Traci Cotton.

## PSCTM Members

presented at the Portland $56^{\text {th }}$ NWMC
Lynn Adsit: "Captivating Review Ideas Students Can't Resist"
Dan Finkel: "Rich Tasks and Transformative Mathematical Experience", "Making and Breaking Conjectures",
"Mathematical Openers"
Joe Frost: "The Uncivil War of Calculus",
Joyce Frost: "Understanding Important Algebra and
Geometry Concepts Through Paper Folding
Art Mabbott: "From
Triangular Numbers,
Tetrahedron Numbers to the Tetrahedron Kite" "Exploring Geometric Congruences Using Transformations", "Exploring the Triangle Sum Theorem on the Sphere"
Kim Schjelderup:
"Remember the M in STEM-
Encouraging Students to Think

```
1\times9+2=11
12\times9+3=111
123\times9+4=1111
1234\times9+5=11111
12345 x 9 + 6 = 111111
123456 x9+7=1111111
1234567\times9+8=11111111
12345678\times9+9=111111111
123456789 x 9 +10= 1111111111
```


## Jerry Johnson session

Try out these number patterns that Jerry Johnson shared in his session, "Mathematical Magic and Magical Mathematics".

## A "Handy" Math Manipulative

As an elementary math teacher, I have been asked many times about students using their fingers to make calculations. Opinions range from people about the use of our digits when solving a math problem. Personally, I think using your fingers is a fine tool for mathematical thinking. I find myself using my fingers to "hold on" to numbers I am working with when solving mental math calculations. This happens frequently at the grocery store for me. Here is an interesting article about young children using their fingers as a tool for solving math problems. Maybe you will find it "handy" too! https://www.edutopia.org/article/case-finger-counting-youki-terada

## Traci Cotton

```
9\times9+7=88
98\times9+6=888
987\times9+5=8888
9876 < 9 + 4 = 88888
98765 < 9 + 3 = 888888
987654 < 9 + 2=8888888
9876543 < 9 + 1=88888888
98765432 < 9 + 0=888888888
```

```
1\times1=1
11\times11=121
111\times 111= 12321
1111 x 1111= 1234321
11111 }\times11111=12345432
111111 x 111111= 12345654321
1111111 x 11111111=1234567654321
11111111 x 11111111= 123456787654321
111111111 x 111111111=12345678987654321
```



Here is a Reader's Digest article from the Youcubed website.
https://www.rd.com/health/wellness/c ounting-with-fingers/
"Studying brain scans, researchers discovered that when students ages 8 to 13 work on subtraction equations, the somatosensory region "lights up" on the scans, even if the students aren't using their fingers."

Joyce Frost

It is magic until you understand it, and it is mathematics thereafter. Swami Bharati Krishna Tirtha (1884-1960), known for his book Vedic Mathematics. From Jerry Johnson's Portland NWMC talk.


## PSCTM Winter Dinner

 Monday, February 12, 2018 Challenged in KenyaWhat Determines a Good Math Teacher or Student?Dr. Gini Stimpson,<br>UW Extension and Teachers Development Group

Shifts in What It Means to be a Good Math Teacher and Student Over My 53 Years as a Teacher: Reflections Inspired by My Recent Experiences Working with Teachers in Kenya As a member of a team of STEM educators working with secondary teachers in Southeast Kenya, work sponsored by Rotary International, I felt challenged anew to consider
$>$ how to surface and honor current knowledge and practices,
$>$ where to begin developing research-based practices, and
$>$ to learn and experience technology that provides the greatest value added.
Together we will deepen our understanding of the characteristics of good teaching and learning and then compare and contrast those characteristics to current practices in Kenyan schools where students and teachers have been taught through repetition and drill.

Dr. Virginia C. Stimpson (Gini) is a nationally recognized mathematics educator who has served as a co-PI on NSFfunded and Eisenhower-funded professional development and research-focused grants during and following her 35 years as a high school math and physics teacher at Mercer Island High School. From 2004-2007 she was the evaluator on the NSFfunded grant Lenses on Learning: Understanding Mathematics Instruction at the Secondary Level. She also served as the evaluator of the NSF Grant Facilitating Lenses on Learning: Developing Leadership to Support Excellent Teaching in Elementary Mathematics. She was a member of the Advisory Board for the development of the DMI seminars that focus on algebra, PFC and RAO, and has facilitated DMI seminars and prepared more than 400 teacher leaders to use those materials with their colleagues through both the University of Washington and Mount Holyoke College. She served as chair of the NCTM Research Advisory Committee.
Gini currently does extended work with K-12 teachers and administrators in districts across the country, work supported by the University of Washington and Teachers Development Group. Recently she joined a secondary STEM team doing work with secondary teachers of mathematics in Kenya.

> Math: It's all fun and games until somebody divides by zero.

Decomposition of Triangular Numbers and a state of equilibrium.


Last spring I attended a presentation at the UW sponsored by Jayadev Atyreya at the Washington Experimental Math Lab, WXML. I have used Triangular and Tetrahedron Numbers with my Straw and ribbon tetrahedron kite project. What I didn't know was that you could decompose them following a fairly simple procedure, eventually reaching a state of equilibrium no matter which triangular number you start with or which initial decomposition you choose. AND this only works with triangular numbers and NOT with any other numbers. What are TRIANGULAR NUMBERS, you ask? They are the number of objects that you can arrange to form a triangle. I have shared this procedure with middle school students and they loved it. Try it yourself.

1. Choose a Triangular Number.
2. Decompose into two terms.
3. Move each number one column right, subtract one from each term and place the sum of those in the first column.
4. Repeat 3. If you get a column that reaches 0 , remove the 0 and slide all of the other columns to the left.

A decomposition of $1 \& 9$, would give:

| 1 | 9 |  |  |
| :--- | :--- | :--- | :--- |
| 2 | 8 | (there was a 0 ) |  |
| 2 | 1 | 7 |  |
| 3 | 1 | 6 |  |
| 3 | 2 | 5 |  |
| 3 | 2 | 1 | 4 |
| 4 | 2 | 1 | 3 |
| 4 | 3 | 1 | 2 |
| 4 | 3 | 2 | 1 |
| 4 | 3 | 2 | 1 |

Art Mabbott

Benford
and
Billiards,
Jayadev
Athreya,
October 12
Fall
PSCTM
Dinner


Benford's Law: If you look at the number of followers for Twitter users, you'll notice something strange: about 30 percent of them have a number of followers whose first digit is 1, about 17 percent have a number of followers whose first digit is 2, about 12 percent have a number of followers whose first digit is 3. A similar phenomenon occurs when you look at the list of US cities by population. Jayadev explored with us why this weird rule (known as Benford's Law) happens. He also discussed how the *same* mathematical phenomenon underlies why a billiard ball in a square table that never hits a corner visits every part of the table in a systematic way. If you would like a copy of his wonderful powerpoint, please email Joyce Frost at: frostjoycee@gmail.com

## Check out this article about Jayadev in Geekwire!

https://www.geekwire.com/2016/meet-minds-behind-axiomatic-art-project-based-theoretical-mathematics/
Meet the minds behind Axiomatic: An art project based in theoretical mathematics
"At first glance, Timea Tihanyi and Jayadev Athreya seem an unlikely collaboration. Tihanyi is an interdisciplinary visual artist who teaches in the University of Washington's School of Art and has spent more than two decades working in ceramics. Athreya is an associate professor in the UW's Department of Mathematics and director of the Washington Experimental Mathematics lab. But despite our stereotypes of math and art, Tihanyi and Athreya say they are much more similar than we often think. That's why they are collaborating on Axiomatic, a project that seeks to create real-world representations of complex theoretical mathematics, with the goal of highlighting the similarities between the two fields." Geekwire.com

Axiomatic: Mathematics is about truth. Art is about beauty. The goal and process of creating mathematics and creating art are considered to be diametrically opposite. Yet, mathematics, intellectually elegant and precise, is also beautiful. And art, while irreverent to rules, is a way of exploring truth, perhaps multiple truths. axiomatic is a crossdisciplinary collaborative research project spearheaded by a mathematician and a visual artist that aims to explore and demystify both disciplines by putting them conversation with one another.


## Jayadev shares in Federico Ardila-Mantilla's axioms:

Axiom 1: Mathematical talent is distributed equally among different groups, irrespective of geographic, demographic, and economic boundaries.
Axiom 2: Everyone can have joyful, meaningful, and empowering mathematical experiences.
Axiom 3: Mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs.
Axiom 4: Every student deserves to be treated with dignity and respect.

PSCTM member Angela Ensinger's Robotics teams:

On November 12, 2017, three teams from St. Madeleine Sophie Catholic School, led by teacher/advisor (and PSCTM board member) Angela Ensminger, competed in the second annual Special Olympics of Washington Unified Robotics Championship at the Pacific Science Center in Seattle. As one of only two middle schools in the 36team event, the students went head to head in a round-robin battle with a community college team and high school teams. Angela's teams took home the Rising Star Award, The Perseverance Award, and the award for Best Design. Her school also won the Team Social Media Award.

## Special Olympics Unified

Robotics is a student-
designed and implemented robotics program open to students with and without intellectual disabilities, as well as students with a variety of learning and behavior challenges. Unified Robotics encourages any number of participants as robotics team partners to train, strategize and compete.

## Congratulations to Angela

 and her teams!Answers to Three of a Kind: 1) degree 2) springs 3) screens 4) columns 5) bridges 6) charges 7) rackets 8 ) showers 9 ) spreads 10) letters

## Three of a Kind

Here's a fun game to play with your students to expand lateral thinking: The words in each set below share a single feature. For example, a compass, a phonograph and a pine tree all have needles. Once you have solved them all challenge your students to come with their own.

1. Thermometer, college graduate, location on a globe
2. Mattress, health resort, year
3. Television, porch, basketball team on the offense
4. Greek building, newspaper, marching army
5. River, nose, denture
6. Ion, credit card bill, cavalry
7. Tennis player, noisy party, Mafia ring
8. April, locker room, bride before her wedding
9. Bed, rancher, bookie
10. Crossword puzzle, post office, high school sports star By Jane Bissonnette

Back Seat Math Games: When my sons were small, I used to keep them occupied in the back seat on the way to daycare by playing games with them. One easy game was to pose arithmetic problems to each of them in turn, and the other could chime in with an answer after 15 seconds. That grew out of our concern that the older boy was having trouble with the "page of problems in two minutes" exercises in second grade. It turned out that he was much faster doing them verbally than on paper, which we think was related to slow handwriting. In the backseat game, if the one being questioned came up with the right answer, he could pose a problem of his choice to me. The younger one was fascinated with doubling, so his question was often in the form of "What's twice (some very large number)?"

After Thanksgiving, I was taking my older son, his wife, and their new baby to the airport and a version of the game came back to us. I noticed that a semi beside us had one of the wind-deflecting tail assemblies and wondered aloud how long it would take for the fuel savings to pay back the initial cost. We took turns calculating needed information for the final question. We guestimated that semi trucks travel at least 4 hours per day, 5 days per week at highway speeds using about 6 miles per gallon, or 10 gallons per hour at $\$ 2.50$ per gallon. 20 hours * $\$ 25 /$ hour $=\$ 500 /$ week for fuel. I had heard somewhere that the wind deflectors on the cabs save up to $10 \%$ of fuel costs, so we guessed that the tail deflectors are probably about half as effective. $5 \%$ savings of $\$ 500 /$ week $=\$ 25 /$ week savings. The deflectors aren't very complicated, so we guessed they probably cost around $\$ 2000$ each, $\$ 2000$ divided by $\$ 25 /$ week $=80$ weeks.

We couldn't believe something that simple hadn't been invented earlier if it could pay off so quickly, so Greg checked our estimates on the web. The ATDynamics website describing their product claims that the tails offer $5.54 \%$ fuel savings at 65 mph . (one estimate validated) Another web search yielded the clue that semi trucks average 5-7 mpg at highway speeds and drive an average of 45,000 miles per year. If you guess that's 45 mph average for highway and city driving, then the 1000 hours/year works out to around 20 hours/week. (check) Finally, a New York Times article from 2012, "Stretching Truck's Mileage", cited a shipping company officer who estimated that the tails on long-haul trucks would pay for themselves in less than a year. The article went on to say that there are nearly 2,000,000 tractor-trailers on American highways, so a 6 percent reduction in diesel use would amout to savings of 1.6 billion gallons per year. I hope the aerodynamicist that invented the tails is proud of that invention! Joe Frost

# Upcoming Professional Development Opportunities! 

PCMI Geometry Workshop: Scaling the Teaching Curve - I Can See for Tiles and Tiles Love doing mathematics? A penny for your thoughts on teaching? Join us for a free professional development! Middle and high school teachers are invited to apply. Park City Mathematics Institute alums are asked to bring a colleague to share the PCMI experience.
Enrollment is limited and first come, first served, so register now! There is no registration fee. Support for overnight accommodations is available for those with difficult commutes to and from the workshop.
Apply now at: https://goo.gl/forms/mm9aFWh0eVKiHW1z1
You will be notified by January 12, 2018 if your application has been accepted. Local Contact: Gabie Mathiesen, Email: gemathiesen@hotmail.com IAS/PCMI Contact: Dena Vigil, Email: pcmi@ias.edu Check http://mathforum.org/pcmi/outreach/for updates.
Park City Math Institute Summer Teacher Program: Apply now for the 2018 Teacher Leadership Program, July 1-21, 2018. Applications need to be completed and submitted by January 15, 2018. Go to: $\mathrm{http}: / / \mathrm{math}$ forum.org/pcmi/ and click the green button at the bottom of the page.

View PCMI TLP YouTube channel for an overview of the Teacher Leadership Program, ideas for your classroom, resources for you and your colleagues, and short clips of important things to think about as teachers.

## SEATTLE SCHOOLS MATH CIRCLES:

Jayadev Athreya and Daniel Finkel are leading two Math Circles in Seattle - one targeted at elementary teachers and the other targeted at secondary teachers.
The next elementary session is January 9th at Gatzert Elementary School, 1301 E. Yesler Way.
The next secondary session will be January 9th at The Bush School, 3400 Harrison Street.
Both groups meet from 5:30 to 7:30 pm and offer two free clock hours. A light snack is provided as we work through some interesting problems. Notices and wonders are shared as we struggle our way through the tasks.
For more information and an invitation to either of the next sessions, please contact Daniel Finkel
(finkelitis@gmail.com) or Jayadev Athreya (jathreya@uw.edu).

## UNIVERSITY OF PUGET SOUND MATH CIRCLE:

UPS and David Scott sponsor a Math Circle in Tacoma. The next one is December 9th from 8:30AM to 3:00PM (5 clock hours). They offer a light breakfast to start and a nice lunch at mid-day. The morning is spent working in groups to explore two rich problems. While we try never to take away any of the ah ha's, as discoveries are made, teams share their notices and wonders. The participants run the gamut from tutors and undergraduate students to elementary, middle school and high school teachers. For more information about the next session, please contact: David Scott (scott@pugetsound.edu) and he will put you on the list for the next session. These sessions are open to everyone and they come with free clock hours.

## TI USER GROUP: Lynn Adsit, Art Mabbott, and Kim Schjelderup

The FREE Monthly TI User Group is always on the FIRST SATURDAY of the month. Our next gathering will be on January 6th, 2018. So excited to be starting the New Year with some great training, superb collegial discussions, yummy snacks and precious clock hours. Also, our User Group fulfills the new Washington State STEM in-service requirement. We meet at Mercer Island High School from 9am-12 for a total of $\mathbf{3}$ free clock hours. Hope you are able to make it! To attend, send an email to: lynn.adsit@mercerislandschools.org. That way we will have enough snacks and drinks for everyone!

