Puget Sound Council of Teachers of Mathematics

March 8, 2024





Puget Soundings



Save the date for our *in person* Spring Dinner featuring Scott Bellman, Interim Director, UW DO-IT Center

Puget Soundings Newsletter: March 8, 2024 Happy Pi Day!

Editor: Joyce Frost (frostjoycee@gmail.com)

Save the Date!

In person Spring Dinner Scott Bellman, UW DO-IT Center

May 13, 2024 5 – 7:30 pm

St Madeleine Sophie Catholic School 4400 – 130th Pl SE Bellevue, WA 98006

Try out one of our PSCTM board meetings! Join us on:

- March 11th
- April 15th
- June 10th

Email Joyce for more info! frostjoycee@gmail.com Happy Almost Spring PSCTM members and friends!

The school year is flying by and my eighth graders are already counting down the days until summer – less than 60 school days left! There are so many great activities to do still! I am looking forward to sharing Pi Day with my students next week.

Our last speaker event will be happening Monday, May 13th with Scott Bellman from the Do-IT Center at UW. Come join us for dinner and great conversations. We are still looking for a few new board members to

help out bringing these wonderful programs to you. We meet about once a month, have dinner and make plans! Thinking about it? Come to a board meeting and see what it is all about! Sincerely, Angela Ensminger, PSCTM President



PSCTM Board: Jane Bissonnette - Secretary, Joyce Frost – Program, Newsletter, Jane Hunter - Newsletter, Art Mabbott – Treasurer, NCTM Rep, Joe Frost - Web Page, Angela Ensminger – President











PSCTM Board Invitation - - - Jane Bissonnette

"I was first encouraged to attend a PSCTM dinner by my college instructor. I felt immediately welcomed. I loved learning about new classroom techniques and math happenings in addition to meeting fellow math teachers. After several years of attending

meetings, I was invited to join the board. It has been a great experience for me. Besides supporting our membership with dinners and communication there is a lot of idea sharing within the board which helped me immensely with my teaching. Membership on the board has given me the encouragement to explore topics beyond what I would normally pursue. I value the dear friendships I have made as a board member. "

Scott Bellman, Interim Director, UW DO-IT Center

Title: Lessons Learned from Conversations with Neurodiverse Students

Description: We will explore the needs and challenges experienced by postsecondary students identified as "neurodivergent" learners—those with academic challenges

related to conditions such as dyspraxia, dyslexia, attention deficit hyperactivity disorder, dyscalculia, autism spectrum disorder, and Tourette syndrome. In an effort to center their voices in the conversation, we will discuss lessons learned directly from interviews and conversations with neurodivergent students, along with ideas about serving them, and all students, more effectively.

The DO-IT (*Disabilities, Opportunities, Internetworking, and Technology*) Center is dedicated to empowering people with disabilities through technology and education. It promotes awareness and accessibility—in both the classroom and workplace—to maximize the potential of individuals with disabilities and make our communities more vibrant, diverse, and inclusive.

The DO-IT Center strives to

- increase the success of people with disabilities in challenging academic programs and careers;
- promote the application of universal design to physical spaces, information technology, instruction, and services;
- freely distribute online content, publications, and videos for use in presentations, exhibits, and the classroom; and
- provide resources for students with disabilities, K-12 educators, postsecondary faculty and administrators, librarians, employers, parents, and mentors.

"Some kids with disabilities have expectations that are lower than they need to be. At DO-IT, we try to change that."



March 8, 2024





PSCTM Newsletter: Puget Soundings

March 8, 2024



Thanks to Peg Cagle for a very inspiring presentation on "Math Worth Falling in Love With!" She encouraged us to let our students see math as something to 'wrestle with' instead of a minefield to avoid!



Peg's 'friends' share when they first fell in love with math (you may recognize some names...)

Making a square from 4 isosceles triangles -David Masunaga, 4th grade

Polya's problem solving & the Handshake Problem -Duane Habecker, credentialing program,

Four color problem -Karen <u>Hyers</u>, 10th grade

Solving <u>Hectix</u> 3D puzzle -Annie Fetter, age 9 Reading William Dunham's "Journey through Genius" -Gabe Davis

> Fibonacci sequence -Brian Shay, 7th grade

Geeking out with other kids passionate about mathematics -Sam Shah, 9th grade

Explaining his thinking to the class and having everyone else listening -Max Ray-Riek, 3rd grade

The unit circle	SOMA cube -Annie Fetter	Conway's Rational Tangles
-Chris Luzniak		-John Golden
Gazzillionth term in a pattern ,		Quadratic inequalitites
-Max Ray- <u>Riek</u>		-Libo Valencia
Similarity with mirrors		3D scaling of block puppy
-Claire Verti		-Diedra Baker
Area of a trapezoid		3 Act Money Wall
-Egohsa Awaah		-Kathy Henderson
9 Colours from nrich.math.com	Cathy F	osnot's Tabletops, Floors & Fields
-Aristotle <u>Ou</u>	Nora's Ark -Fawn Nguyen	-Adina R

And she provided great suggestions for math topics/problems for multiple math levels...





Tangent lines that had one chance to meet then parted forever. Parallel lines that were never meant to meet. Asymptotes: lines who can get closer but will never be together. Math pi rates

We cannot solve our problems with the same thinking we used when we created them. Albert Einstein

Receive Clock Hours for PSCTM events!

For attending one or more PSCTM events, you can receive 1.5 clock hours per presentation. Earn clock hours for Fall (October 23, 2023), Winter (February 26, 2024) and/or Spring (May 13, 2024). Our treasurer, Art Mabbott, will have details at each of our presentations.

Email him (art@mabbott.org) for details!

Follow PSCTM on social media! Share your lesson ideas, news with us, too! @PSCTM



Winter Dinner Presentation Door Prize Winners! Congratulations to *Amy Dahl* and *Jane Hunter*!

Peg Cagle, our Winter presentation speaker suggested offering door prize winners a set of "Einstein Hat puzzles" – aperiodic tiles. She suggested that we could find them on Etsy. In the process of ordering them, I learned that I had actually ordered "Spectre" tiles and had to look up the two types to understand the distinction. Enjoy what I learned about these fascinating tiles in the process! First – March 2023

I just noticed that your message says "Enjoy your new Einstein Hat Tiles", but the actual order is for the Spectre tiles. I just wanted to confirm which tiles you were hoping to send as a gift. Please let me know when you get a moment.

Thanks! ^_^ -Braden

Just nov

Braden:

I had no idea there was a new tile since the Einstein Hat tile! Yes, I would like the Spectre tiles. These are for math teachers and I will be sure to include the description of the two tiles in my newsletter that I am putting together for the organization! These look very beautiful and will be enjoyed. Thanks for asking and for checking. Joyce Frost



<u>Einstein Hat tile</u>: Mathematicians have finally discovered an elusive 'einstein' tile, a 13-sided shape called 'the hat' forms a pattern that never repeats.

See an 'einstein' tile morph into different shapes – Science News "In November 2022, hobbyist <u>David Smith</u> discovered a "hat"-shaped tile formed from eight copies of a 60°–90°–120°–90° <u>kite</u>, glued edge-to-edge, which seemed to only tile the plane aperiodically.^[8] Smith recruited help from mathematicians <u>Craig S.</u> <u>Kaplan</u>, Joseph Samuel Myers, and <u>Chaim Goodman-Strauss</u>, and in March 2023 the group posted a preprint proving that the hat, when considered with its mirror image, forms an aperiodic prototile set.^{[9][10]} " from <u>Wikipedia</u> (Students could make these!)



Spectre tiling

Spectre tiles on Etsy

<u>Spectre tile</u> (Be sure to click on the link and read this fascinating article...) "Forget the 'Einstein' tile, meet the true aperiodic tile 'Spectre.' Hot on the heels of the discovery of the "one-in-a-million" shape "Einstein" in March, a new shape called "Spectre" might be the true owner of the title." Christopher McFadden, June 4, 2023

"Back in March of this year, a team of computer scientists found a way to completely cover a flat surface using only one shape, which they call "Einstein" or "the hat." The former has nothing to do with the famous physicist but is a play on words from the German ein stein ("one stone"). Considered to be a "one-in-a-million" shape at the time, it was believed to be an exceptionally special discovery in mathematics as this shape can cover a surface without repeating a specific pattern. This kind of tiling is called "aperiodic tiling," it's been a tricky problem in mathematics for quite a long time. While this was a significant finding, there was a slight problem: the <u>original "hat" shape needed to be</u> flipped over (like a mirror image) to cover some parts of the surface. This made some people argue that they were technically using two different shapes (the original and the mirror image) instead of just one. "Who would believe that a little polygon could kick up such a fuss," said Marjorie Senechal, a mathematician at Smith College who is on the roster of speakers for the event. Not wanting to leave this problem unsolved, the team kept working. They found a different shape closely related to the hat but could cover the surface without needing to be flipped over. It still did the aperiodic tiling, but now with only a single shape, no mirror images were needed."

The history of aperiodic tilings:

"Back in the 1960s, mathematician Hao Wang believed that it was impossible to find a collection of shapes that could tile a plane without repeating. However, his student Robert Berger, who is now a retired electrical engineer in Lexington, Massachusetts, proved him wrong by discovering a set of 20,426 tiles that could do just that. Later, he found another set of 104 tiles. By the 1970s, mathematical physicist <u>Sir Roger Penrose</u> from Oxford had narrowed it down to just two sets."

Perhaps you have played with one of the Penrose tile sets, Kites and Darts? <u>Here is some info</u>.



Penrose tiles:

"Two additional types of Penrose tiles known as the rhombs (of which there are two varieties: fat and skinny) and the pentacles (or which there are six type) are sometimes also defined that have slightly more complicated matching conditions (McClure 2002)"

According to Wolfram MathWorld

"In 1997, Penrose sued the Kimberly Clark Corporation over their quilted toilet paper, which allegedly resembles a Penrose aperiodic tiling (Mirsky 1997). The suit was apparently settled out of court."

'Unsolvable' Code Hidden in Antique Dress Pocket Is Finally Cracked – January 8, 2024

In honor of International Women's Day, first celebrated in 1909 (March 8th, 2024), here is a strange story from more than 120 years ago centering around a dress, pieces of paper, and a strange code that took all those years to crack!

Short, handwritten lines of unrelated words contained coded weather reports to send via telegraph in the late 19th century



Short, handwritten lines of unrelated words contained coded weather reports to send via telegraph in the late 19th century.

The silk dress, which dates to the mid-1880s, in which the pieces of paper containing the code were found. They were tucked in a hidden pocket, the opening of which was hidden by an overskirt.





It's been a while since I've inundated you with mathematics humor...



<u>This High Schooler Invented an A.I. –</u> <u>Powered Trap That Zaps Invasive</u> <u>Lanternflies</u>



Using solar power, machine learning and her family's patio umbrella, 18 – year – old Selina Zhang created a synthetic tree that lures the destructive species.

Zhang is one of 40 finalists in the <u>Regeneron Science Talent</u> <u>Search</u>, the country's oldest and most prestigious science and math competition for high school seniors. Finalist projects range from revolutionary engineering feats, such as low-cost, universal 3D-printed prosthetics for amputees, to space science breakthroughs, such as analyses of microorganisms on comets and asteroids to hypothesize the establishment of life on Earth. Zhang's invention falls in the contest's environmental science category, but it clearly crosses fields.

Math Pictures for function graphing! Where should the x & y axes be placed?







Regional Conference



Regional Conference & Exposition

Thank You

Washington State Mathematics Council for hosting the 2024 NCTM **Regional Meeting & Exposition**

Thanks to PSCTM members. Art Mabbott, Joe Frost and Joyce Frost for volunteering with the February 7-9, 2024 Regional NCTM Conference. And a special congratulations to Angela Ensminger for her very successful Thursday burst session on Art and Math!

Upcoming NCTM event:

NCTM 2024 Virtual Conference April 10 – 13, 2024 Through live and on-demand sessions, rediscover YOUR joy as a mathematics educator while gaining skills to empower your students through prioritization of student-centered instruction.



Parallel pews from above



360 degrees of parabola water jets

SELFIE STATION

#NCTMISEA24



PSCTM member Rona Gurkewitz at the SUMM booth. Problem Solving WS







Convention escalators

Benjamin Banneker puzzle: rearrange pieces to make a square



A free Black man who owned a farm near Baltimore, Benjamin Banneker was largely selfeducated in mathematics and astronomy. The 18th century intellectual used his knowledge to create a series of almanacs in the 1790s. He also helped survey territory for the construction of the American capital city, Washington D.C.

Let's Celebrate Pi Day Thursday, March 14, 2024!

Math Fun – Pi! (Jane Bissonnette)

Here is a fun activity for Pi day.

Have your students make a Pi chain. Get 10 different colors of construction paper and cut into strips. Pair each color with a number for example, pink represents the number one, purple represents the number two and so on. If you want to go the extra mile you can label the strips as shown in the picture below. Start creating your paper chain by taking a strip of paper that represents 3 and make it into a loop. Close the loop with a stapler or tape. Next take a strip of paper that represents 1 and thread it through your loop. Close the loop. Repeat with strips that match the numbers in Pi so that you have a visual representation of Pi. Challenge your students to see how a long a chain you can make.

Here are the first 500 decimal places of Pi:

3.1415926535 8979323846 2643383279 5028841971 6939937510 5820974944 5923078164 0628620899 8628034825 3421170679 8214808651 3282306647 0938446095 5058223172 5359408128 4811174502 8410270193 8521105559 6446229489 5493038196 4428810975 6659334461 2847564823 3786783165 2712019091 4564856692 3460348610 4543266482 1339360726 0249141273 7245870066 0631558817 4881520920 9628292540 9171536436 7892590360 0113305305 4882046652 1384146951 9415116094 3305727036 5759591953 0921861173 8193261179 3105118548 0744623799 6274956735 1885752724 8912279381 8301194912





Enjoy these activities from NCTM to help celebrate Pi Day!

- Measures of Circles (Activities with Rigor and Coherence)
- Pi Fight (Illuminations Interactive)
- <u>Circle Tool</u> (Illuminations Interactive)
- <u>Pi Day, Lets Eat Cake</u> (Problem of the Week)
- <u>Pi Day Treats</u> (Problem of the Week)

Pi Day: <u>https://www.weareteachers.com/pi-day-worksheets/</u>

42 Mathtastic Pi Day Activities for the Classroom https://www.weareteachers.com/pi-day-activities/





14 Fun 2024 Pi Day Activities for High School Students

https://www.hmhco.com/blog/pi-day-activities-for-high-school-students

Pi Day Activities

https://www.exploratorium.edu/pi/activities

Pi Day is on its way! Pi Day Activities!

https://momgineer.blogspot.com/2015/02/pi-day-is-on-its-way-pi-daylink-up.html

The Pi Day Deals on Pizza, Pie & Gadgets for National Pi Day 2024 https://www.couponcabin.com/blog/national-pi-day-deals/

"The thing we love most about Pi Day (besides the cool math facts) is that it inspires local and nationwide deals on retail and food, most of which include pizza and pie! In honor of March 14, we're bringing you all the best Pi Day freebies and deals in 2024 as well as the interesting history behind National Pi Day."

Blog Spotlight – Math = Love (mathequalslove.net)

One of my favorite blogs for inspiration (especially puzzles) is authored by Sarah Carter, a math teacher from Oklahoma. There are lots of great ideas to enhance your math classroom. In particular, for Pi Day, she has an entire range of activities to help your celebrations!

Go to <u>https://mathequalslove.net/pi-day-palooza-collection-of-ideas-for/</u> My personal plan is to set up stations with some of my favorite activities from her blog.





Life is a lot like Pi – sometimes it's irrational but always fascinating. Pi Day inspires me to make irrational but well-rounded decisions. Pi reminds us that life is full of infinite possibilities. Life is a journey that goes on & on – like Pi.

Check out these timely NCTM sites:

St. Patrick's Day, March 17

- Lucky Lollipops (Problem of the Week)
- Lots More Lucky Lollipops (Problem of the Week)
- <u>The Straggler Shakes Hands</u> (Problem of the Week)
- Irish Specials (Problem of the Week)
- The Math of the Irish (Problem of the Week)

Women's History Month, March

- <u>Womens Walkway</u> (Problem of the Week)
- Nightingale (Notice and Wonder)
- <u>Space Shuttle</u> (Illuminations Lesson)

Many of you know that **Dan Meyer** has a fabulous blog, *Math Worlds*, that has many helpful suggestions! (*Building better worlds for learning math.*) <u>Click here to subscribe</u>.

For the October 18, 2023 blog post, he posed the question, "Okay, so how would YOU spend \$100M in Education?" Here are the four points that he made in response to this question:

- What would happen to teacher and student outcomes if we made some drastic improvements to teacher working conditions?
- How can we develop an asset orientation in teachers at scale?
- How can we help teachers develop through their curriculum?
- What are models for personalized learning that are more inclusive of teacher and student community?

For the 2nd bullet, Dan Meyer linked to a video of a 2017 University of Utah lecture by **Dr. Ilani Horn**. Some of you may remember that she was a Mathematics Education professor at the University of Washington prior to her current position as Math Education Professor at Vanderbilt University. <u>Click here</u> to listen to this lecture – it is fascinating! She describes herself as a listener of math teachers – talking about their instruction.

Dr. Ilani Horn: An Asset-Orientation is Everything

What is an "**asset-orientation**"? When teachers take an asset-orientation toward students, they seek to understand their strengths and value them as whole people.

"I describe key findings emphasizing the centrality of math teachers bringing an asset-orientation to their work. Teachers with an asset-orientation emphasize the unique strengths and cultural funds of knowledge their students bring to math learning. I review some

key findings about the impact of an asset-orientation on student learning. I then extend these to explain why this stance is also critical for mathematics teachers' learning as they strive to improve their practice. "

About Ilani Horn: "More people are good at math than manage to succeed in math at school. This assumption, drawn from my own experiences as a high school teacher, educational scholar, and mathematician, grounds my work. For this reason, I center my research on ways to make authentic mathematics accessible to students, particularly those who have been historically marginalized by our educational system.

Cal Armstrong (@sig225): I learn; I help others learn Mathematics Educator/Microsoft Education Fellow/PCMI – Institute for Advanced Study/Aux Police A/Sgt @cal-armstrong@mathstodon.wyz

PSCTM member from Ontario, Canada sent us the following article for this newsletter. Cal and I (along with Art Mabbott and Peg Cagle) served on the summer staff for the Park City Math Institute and that is where we met! Here is his author's note about this article. I think you will really enjoy it!

*As the author is the main programmer for chatOAME, this teacher's experience and feedback allow for relatively immediate changes to be made to the background of the service so that when content for teachers is created, formative assessment and setting-the-stage will become a more definite aspect of the AI's instructions when designing lessons.

Harnessing AI in Mathematics Education – Cal Armstrong (be sure to read the conversations...)

I had the opportunity to have a chat before our March Break with a teacher who has been using a special version of ChatGPT constructed for the OAME (Ontario, Canada's parallel to PSCTM, and an affiliate of NCTM). The service, called chatOAME, puts a "lens" between the teacher and ChatGPT's most advanced engine (4-Turbo) – the lens is made up of OAME's 50-year collection of its two journals, all of its web resources and published policies and proprietary documents so that every question is answered with a focus on the best of Ontario mathematics it bends ChatGPT's response towards OAME's Mission and Vision.

Our brief conversation (it was two days before the start of our two-week Spring break!) mentions some highlights of her use of chatOAME to design two lessons. You can see the two conversations here (<u>https://bit.ly/psctm-grade7</u>) and here (<u>https://bit.ly/psctm-grade8</u>), edited only for clarity. Should you read her conversations, you'll see the vast potential these kinds of specialized AI systems hold for refining lesson planning, formative assessments, and crafting learning environments that can be effective with both teachers and students alike.





Her first conversation is setting up a Grade 7 class on the circle, including circumference and area. She describes her class make-up and student characteristics and how she'd like a lesson crafted to meet their general needs. It does, and then the teacher conversationally asks for modifications to fit other needs, including the incorporation of an Indigenous perspective.

As she looked back on the Grade 7 lesson after having completed it with students, she noted that there were opportunities to use AI more substantially that she had overlooked. While indigenous components of the curriculum were successfully implemented, and the students were actively engaged and curious, she didn't feel that formative assessment of their understanding was as extensive as she would have liked and realized that she hadn't mentioned it particularly with chatOAME*. This oversight reminded the teacher in her next conversation in planning a Grade 8 lesson.

Another thing she noticed was that she (and the AI) had missed deliberately planning for methods of student interaction and collaboration, an approach especially important with Grade 7 students, and she needed those steps to meticulously set the stage for a student-active learning environment. She also hadn't used the AI to create actual content for the class; the structure of the lesson was there but not the individual pieces that the teacher and the students could use.

She smiled and said, "Everything that I noticed lacking in the Grade 7 lesson was done in the Grade 8 lesson."

As you can read, her conversation about Grade 8 with chatOAME let her experiment with student content generation and lesson ideas that introduced resources and methodologies she hadn't considered before. This speaks to the motivation for chatOAME's creation – to be a teacher's *More Knowledgeable Other* from Vygotsky.

In the conversation, she and the AI planned a lesson for Grade 8 word problems involving fractions. The teacher asked for a problem (and a solution) that she could use with the students at the whiteboards, and a list of vocabulary necessary for students to be able to move from word problem to solution. She made sure to ask for formative assessment options in the lesson and chatOAME made a series of suggestions with the teacher choosing to have the students do a self-reflection. As well, chatOAME's recommendation to use the bar model proved to be a rich decision. Moreover, AI eased the generation of student-crafted questions, serving as an effective method for formative assessment. This approach had her note the student's improved engagement and participation levels, particularly notable before an imminent break.

Her reflection on these two teaching experiences sparked an expanded view of formative assessment, extending beyond traditional quizzes to embrace more interactive and nuanced methods. The expansive knowledge base of AI, and the bespoke nature of the OAME lens we put in front of it, present opportunities for designing personalized, adaptive assessment strategies that cater to the diverse learning paths of individual students and reflect the best of mathematics education practices. Through integrating AI into the process, she noticed that she could craft assessments that promote self-reflection and deeper engagement with the subject matter with considerable ease.

During our chat, the teacher referred to her current use of Danielson's Framework for Teaching but noted that it was now insufficient and that she sees the need for something different – a framework that recognizes that she's now teaching with a coach continually by her side. Her ongoing dialogue with chatOAME lets her refine her teaching approaches and find ways to enhance the quality of student learning experiences through research-based educational practices that are new, forgotten or under-appreciated.

She would also like to begin using chatOAME to ask questions about the students' self-reflections. What themes are there across the class, and what is notable about each individual student's writing? And, longitudinally, what growth is seen in their writing about their mathematical work? How can she adapt her lessons to accommodate the needs that surface from this exploration? She has done this before, manually, but having a remarkably fast assistant to supply another set of eyes on the data can only help.

We think that the integration of AI into educational practices presents a promising opportunity for teachers to enrich and accelerate the preparation part of their day. Through reflective practice and a willingness to harness the capabilities of AI, teachers are now able to, relatively easily, develop personalized content that enhances instructional strategies and can positively affect student outcomes. As you read the conversations, we think it displays the potential of AI in fostering innovative, engaging, and impactful educational environments. It still makes mistakes, and has biases both explicit and hidden, but bringing a deep-thinking teaching assistant into the classroom is an opportunity not to be missed. --- **Cal Armstrong**

"Human innovation is the sun and AI is the moon. We can't have the reflection of human knowledge without human knowledge. Human knowledge is what will feed and innovate AI, and a critical understanding of subject knowledge is essential to that process."

Math Circles – Art Mabbott

Last Tuesday I got to experience an evening at the Seattle Math Circle. "What is a Math Circle?" you ask? It is a 90 minute session every Tuesday evening at the University of Washington where Doctoral Students who have a passion for mathematics join Middle School students (7th, 8th, and 9th grades) who want to grow their own passion to mix, meet, explore and share their solutions to rich and different problem sets. Tuesday they were exploring proof - how do you know you have done enough? It was clear that they had already discussed direct proof by, for example, induction. That night they were looking at Proof by Contradiction for the first time. The evening started out by taking a look at a Fibonacci sequence and asking "Prove that two consecutive elements in the sequence are never both divisible by 19? Several students were able to explain in their own words, but differently, by contradiction that it wasn't possible which eventually led to a problem. They then went to work on a dozen or so MS approachable problems individually and in small groups, mentored by the Grad students. There was a lot of productive struggle and after a quick 60 minutes, the kids shared their approaches. It was wonderful to watch. AND they were challenged if they did too much 'hand waving'. They felt safe to take a risk and share. It was cool! So, who can join this Math Circle? Who is it intended for? And what does it cost?

If you have a middle school student who is a little bored, or one that likes math contests or one who hates contests but would love to hang out with PhD math students on a Tuesday evening form 5-6:30pm? This would be for your student! It is tailored and targeted for middle school students. And it is FREE! They do take donations, but there is no charge for any student wanting to join The Seattle Math Circle. Please check out the flyer below. The next series of meetings of the Math Circle starts with the UW's Spring Quarter on Tuesday, March 26th, 2024 and they are looking for new future mathematicians to join them.



Monthly Math Hour – Art Mabbott

The Seattle Math Circle is also sponsoring a *Monthly Math Hour* at the UW for students in grades 6-10. The topic each month changes and this spring's subjects look exciting. Some of your students may be looking for a way to explore their own passion for some different mathematics. I heard Andrew Wiles talking about first hearing about Fermat's Last Conjecture when he was in Middle School and thinking: *"Someday I want to learn more about that Conjecture. And maybe I will be able to prove it, too."* Amazingly, in the early 1990's he did! What problem might light that fire/passion for mathematics in one of your students?

Monthly MATH Hour at UW

An hour of fun math at the University of Washington for students in grades 6-10



All three talks will be IN PERSON at the University of Washington Main Campus, Architecture Hall (ARC) 147. The location for the Math Olympiad is TBD. All events are FREE. For further information, campus maps, and driving directions see sites.math.washington.edu/~mathcircle/mathhour

A lot of Pi – Joe Frost

In 2021, a Swiss computing team ran a program for 108 days to calculate the first $2\pi \ge 10^{13}$ digits of π . The attempt was led by **DAVIS** (Centre for Data Analytics, Visualization and Simulation), a center for research, industry and education that operates within the University of Applied Science of the Grisnos located in Chur, Switzerland. The number of digits was chosen for symbolic reasons, but the actual process used is designed to test hardware and software against a standard benchmark. Which computer is fastest is often debatable because a fast central processor unit (CPU) coupled with a not-so-fast input-output (IO) device might be slower than a mediocre CPU hooked to a fast IO device. A reliable comparison of the overall speed of a computer is the time it takes to calculate a specified number of digits of π .

Cray supercomputers, first released in the 1970's, used a set of daisy-chained, super-cooled CPUs to achieve speeds that were phenomenal at the time. Weighing in at 5500 pounds, the multimillion dollar computer operated at 1.9 billion floating point operations per second (FLOPS). In comparison, an iPhone 12, weighing just under six ounces, operates at 11 trillion FLOPS. Sadly, we don't have a head-to-head comparison of the time it would take those two competitors to calculate the first billion or so digits of π .



