Puget Sound Council of Teachers of Mathematics September 15, 2021

Puget Soundings

"The difference between ordinary and extraordinary is that little extra." - - - Jimmy Johnson
"Autumn shows us how beautiful it is to let things go." Anonymous

September 15, 2021. Happy Fall!

Editor: Joyce Frost (frostjoycee@gmail.com)

Mathematics for Human Flourishing

Dr. Francis Su

Zoon Presentation
Monday, Oct. 18, 2021
5 – 6:30 pm

"You might think of math as a set of skills, like doing arithmetic or factoring a quadratic. But math is much more about building a set of virtues: like persistence, creativity, and a competence to solve problems you've never seen before. All of us have deep human longings, such as for exploration, beauty, and truth. I'll explain how math can (and should) meet those desires, and how the resulting virtues will serve you well no matter what you do in life and no matter what life throws at you. An incarcerated man---now my friend---has helped me see this more clearly than ever before." ***Register Here!***

Dear PSCTM members,

Welcome back! The beginning of the 2021-22 school year has been exciting. It's a joy to see so many smiles, and to hear the enthusiasm in the voices of students and educators alike.

Many of us are taking some extra time this fall to focus on social-emotional learning (SEL) opportunities to build relationships, create routines, and construct a new sense of normal. This effort will strengthen our students' mathematical identities and support them in taking risks as they learn new concepts.

Maya Angelou once quoted, "I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel." We hope you have a wonderful school year, and we look forward to continuing this learning journey together.

Best wishes,

Traci Cotton, PSCTM President

Renew your PSCTM membership online!

Jane Bissonnette - Past President, Secretary, Joyce Frost – Program, Newsletter, Jane Hunter - Newsletter, Art Mabbott – Treasurer, NCTM Rep, Joe Frost - Web Page, Laura Beckett, Maryke Haynes - Equity, Angela Ensminger – Membership/Social Media,








Monday, October 18, 2021, 5 – 6:30 pm
Mathematics for Human Flourishing

Francis Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College *and a former president of the* ***Mathematical Association of America****. In 2013, he received the Haimo Award, a nationwide teaching prize for college math faculty, and in 2018 he won the Halmos-Ford writing award. His work has been featured in Quanta Magazine, Wired, and The New York Times. His book, Mathematics for Human Flourishing (2020), winner of the 2021 Euler Book Prize and finalist for the Phi Beta Kappa Book Award in Science, is an inclusive vision of what math is, who it's for, and why anyone should learn it.* *Register Here!*

2021/2022 PSCTM Dinners!

Fall Zoom Presentation:
Monday, October 18, 2021
Winter Dinner:
Monday, February 7, 2022
Spring Dinner:
Monday, May 9, 2022

The Fall and Winter dinner will again be ***virtual.*** The Spring dinner ***may*** be back in person.

You will not want to miss this great presentation! Many of our PSCTM board members have met Dr. Francis Su through his work with the Park City Mathematics Institute. Some of you have heard of his famous 2017 speech before the ***Mathematical Association of America*** which prompted a call to write this book on the *Mathematics of Human Flourishing*. If you are not already convinced, please note this book recommendation by board member ***Maryke Haynes:***

"Francis Su's book, Mathematics for Human Flourishing, was recommended to me by a former teacher. Once I opened it, I couldn't put it down! I stayed up all night (on a school night!) finishing it. I cried no less than three times from joy and appreciation. Since then, I have given away four copies to teachers and non-teachers, math people and "non-math" people. This book is good for the soul." - Maryke Haynes

For this Fall presentation, we will be holding our usual membership door prize drawing. However, in lieu of one prize for one member, we will be awarding five lucky members with copies of Francis Su's book, Mathematics for Human Flourishing. You can register for the presentation here.
Books will be sent directly to winning members' addresses after the event.

New Shape Opens 'Wormhole' Between Numbers and Geometry

Laurent Fargues and Peter Scholze have found a new, more powerful way of connecting number theory and geometry as part of the sweeping Langlands program.

"The grandest project in mathematics has received a rare gift, in the form of a mammoth 350-page paper posted in February that will change the way researchers around the world investigate some of the field's deepest questions. The work fashions a new geometric object that fulfills a bold, once fanciful dream about the relationship between geometry and numbers."

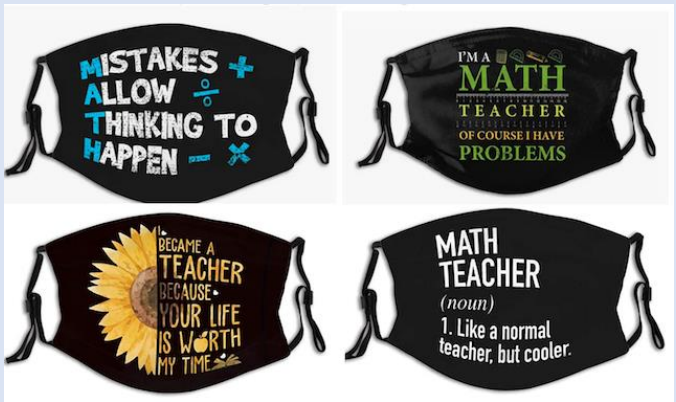
Is there a Silver Lining for Education in the Dark Clouds of the Pandemic?

As I sat in my chair today after my students left, I pondered this question. Has there actually been some advantages in Education due to the pandemic? The truth is, in my opinion…a hesitant, but definite yes!

- Many districts made sure this year that computers were in the hands of their students.
- Districts have adopted education platforms like Schoology, Canvas or Google Classrooms that have organized the learning experience for students as well as given them a place to find other sources.
- Teachers have spent the last year getting training on Desmos, Kami and so many other virtual options and are using them in the classroom to add to the teaching experience.
- Students are much more adept with technology and in person are beginning to teach each other how to use the technology.
- Even those apps that seem to "*Do it all"* for the student have brought an advantage. It has raised the level of conversation in my classroom. I ask them to ***explain their thinking*** to me, to their neighbor or to their team. We discuss the different ways a problem might be solved and ask ourselves which one works best for me and why? They now know that the process is just as important than the answer. These apps have brought about more math conversations than I have ever seen in the past.
- Students are so happy to be back in person with someone there ***seeing*** them that it has made the interactions even with masks fun. I broke down and got creative purchasing masks on Amazon by the company, ***Aniuerln*** pictured below.

I'm still taking it every day at a time. The difference now is that I am also giving myself and my students permission to learn with our mistakes and search for those Silver Linings. I am confident this will be a unique and rewarding year and that the education of our students will end up better for it.

Jane Hunter



Math at work – This Calculator Estimates Your Risk of Getting Covid-19

The online tool draws on recent data to approximate your chances of contracting the virus in different scenarios.

You can find a great article about this Covid Calculator in the Smithsonian Magazine.

Or watch a great video about it on YouTube.

Microcovid.org is a tool which uses a mathematical model based upon publicly available global Covid data and scientific research.

For information on their reasoning, go to microcovid.org/paper

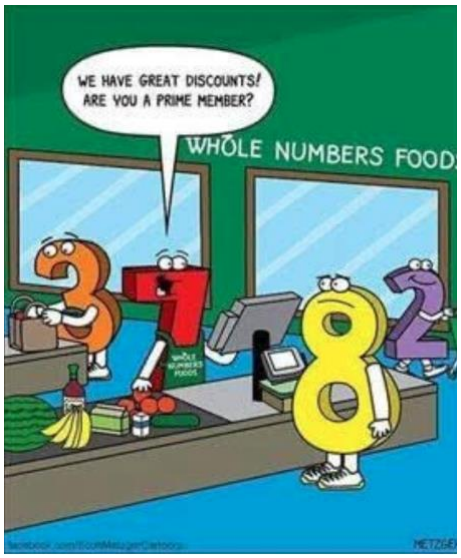
Receive Clock Hours for PSCTM events!

If you attend one of our PSCTM events: Fall 2021, Winter 2022, or Spring 2022, you can receive one and a half clock hours per presentation. Just send an email to art@mabbott.org after the event.

PSCTM's simplified process:

- Request clock hours for any one of the events
- Art will send you an evaluation form
- Complete evaluation form and email to Art
- Art will send you the clock hour form for the event that you attended
- Complete the clock hour form and keep it for your records. (***Email Art if you have questions)***

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



Creating the Never-Ending Bloom

John Edmark, Artist, Designer, Inventor - Stanford University

Above right are just a few examples of his beautiful work. In his work, he likes to base these blooms on the Golden Ratio which can be described as rectangles that have the following ratios of sides:

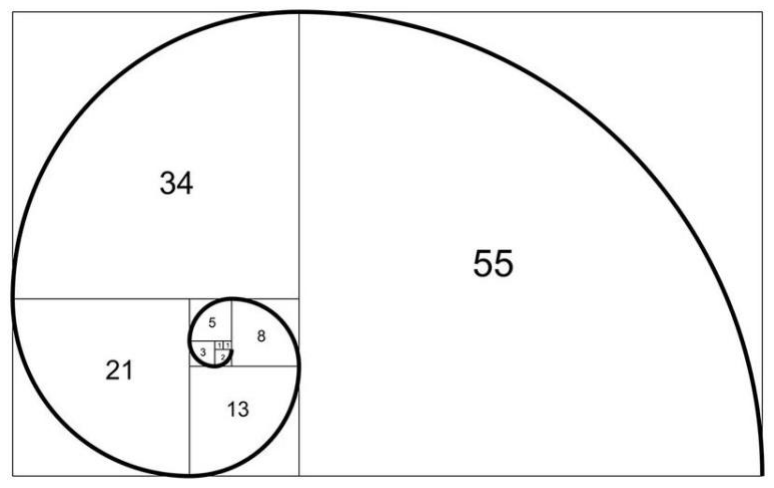
$$\frac{A}{B} = \frac{B}{A+B}$$

"I think my work is most successful when it evokes a sense of wonder, when it sort of seems to be magical. What I am trying to achieve in my work is something that will evoke that in somebody else and they will say, 'wow, what's going on there – how is that possible'?"

John Edmark

Fun with Number Theory!

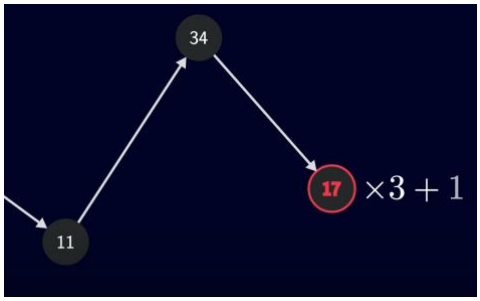
I've heard many stories over the years about mathematicians and what first sparked their love of mathematics. A fairly common thread is that they were introduced to a puzzle where it was easy to understand the rules, but the results were unexpected. My first introduction to that sort of puzzle was from my 7th grade History of Math teacher, Royal Penewell, who introduced us to a number of deceptively simple number theory concepts. For example, the Fibonacci Sequence is easy to build; start with 0 and 1 and add the two terms together to get the next term. Add that term to the previous one to get the next one, and so on. 0 + 1 = 1, 1 +1 = 2, 1 + 2 =3, and so on, forever. You can build a spiral by taking a 1 by 1 square, tacking on another 1 by 1 square, tacking on a 2 by 2 square, and continuing the pattern by adding a square whose sides are determined by the next Fibonacci number. Drawing a curved line that connects the outer junction of the squares yields a curiously beautiful shape.

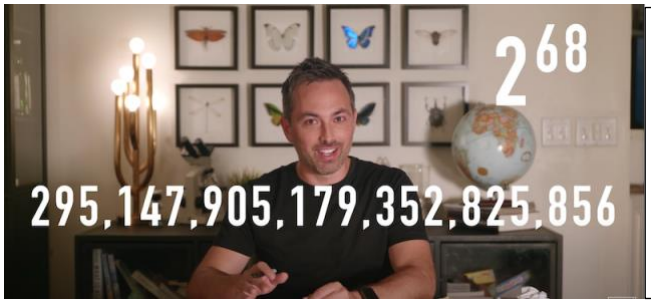


Another curious sequence is the basis of the Collatz Conjecture, also called the 3n+1 problem. Take any number and, if it is even, divide it by two. If it is odd, multiply it by 3 and add 1. Take that term and apply the same rules. If the number is a power of 2, the terms will uniformly descend to 1. If it is any other number, the unproven conjecture is that the terms will grow and shrink but will always eventually descend to 1. If you start with 5, the terms are 5, 16, 8, 4, 2, 1. If you start with 6, the terms are 6, 3, 10, 5, 16, 8, 4, 2, 1. Every number up to 2^{68} has been tested, and it has worked every time. However, no one has yet proved that it will always work, and it only takes one counterexample to prove that it won't. Enthusiasts try to find which numbers yield the longest string of terms before they hit 1. In our example above, it took 8 steps for a sequence starting with 6 to reach the end. If you start with 7, you get 7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1, or 16 steps. If you start with 9, you get 9, 28, 14, 7 and so on, so the sequence is 19 steps long. If you can find a number whose sequence eventually leads back to the starting point, you will have disproven the conjecture. It is more difficult today than when I was a 7th grader only because so many people have tried and exhausted all the numbers smaller than 2.9×10^{20} so the numbers that haven't been tried are now very large! - - - ***Joe Frost***

The Simplest Math Problem No One Can Solve – Collatz Conjecture

Enjoy this video explaining more about the problem Joe mentioned above. The Collatz Conjecture is the simplest math problem no one can solve – it is easy enough for almost anyone to understand but notoriously difficult to solve.

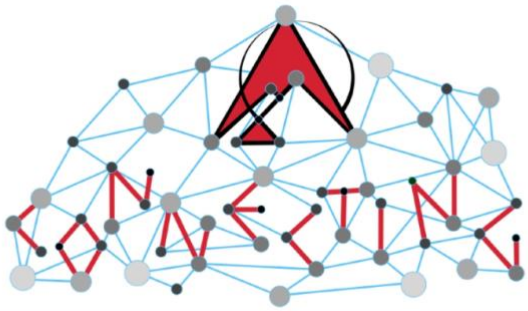




"This is the most dangerous problem in Mathematics, one that young mathematicians are warned not to waste their time on."

BCAMT
British Columbia Association of Mathematics Teachers

The BCAMT proudly presents...



60th Northwest Mathematics Conference

October 21 - 23, 2021

Virtual Conference on Zoom

Early-Bird Registration Now Available!

Thurs, Oct 21: Virtual Math Social Evening

Fri, Oct 22: Opening Keynote · Sessions · AGM

Sat, Oct 23: Sessions · Closing Keynote @ 11:15 am

Keynotes: Francis Su & Chrissy Newell

Featured Speakers: Nat Banting · Cathy Bruce · Molly Daley · Graham Fletcher · Robert Kaplinsky Jenna Laib · Peter Liljedahl & Thinking Classroom Educators · Cathy Marks Krpan · Fawn Nguyen Carl Oliver · Al Overwijk · Marian Small · Christina Tondevold · Theresa Wills · Steve Wyborney BC educators from the BC Numeracy Network, the Indigenous Mathematics K-12 Network, and the BC Reggio-Inspired Mathematics Project ... and more!

www.bcamt.ca/nw2021

60th NWMC Keynote Speakers

Francis Su

Friday 08:30

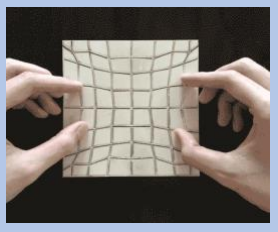
Chrissy Newell

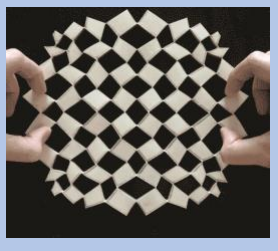
Saturday 11:15

Mathematical framework turns any sheet of material into any shape using kirigami cuts

Researchers from the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) have developed a mathematical framework that can turn any sheet of material into any prescribed shape, inspired by the paper craft kirigami (from the Japanese, kiri, meaning to cut and kami, meaning paper).

"Our work draws on inspiration from art, tempered by the rigor of mathematics, and the challenges of engineering shape. Finding kirigami tessellations that can convert a square to a circle, or a flat sheet into a poncho is just the start. We think that this is just the beginning of a class of new ways to engineer shape in the digital age using geometry, topology, and computation," said Mahadevan.





Get Ready for the Northwest Math Conference in Tacoma in 2022!

PSCTM is excited to partner with the **Washington State Math Council** for the **2022 NW Math Conference.** The conference will be returning to the **Tacoma Convention Center October 13 – 15, 2022.**

We will be focusing on strands of inviting **all voices** into math, addressing diversity and inclusion, planning for equity and access, inviting in through play and curiosity.
We plan to provide several ways to participate through registration options (Saturday only, Keynote streaming) and intentionally creating space for educators to connect. We will have a slightly longer and robust program on Saturday for 'Saturday only' participants.

If you are interested in helping, contact Maryke at: mhaynes@everettsd.org, (206) 351 – 3095 **Maryke Haynes (co-chair, logistics)**

KEYNOTES: Kristopher Childs, Laila Nur,
Breakfast: Alison Hintz and Elham Kazemi.
Our Ignite program will be all classroom teachers!

After 65 Years, Supercomputers Finally Solve This Unsolvable Math Problem

For decades, a math puzzle has stumped the smartest mathematicians in the world. $\mathbf{x^3+y^3+z^3=k}$, with **k** being all the numbers from 1 – 100 (a Diophantine equation) that's sometimes known as "summing of three cubes."

When there are two or more unknowns, as is the case here, only the integers are studied. The trick is finding integers that work for all equations, or the numbers for x, y, and z that will all equal k. Over the years, scientists have solved for nearly every integer between 0 and 100. The last two that remained were 33 and 42. Watch this ***Numberphile*** video and this one.
As of 2019, **42 is the only remaining (eligible) number below 100** which has not been represented as the sum of three cubes... 33 was cracked by Andrew Booker from the University of Bristol.

A Summer Refresh: Park City Math Institute

Angela Ensminger and Maryke Haynes

Every summer, graduate students, math professors and math teachers gather in Park City, Utah for three weeks to celebrate the joy and beauty of mathematics. Many members of PSCTM have participated over the years. This year, the Park City Math Institute was held virtually, and the organizers worked hard to keep many of the special features. PCMI is an annual event organized by the Institute for Advanced Study to focus on gathering a variety of people from many areas of mathematics teaching and learning.

Each day, teachers from Grades 3 to 12 gathered online to engage in mathematical concepts as curious learners during "Morning Math". The hosts did a great job creating spaces where teachers could work with other teachers from all over the county. In the afternoons, we gathered to reflect on our teaching practice with activities led by Peg Cagle. Special events were held and included game nights, such as an evening with Francis Su doing an Esti-ma-thon, and meeting with Rochelle Guittrez's cohort to learn about their special projects in humanizing mathematics.

Here are some highlights from the three weeks:

Tea and Cookies! An important part of PCMI is the interactions between math teachers, undergraduate students, graduate students, researchers, and other mathematicians. In the past we have shared meals, attended events together and had afternoon tea and cookies! This year, they mailed us the supplies to have afternoon tea and cookies at home!

Week 1 Fibonacci with Darryl Young and Bowen Kerins. This week, we explored Fibonacci and Fibonacci-like sequences and discovered some great connections with factoring polynomials and the golden ratio. We especially enjoyed how we were allowed to "discover" the connections at our own pace.

Week 2 Complex Numbers and Geometry with Patrick Honner. This was an algebra heavy week, where we got to flex a lot of the skills we teach in high school algebra class by combining them together in new and exciting ways. Maryke had a particularly frustrating couple days where she couldn't see what everyone else seemed to see. Then one morning while in the shower getting ready for the day it came to her! The reminder of the feeling of struggle, the breakthrough after patience and the grace and support from teammates was just the reminder she needed for the coming school year.

Week 3 Combinatorics and Cuisenaire Rods with Brian Hopkins. While Cuisenaire rods in a classroom can be a bit overwhelming, being able to play with them on our own was a blast! We spent the week looking for patterns to predict how many ways a value could be, how many ways with just odds, without ones, and so on.
Reflection on Practice with Peg Cagle. A major theme of the sessions throughout the three weeks was examining the discretionary spaces we encounter. We often discuss the big planning decisions we make, but we are making hundreds of decisions a day when teaching (no wonder we are tired!) Peg encouraged us to move from an epistemic stance to taking a stand and Rochelle Guiterrez shared ideas for creative insubordination. In the third week we examined resources to support our work with colleagues for equitable math instruction (equitablemath.org).

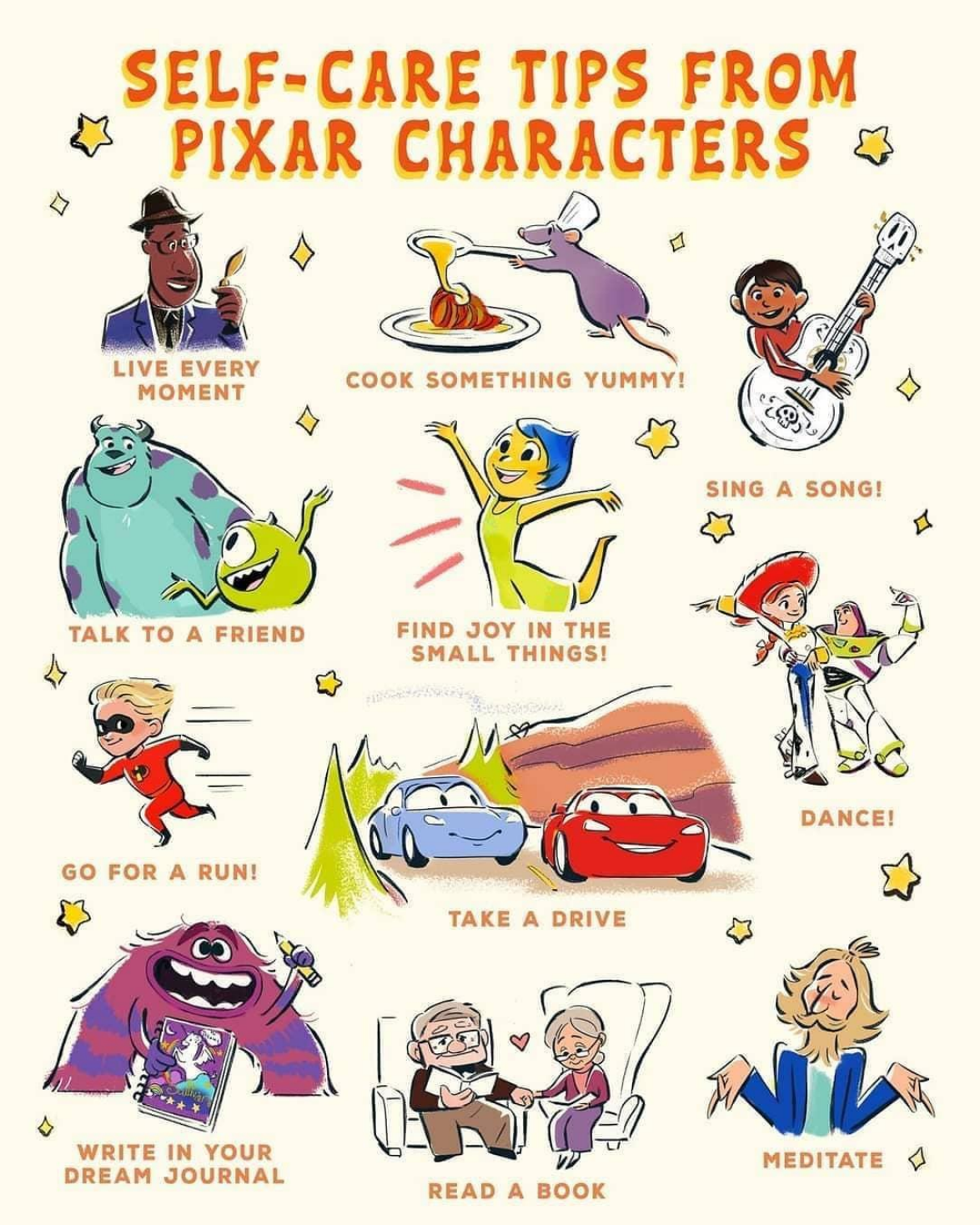
For Maryke, three weeks away from home is not feasible, so being able to participate virtually was a great opportunity. Angela also participated in 2019 and is planning on returning! She highly recommends the experience! The chance to explore math while creating connections with teachers all over the country is amazing. PCMI next year will be back in person in Park City, Utah July 17, 2022, to August 6, 2022. Applications will be available in November, closing in January. Teachers receive a stipend for the 3 weeks as well as lodging, transportation, and most meals!
We hope to see you there! https://www.ias.edu/pcmi

The World's Cutest Dot Talks

By Maryke Haynes

This summer my Golden Retriever, Ritchie, had 11 puppies, 7 girls and 4 boys. It meant that I had to count to 11 A LOT – many times a day and flex my subitizing strategies.
I named each of them after the characters in ***Schitt's Creek***: David, Patrick, Johnny, Roland, Moira, Stevie, Alexis, Jocelyn, Ronnie, Twyla, Wendy from Blouse Barn.

How do you see 11 in each of these pictures?



Pixar ✓
@Pixar

To self-care... and beyond! Channel your inner Pixar character with these tips.

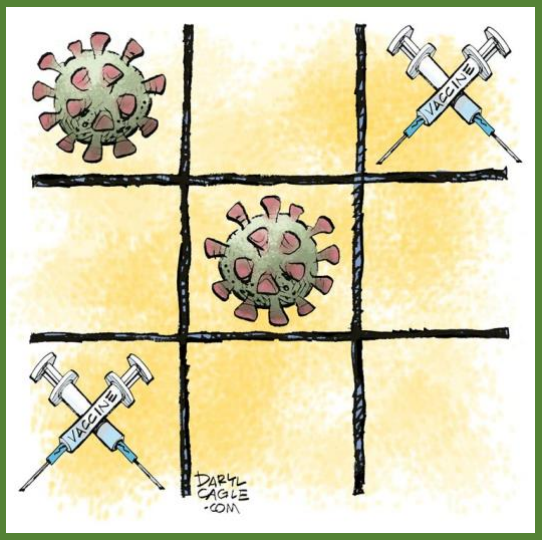
Math Fun: *Jane Bissonnette*

In the last edition I shared some lateral thinking puzzles. Here is another activity I do with my students that is not strictly mathematical but does require lateral thinking. It is called Three of a Kind. The three words in each set share a single feature. For example, a compass, a phonograph, and a pine tree all have needles. As an extra activity, I have the students come up with their own Three of a Kind. The first three sets are from my students.

1	leafy vegetable	political party	golf course
2	duck	restaurant goer	congress
3	river	cave	face
4	thermometer	college graduate	location on the globe
5	mattress	health resort	year
6	television	porch	basketball team on the offense
7	Greek building	newspaper	marching
8	bed	rancher	bookie
9	tennis player	noisy party	mafia ring
10	crossword puzzle	post office	high school sports star

Answers

Greens 2) Bills 3) Mouth 4) Degrees 5) Springs 6) Screens 7) Columns 8) Spreads 9) Racket 10) Letters



Math may not teach us how to add love or subtract hate, but it gives us every reason to hope that every problem has a solution.

2021 Perspective - - - James Stallworth

During the summer months, growing up in the Midwest, I played Stoplight tag with my neighborhood friends. For those unfamiliar with the game, one person stands some distance away from his peers facing the opposite direction. With closed eyes, maybe spinning around if the spirit so moved them, they would call out "Red Light, Green Light, Yellow Light, STOP!!!" Any person caught moving would have to return to the starting line. If someone was able to make it all the way to the caller, they would win the round and be the next caller. Part of the fun was seeing who you could either trick into moving prematurely or lull into a false sense of security.

I am sure that if I looked hard enough, there probably would be an app out there now for this game and kids would be able to play it virtually from the comfort of their own couch instead of worrying about skinned knees on the blacktop as you stretched your body into an unnatural position trying to reach the caller first. There was a risk to the game, but it was something that we undertook to gain this fun experience.

I bring this up because for the first time in a generation, the entire society was at a Red Light, and we stopped moving and froze in place. The pandemic placed us all at the starting line and asked us to move our kids to the finish line with someone or something else in control. Should we be in-person or fully remote? Should we have videos on or off? Should everyone pass to the next grade, or should everyone stay behind for a do-over? Each of these questions has come up at some point in the discussion of the 2020-2021 school year, especially in terms of mathematics instruction. Do we move forward with reckless abandon or so we stop and reflect on the successes we were able to experience through these challenging times. Or even still do we return to the starting line and begin again like nothing truly happened?

Anyone that knows me will tell you that I am passionate about mathematics and mathematics instruction. But I am equally passionate about students being able to construct their own mathematical knowledge and create a deeper understanding of the content rather than quickly memorizing an algorithm that may or may not benefit them in every situation. If we race to patch the remainder of our school year with formulas, superficial concepts, and "tips and tricks of the trade" are we truly teaching our students to appreciate mathematical thinking or are we pushing our own academic agenda on them? We have to acknowledge that there will be learning losses from this past year, but do we want to compound those deficits with a new distaste or disgust for mathematics if we remove some of the inherent beauty and fun out of problem solving and reasoning?

As teachers we had to step out of our comfort zone and learn multiple new devices, technologies, and learning platforms. Now that we are returning to something that looks a little bit more normal, are we going to place all of that learning on the shelf or apply it to our "new normal," a term that if you are anything like me have heard at least 14 times a week in the myriad of zoom meetings you were forced to sit through. Already I am thinking of ways I can build on my new skills for the next school year. Shouldn't we provide our students with the same opportunities rather than asking them to return to sitting quietly in rows and completing blackline masters of skills that came from the district office?

The world is and has drastically changed around us in the last 18 months. This was our own little game of Stoplight Tag. And now we have a choice to make. We can sit at the starting line waiting for someone else to take the lead. We could sprint straight ahead and run the risk of being caught off guard and get sent back to the drawing board. Or we could find a middle ground and an innovative way to move forward into uncharted territory with a new bank of skills and experiences that can turn a temporary setback into a potential reshaping of how we do and teach mathematics to our students.

I don't know about you, but I am game to venture off the beaten path.

***I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.* - - - Maya Angelou**