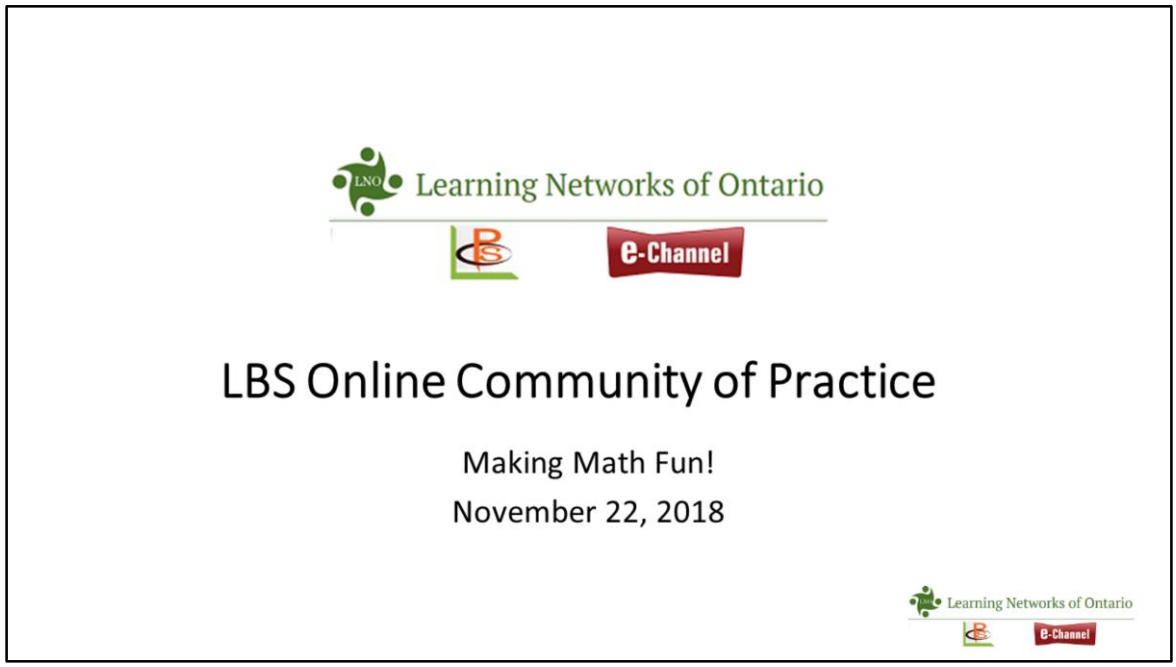
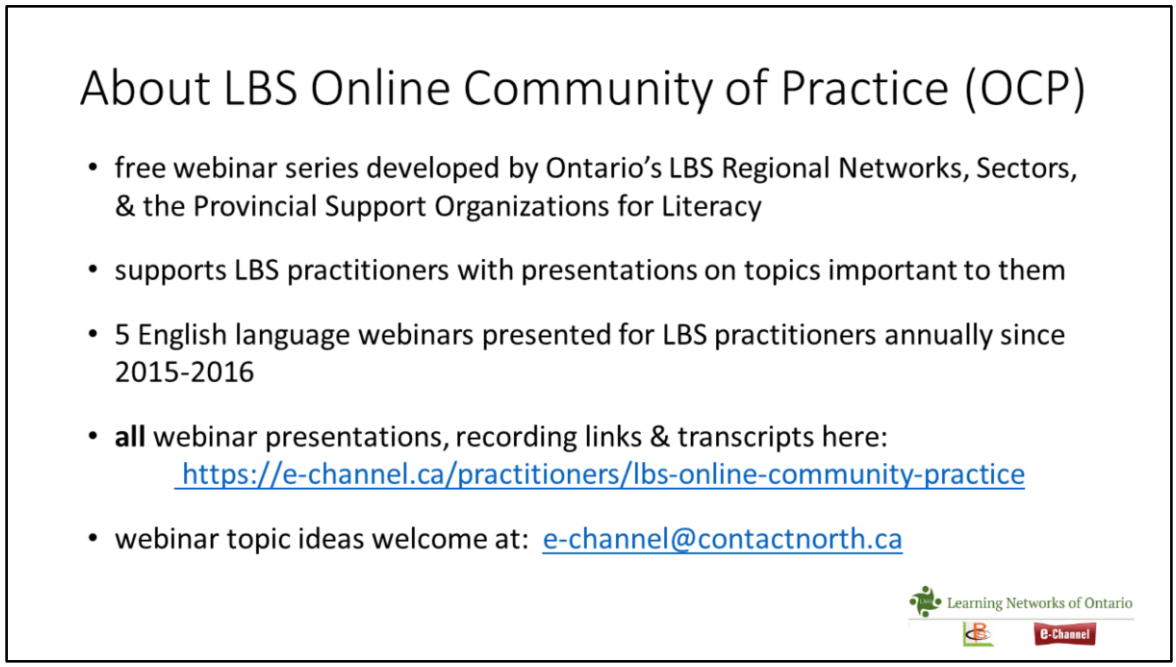


Sarah Stocker: Welcome everyone. My name is Sarah Stocker. I am here to support the webinar this afternoon. I would like to welcome who is already online. If you're feeling a bit unsure of what you are looking at on the screen, I am going to give you a brief orientation. (Sarah provides an orientation for the live session.) I will now turn the webinar over to today's moderator, Andrea Dickinson from Tri-County Literacy Network.

Andrea Dickinson: Thank you very much, Sarah. Good afternoon everyone. My name is Andrea Dickinson and I'm with Tri-County Literacy Network. I am a member of the Online Community of Practice Working Committee, and I will be your moderator for today's webinar "Making Math Fun!"

I am very pleased to see that today's topic has caught the attention of so many people from all across Ontario.



To begin, I'd like to say a few words about the LBS Online Community of Practice.

It's a series of webinars that has been developed collectively by members of Ontario's LBS Regional Networks, Sectors and the Provincial Support Organizations for Literacy.

Our goal is to provide affordable (because it's free) professional development to LBS practitioners on topics that are important to them.

We have been providing these webinars since 2015/2016 – 5 per year – and you can find all the previous webinar presentations, recording links and transcripts at the link you see on the screen.

We are always interested in hearing about topics that are timely and relevant to you, so if you have webinar topic ideas, please send them to us!

Today's Webinar… Making Math Fun

Rex Murphy on the Point of View:

https://www.youtube.com/watch?v=V9mMh9Wn-mM&t=35s

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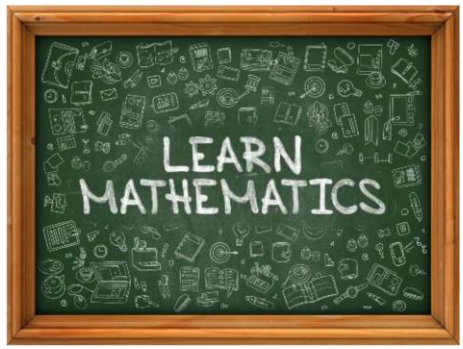
Today we're going to start our webinar with a little Canadian humour on measurement. Thank you to Deb Flynn of the QUILL Learning Network for this contribution! It's Rex Murphy on the Point of View.

I'll turn it over to Sarah to run the video for us (video from link on the screen plays). https://www.youtube.com/watch?v=V9mMh9Wn-mM&t=35s (Video makes fun of how Canadians use the metric system, but sometimes the Imperial measurement system.)

Today's Webinar… Making Math Fun:

- General Principles and Approaches to Making Math Fun
- Finding the "one-der" in Math
- Gamification, Gamer Psychology and Math
- Making Math Fun: Using Videos, Blogs, and Cartoons – resources
- Q and A



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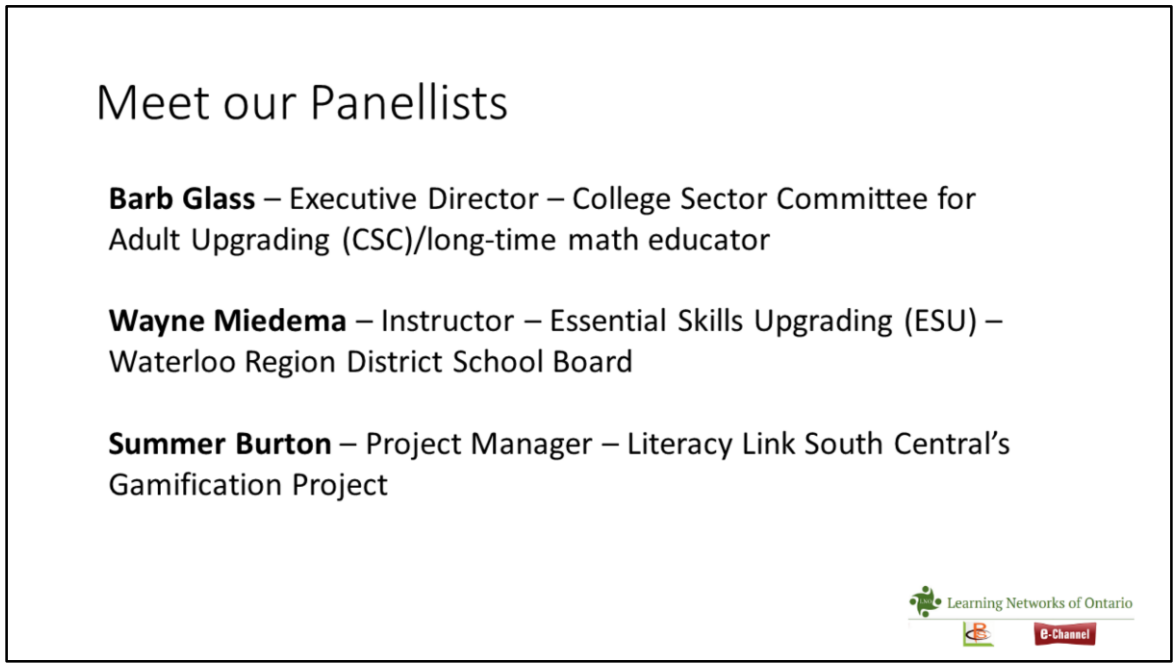
Thank you very much, Sarah, for playing that for us. Just a bit of humour to start things off!

In today's webinar, we will be learning more about making math fun. In this webinar we will be looking at 3 key areas:

General Principles and Approaches to Making Math Fun
We'll also be Finding the "one-der" in Math
We'll move on then to look at Gamification of Math.

After the three mini-presentations, we will look at Making Math Fun: Using Videos, Blogs, and Cartoons resources, and then we will have some time for a Question and Answer period. The presenters have asked that questions be held to the end of their presentations, so we appreciate you holding off until then.

I mentioned we have three main topics, and we are also fortunate to have three excellent presenters who are with us today to share their knowledge and experience.



I'd like to take a moment to introduce our panelists.

We have Barb Glass – Executive Director of the College Sector Committee for Adult Upgrading and a long-time math instructor – to talk to us about General Principles and Approaches to Making Math Fun
We have Wayne Miedema – Instructor – Essential Skills Upgrading – Waterloo Region District School Board - to talk about Finding the "one-der" in Math. Wayne has kindly stepped in to replace Steve Ballard who moved to another job
Last, but certainly not least, we'll hear from Summer Burton – Project Manager – Literacy Link South Central's Gamification Project to talk about Gamer Psychology and the Gamification of Math

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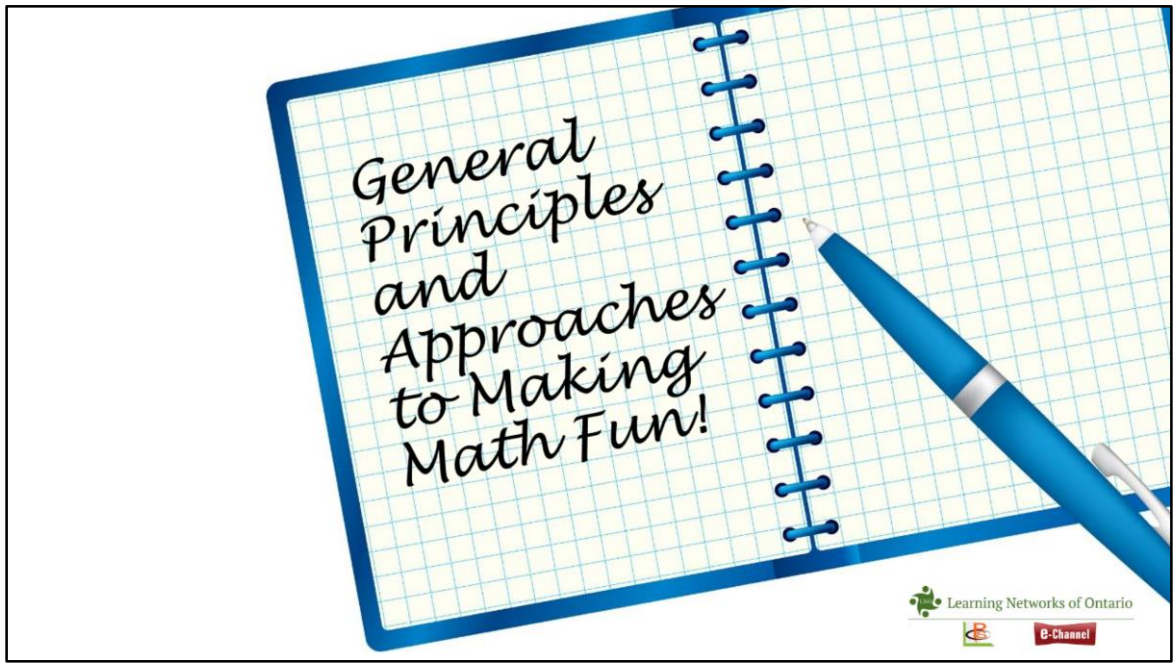

It's my pleasure now to turn things over to Barb Glass.

Barb Glass: Thank you everyone, and thank you Andrea for the introduction, and to Sarah for getting us all set up today. I am really happy to be here, and to chat about a fun topic. Some of you might not think it's fun, and many of learners certainly don't think it's fun, but I think it was a great way to start off with the video that we just saw. I realize that a couple of people weren't able to access it, but you can use the link to view it later, and you will get a laugh out of it. It does set the stage today for this first part of our discussion on making math fun, and for the other presenters as well. There are some themes today that underscore good teaching practice, but we're making it more contextualized towards math.

How I Finally Got Over My Fear of Math…

The classroom smelled like feet. It had no windows and was lit by those awful overhead fluorescents that make everyone over 25 look like an extra from The Walking Dead.

Not that this mattered to most of my classmates, who looked barely 18 and were probably wondering what the old lady was doing in their community college pre-algebra class. But none of this was as uncomfortable as what was facing me on the whiteboard: a long, complicated mess of an equation, full of parentheses, exponents, and negative signs. Somehow I had to come up with the answer.

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I'm going to start with an excerpt from an article I found recently. It's called "How I Got Over My Fear of Math". There are a couple of paragraphs on this slide, and one on the next slide. I'll read it with you.

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Not that this mattered to most of my classmates, who looked barely 18 and were probably wondering what the old lady was doing in their community college pre-algebra class. But none of this was as uncomfortable as what was facing me on the whiteboard: a long, complicated mess of an equation, full of parentheses, exponents, and negative signs. Somehow I had to come up with the answer.

How I Finally Got Over My Fear of Math…

I bent over my graph paper and started to calculate. All too soon, the professor called time and began walking around checking our results. I was in the second row, so he got to me quickly. I pointed to my solution.

"That is correct."

None of my friends and family understood why I'd suddenly decided, at age 38, to revisit high school math.
"Why would you do that to yourself?" my friend Nina, an attorney, asked over lunch, her eyes wide as she sipped her pomegranate iced tea.

"Because I got sick of believing I suck at math," I replied.

Source: https://www.cosmopolitan.com/lifestyle/advice/a27513/fear-of-math/

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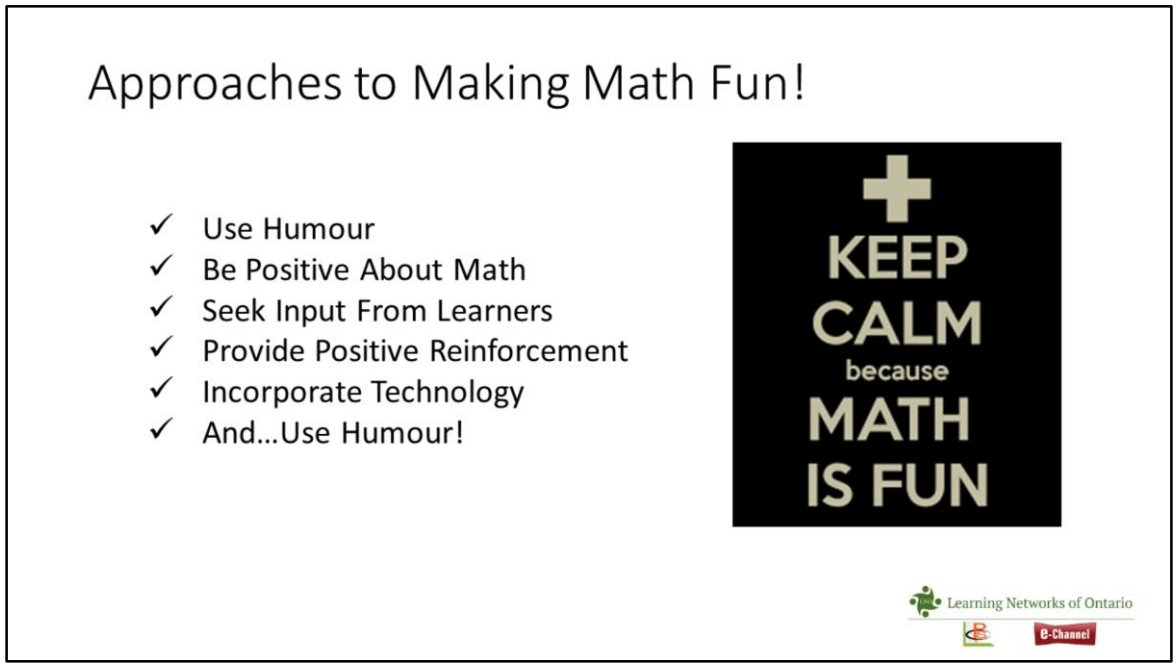
“Because I got sick of believing I suck at math,” I replied.

I think there are lots of adults out there who can relate to this. It doesn’t matter what kind of an upgrading program you are in, whether it’s college, school board, community-based or online. Very few people think of math as being fun. The last webinar was on math anxiety, so this is a nice continuation of trying to help people over their math anxiety by making it a little more fun.



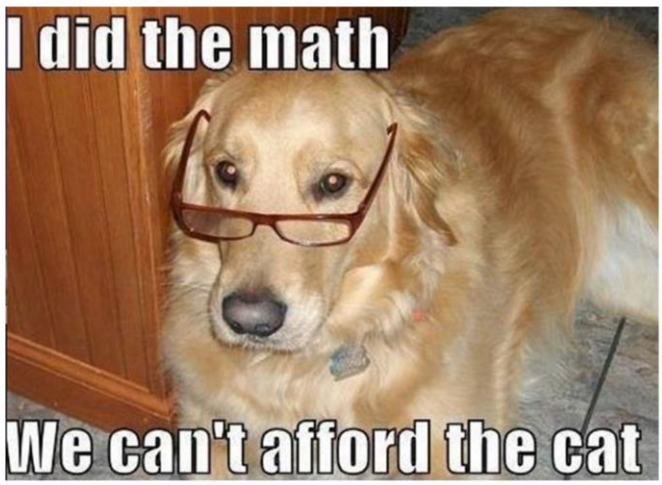
So when I was thinking about what I could share with you today, this is the list that I came up with. Not all of it applies only to math, but we'll put it in the context of math today.

Use humour: We've already started by talking about that, and you'll see the slides that I am using and that others are using throughout the presentation are full of little math cartoons and jokes and things like that that really can help people to be engaged in math.

Of course our own attitudes about being positive toward math is important.

Seeking input from learners, providing positive reinforcement, incorporating technology, and just in case you missed it the first time: using some humour!

Use Humour ☺



It helps to take the mystery and intimidation out of math…

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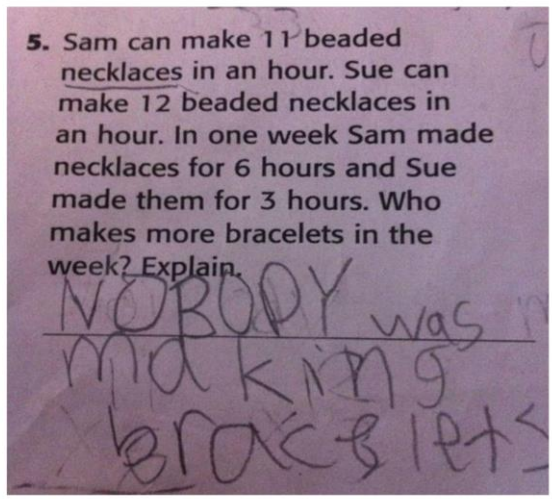
One reason that I really enjoy using humour when teaching math is because it just brings it down a notch for people. It just makes them – I find for adults especially – a little more willing to be open to the fact that even though math can be a little bit scary, it's really not that bad. That's why I have stated here that it helps to take the mystery and intimidation out of math. It could be true for other subject areas too, but especially for math because there's just so much math phobia out there. For years, it has been ok to be bad at math, even though we would rarely hear someone say they are bad at reading or writing. It's just not acceptable to be bad or to admit you're bad at reading or writing, although it's acceptable to admit you're bad at math.

Use Humour ☺



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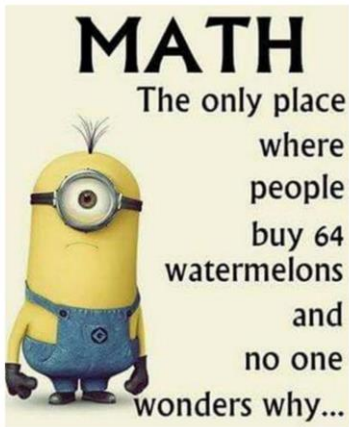
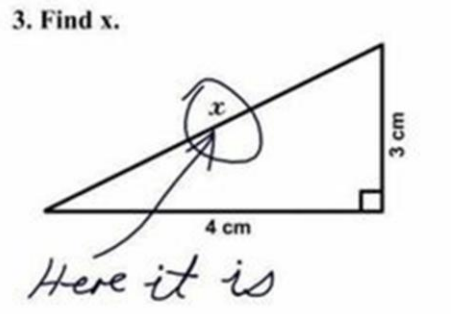
Here's another one that struck me as funny even though it's from a children's class.

Sam can make 11 beaded necklaces in an hour. Sue can make 12 beaded necklaces in an hour. In one week Sam made necklaces for 6 hours and Sue made them for 3 hours. Who makes more bracelets? The astute child responded that nobody was making bracelets because they were actually making necklaces.

Use Humour ☺





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Just a couple of other quick examples. I just pulled these off of a search on Google that said “free math humour” or “free math animations humour”. My point here in showing you a few of these is that it’s not hard to find them. It was really quite entertaining to see how many funny things there are.

I once worked with a teacher who on every assignment she handed out to her class (this was in college), she found some cartoon to put on the cover page because I think she understood that sometimes just a bit of humour takes the edge out of the trepidation that lots of students feel.

Have a Positive Attitude Toward Math

- Emphasize that math incorporates more than just "pencil and paper" calculations.
- Talk about the fun and "beauty" of math.
- Encourage your learners to share "math successes" they have experienced, no matter how small!
- Inspire confidence in the language of math – demystify the terms through discussion, games, peer work, etc.

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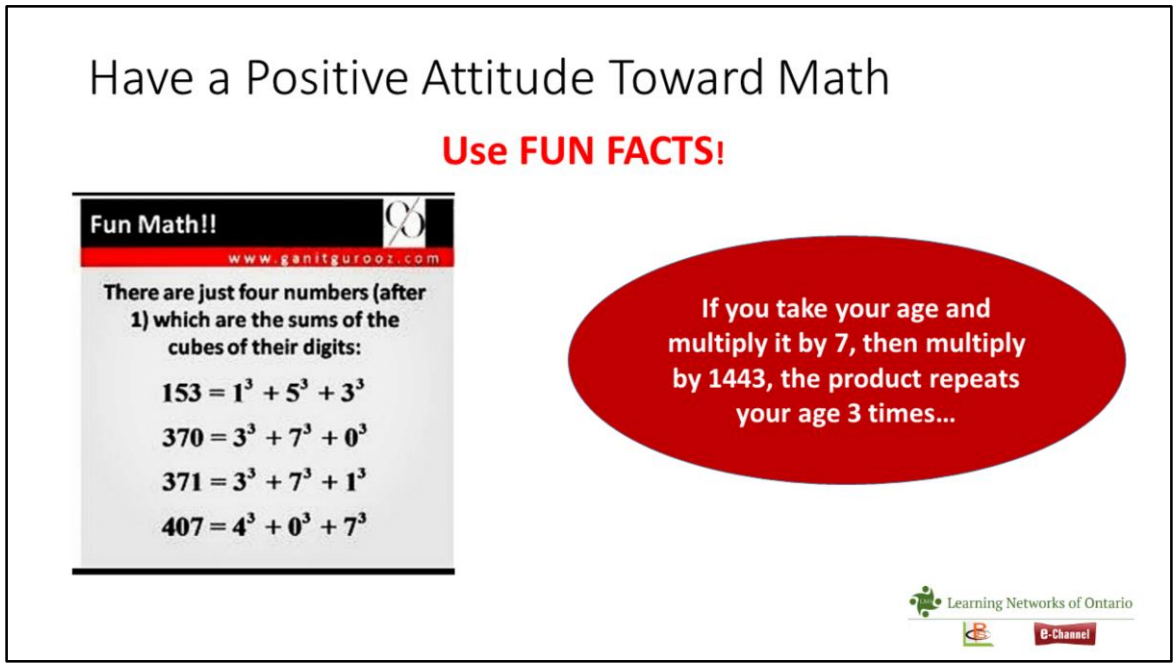
Next, I want to talk a bit about our own attitudes as teachers and practitioners towards math. Even if you have some trepidation and fear about math, it's really important to try to avoid communicating that to your students. I would venture to say that lots of adult students who come into our math programs and classes, whether it's in LBS or an adult ed program, they reflect back and think about all of the pencil and paper calculations they did and how arduous that was, but really one of the things we can do is help them understand that it's not all about pencil and paper calculations. We'll talk a bit more about using some hands on materials later in the presentation.

We can also talk about the fun and humour in math as we have been discussing. As you'll see in Wayne's presentation, there's a lot of beauty in math that people don't even recognize.

I think it's important also that we cultivate an atmosphere in class where students can share the things that they achieve. However you as a teacher or practitioner decide to celebrate successes, it's important. It may be more important in math that in other subjects because of the anxiety that people come with.

The fourth bullet is one that I think sometimes is less obvious. When we get into

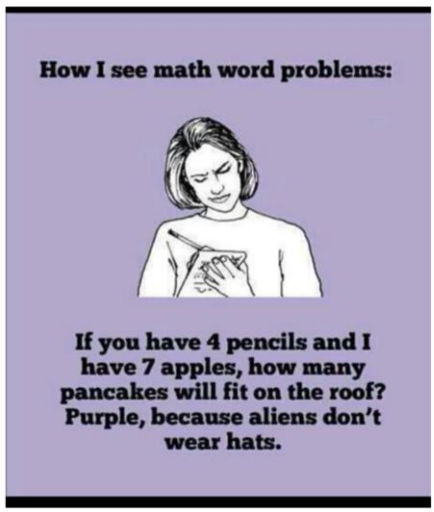
maths and sciences, we find often that it's like another language. There are so many terms and terminology and the use of words in math and sciences that is different than the way we use them in every day life – or they just don't even exist. Things like subtle quotient dividend product. Even those simple terms that if we're familiar with math, we might think aren't too daunting, they can really be daunting to people, in particular to lower level students who may not have strong reading and writing skills to start with. If we can help to demystify those terms, whether it's through a game or a discussion or having a list on the wall where you add terms that students don't understand – there are lots of different ways to take the intimidation out of it, especially when it comes to the language of math.



Some of you will no doubt be familiar with the math fun facts that are out there. Here are just a few examples. Looking ahead to Wayne's presentation, he will be sharing a few more with us.

The first one talks about how if you cube certain numbers, each of their digits will add up to the sum of their cubes. Obviously, that's a topic that's a bit more advanced. But look at the one in the red bubble: if you take your age and multiply it by 7, then multiply by 1443, the product repeats your age 3 times. It isn't necessarily important that people understand why it happens, it's just a fun way to illustrate that there are some cool things that happen with numbers. It's not just about long drawn out, boring calculations.

Have a Positive Attitude Toward Math



Talk about why math ISN'T fun.

Sometimes knowing that others have struggled with math resonates with our learners.

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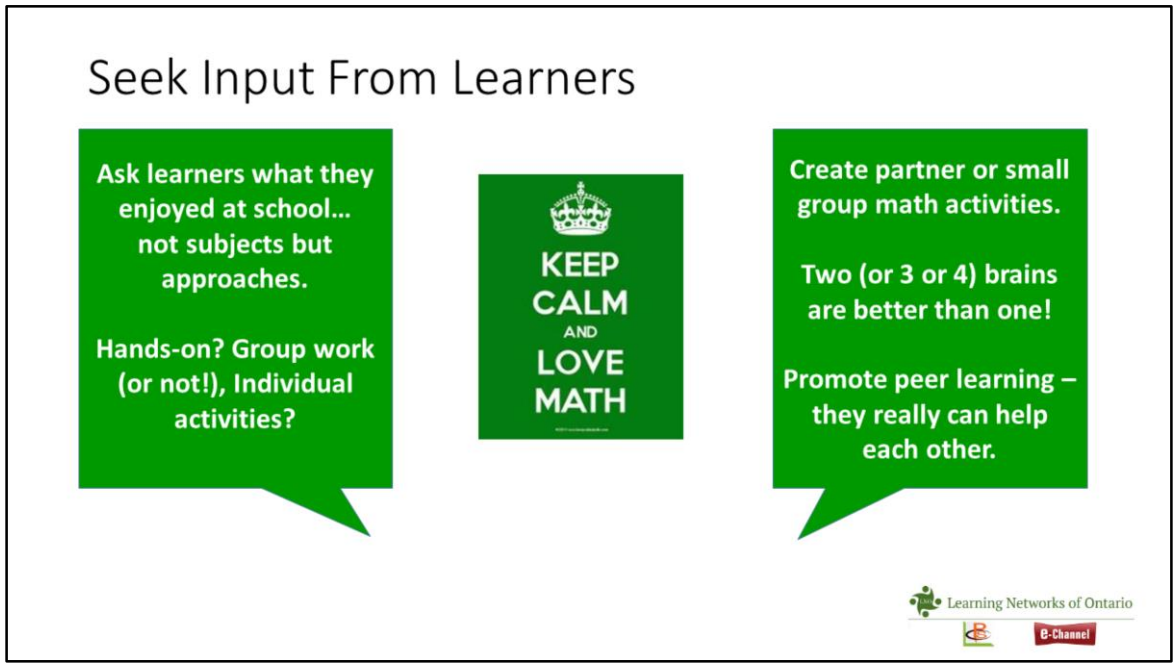
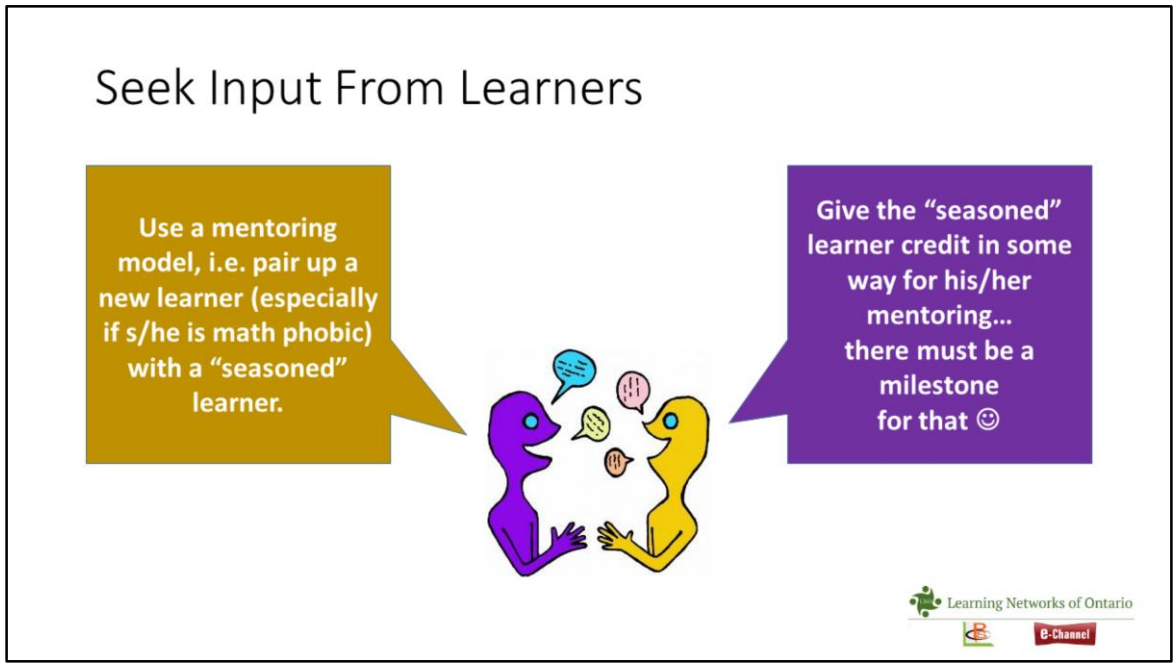
Equally important, I think, is to talk some times with your students about why math isn't fun. Give them an opportunity to explore some of the reasons why they didn't like math. Let them know that it's ok to have come in with some fear or dislike of math, but that you are committed to working with them and making it a bit more fun and enjoyable.

In my work, which has mostly been in college upgrading programs, but also in a couple of other areas of teaching math to adults, is that often once they get over that fear, they tend to grasp things more easily than they did when they were in school the first time. There could be many reasons for that. Perhaps they are now choosing to be with us rather than being forced to be at school. Maybe it's just because our brains are more developed. I have lots of recollections of students telling me that it's easier than when they tried when they were younger. The bottom line is that misery loves company! If someone comes in and really doesn't like math, chances are there is someone in your class that has experienced it, and maybe they can provide some uplifting words for those folks who are still reticent about math.



So that leads in to my next area of approach or principle that I believe is important and that's fairly easy to do. Again, it does relate to other subjects. If we can get some input from learners, especially about how they like to learn, with a subject that might cause they some stress like math, if we can try to provide ways for them to learn that are best suited for them, that can help. I don't just mean learning styles, but I mean things like studying on their own or with a group. Do they like doing hands on learning or not? If they're a more kinesthetic learner, you could do some work with manipulatives or hands on materials. If we already know that the subject is causing them stress, if we can help them learn in a way that will be favourable to them and will provide some level of comfort to them, let's try to do that.



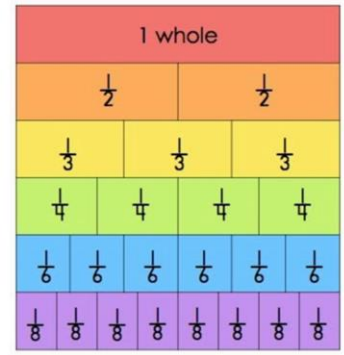
Some learners enjoy peer learning, some don't. Some learners, as you know, really take on the mentoring role quite well and can help provide some extra support and help to the ones that are struggling. Again, this isn't just specific to math.

I just alluded to this a moment ago. Maybe you can pair up a learner who has been in your program for a while with a new learner who can provide a bit of advice and positive reinforcement. They can let them know that math really isn't that bad and that they struggled too but now it's ok. I'm not even being facetious in saying that there must be a milestone to give credit for the "engage with others" competency if you want to promote the mentoring to that level. I know we're all concerned with the activities in our learner plans and what we're putting in them. Any way that we can give credit for something that students are helping to do, so much the better.

Seek Input From Learners

Use Real-life Materials

- Especially applicable to help learners with lower-level skill development.
- Ask learners for ideas of authentic materials to use.
- "Manipulatives" – items that learners can actually touch, count, arrange, sort, combine, etc.
- "Fraction Bars" are one example...



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I just want to talk for a few minutes about using real life materials. There are lots of them out there for math, and I'm sure you are aware of many.

One area that a lot of people struggle with is fractions. You may or may not be aware of fraction bars. This is a picture of what fraction bars look like. As a teacher, you would cut these up and use them on a comparison basis to help students relate to eighths, sixths, fourths, halves and wholes. You can do it for other combinations as well. You can buy these at teachers' stores, or you could make them.

This is just one idea of what we call "manipulatives", i.e., something that students can actually use in their hands to touch, to count, to arrange, to sort, to combine.

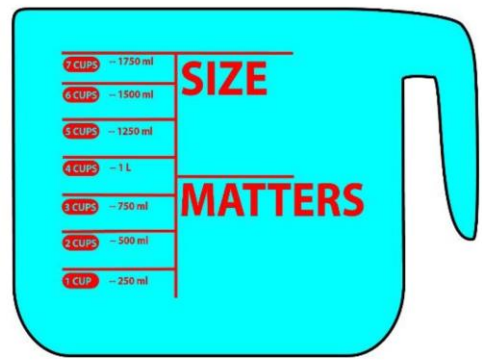
I don't think that it's necessarily applicable to use these just for children. Kids get to use these all of the time in primary schools. Just because we work with adults, it doesn't mean that they don't benefit from hands on and working with real objects, especially when it comes to math.

Seek Input From Learners

Others materials could include:

- Measuring tools
- Scales
- Store flyers/online ads
- "Fake" money
- Forms/Documents, e.g. pay stub

(It does take some time and thought to create lessons using manipulatives and authentic materials, but it's worthwhile!)



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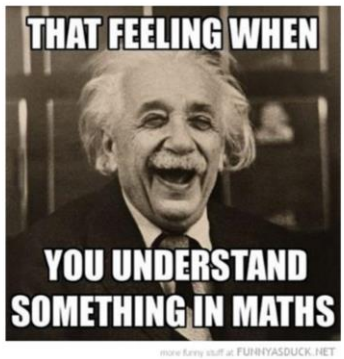
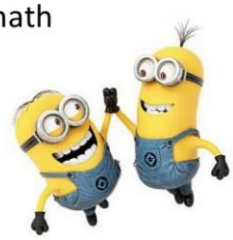
Other materials that you might be able to incorporate into demonstrations, lessons or group work include measuring tools, scales, store ads, Monopoly money or whatever kind of fake money you can pick up at the Dollar Store, and even something that is a form or a document that would include some calculations like a pay stub or a cheque stub or any kind of document like that that you can use to help make the math more real. I say that with the caveat that I have written here: probably it takes a little more time to construct lessons or activities using hands on materials than it does using pen and paper, but honestly the reward and the applicability to our students is great. You might be able to collaborate with other teachers, you might be able to find some of these things from colleagues, but even doing one or two of these activities with hands on materials is useful. It does apply more at the lower levels, and it does get harder admittedly to do hands on activities at slightly higher level math. My other observation is that often by the time learners get to higher level math, they have gotten over some of their anxiety, and if they have a good foundation in basic math they can more readily buy into the higher level math that they need in order to achieve their goal. That's my observation over the years.

Provide LOTS of Positive Reinforcement



- ✓ Acknowledge even the smallest successes!
- ✓ Inspiring confidence in math learning is a huge key to success…and greater "enjoyment".



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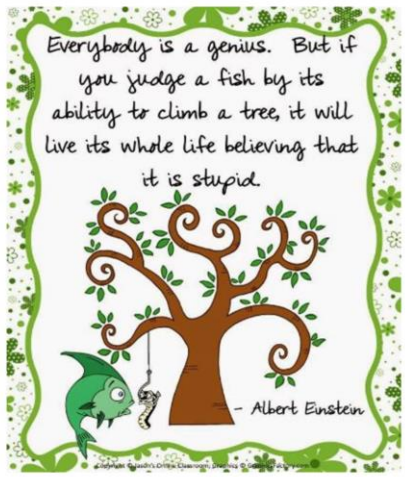
I would say in my almost 30 years of teaching math that this is the single most useful strategy that I have ever employed. I have taught a lot of one-on-one math. Adult learners are just so devoid of any positivity around math. Even if they had a solution that had 3 or 4 steps and they got the answer wrong, if they got the first step right, I was always careful to congratulate them on that before moving on to correct the rest of it. So much of the challenge people have and the reason they don't feel like math is at all fun is because they have no confidence in themselves. I really encourage you as adult educators to use that strategy of positive reinforcement: verbally, in writing, individually, with a group, however it works in your learning environment. It also makes students a little more willing to come and ask for help if they realize that you recognize when they do something right, even if they might not always get the complete answer right.

Provide LOTS of Positive Reinforcement



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This is my bit of philosophy for the day from Einstein. “Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole live believing that it is stupid.”

There are other paraphrases of this, but I think that in math where people feel especially reticent and not confident that even if they do struggle with math, that’s ok, because they are good at other things.

Incorporate Technology Where Possible

- Technology can be a variation on using manipulatives and authentic materials.
- It can also provide sample lessons – so many on YouTube!
  - ➢ Simplifying Fractions
- Free sites for self-study e.g. Kahn Academy
- Kahoot – free software for interactive classes (requires learners to have a device)

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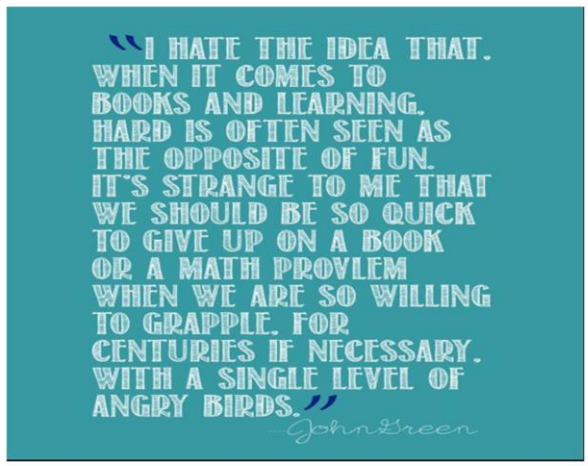
Finally, and this is a bit of a preview for Summer's presentation, there is a lot of technology that we can use for math. A lot of it is free. Summer is going to talk a bit about gamification. I would draw your attention to the many, many lessons that are on YouTube. There are free study sites such as the Kahn Academy. Another thing that you may have heard of is something called Kahoot. It's an interactive piece of software that students can use on their phone. For example, you could have a question on the white board or on a piece of paper, and the software allows students to answer the question, and then the whole group can see how many people thought it was A or B. It's just a quick, interactive teaching tool. However, it does require learners to have a device. Most of them have phones, but I do recognize that not everyone does.

<< Video plays from https://youtu.be/AtBUQH8Tkqc >>

I wanted to show the video to illustrate that there are some great math lessons on YouTube that are free. As you can see, that instructor would be very appealing to our students. He was able to incorporate the visuals – which were really the fraction bars that I alluded to before – in a really high-tech way in that video. If you weren't aware before, you are now that you can access some great things on YouTube. The other nice thing is that students can access this type of resource at any time, not just when they

are in class with you.

And…Use Humour!



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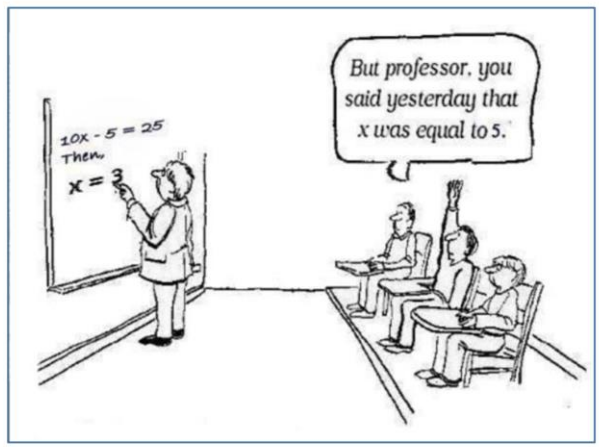
Just in case you missed it the first seven times I said it, the more you can use humour the better. "I hate the idea that when it comes to books and learning, hard is often seen as the opposite of fun. It's strange to me that we should be so quick to give up on a book or a math problem when we are so willing to grapple, for centuries if necessary, with a single level of Angry Birds." That might resonate with some of our younger learners who play games like Angry Birds.

And…Use Humour!



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Finally, before I pass things over to Wayne, one last little cartoon which is also one of my favourites. I've enjoyed the chance to chat a bit today, and I look forward to questions if you have any. I encourage you to try to demystify math, try to take the language of math and work through it with your learners, be positive about it, get feedback from them to help them learn in the best possible way they can, and encourage you to throw in some funny stuff whenever you have the opportunity.

Andrea: Thank you very much Barb. I just have one quick question. Where did the video come from?

Barb: It’s from YouTube. You can google “simplifying fractions”, and you’ll get a number of them. There’s a whole series called Math Antics.

Andrea: Thank you.

It’s my pleasure now to invite Wayne to provide his presentation after the excellent presentation from Barb. Welcome, Wayne!

Wayne: Thank you. Barb talked about taking the mystery out of math, and I’m going to talk about putting the wonder into math. When I talk about the wonder, I’m talking about putting a “wow” into math. You might be wondering what the seahorses and snails have to do with math, but I’m going to keep you in suspense for a few slides.

When I ask my learners where things went bad for them with math, they can sometimes point to negative experiences that they had with math or negative attitudes with math that fueled their decision to dislike it. I believe that there are two

things that I can do in the classroom to counter these negatives. I can be intentional about expressing my positive attitude towards math. That's something that Barb already mentioned. The second is to nurture a sense of curiosity and wonder for numbers and math. I think that's sometimes something that draws people in.

I want to start by apologizing to anyone who was in my Grade 4 class. I'll start by telling you about two significant events in my math life.

The first was in 1976 when I was in Grade 4. My best friend at the time was Stuart. Stuart lived down the street from me and he was the first guy in the neighbourhood to get an Atari video game console. He also liked math. I remember that in that Grade 4 year, I made the conscious decision that I was going to like math, too.

That hasn't meant that all math has been easy for me, though. I have scored 16% on a university stats exam. However, liking math for me has meant that I have been able to sustain interest long enough to figure many things out.

So my Grade 4 experience makes me think that liking or disliking math is to some degree a conscious or unconscious decision we make and, if it is, it can be a decision we revisit and work to change if we want to. The second point is that liking math doesn't mean it becomes it easy. The third point is that I can choose to like math, even if I don't find it easy. The last point is that liking math can help me sustain my interest long enough to be able to understand a difficult concept. So my goal when I am working with math learners in the classroom is not to try to make math easy. Some

learners just find things hard to learn. But if I can nurture a sense of curiosity and wonder, the person can sustain their interest long enough to figure things out.

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The second significant event was in 2009 when my family and I went to Malawi.

I taught the equivalent of Grade 11 and 12 math in a high school. The school was at the base of a mountain that people would climb for the challenge and for the amazing views that would make their heart flutter.

There were times in that class that we worked out math problems on the blackboard that gave me that same feeling after working out long division of a polynomial. I stood back at the board, and the process just looked so elegant. I turned to the class, and I paused, and I said with a smile on my face: “Wow! That is beautiful!” Over the course of the next few months, I continued to verbally and non-verbally express my delight about the math that we were doing, and this attitude was caught by the students in the class to the point where we would work out a problem on the board, and all I would have to do is turn to the class with a smile, and all 70 students would say in unison “wow!” I think by expressing my attitude of “wow” and wonder, that they caught a bit of that for themselves.

When I asked my ***current*** class of learners what made math fun in our classroom, they mentioned some of the things that Barb has already mentioned. But they also

mentioned attitude. They said that math is more fun when it is taught with **enthusiasm because** the enthusiasm is contagious. That pause, that smile, that wow – that is catching. It can provide an antidote to the negative attitudes and experiences, and it can clear a space for interest and wonder.

In the first presentation on "Why Math", Jane Tuer pointed out that children often take on their parents' attitudes towards math. When a parent says that they hate math, the negativity is contagious, and the child is more likely to dislike and therefore struggle with math. If we in our programs can help people to decide to change their feelings about math from hate to interest, this too will be contagious for their children, and it sets their children up for more success in their math classes.

These two experiences that I have mentioned – Grade 4 and 2009 – have taught me these two things that I try to bring to my classroom. The first is to be intentional about expressing my own sense of curiosity and wonder about math, and the second is to try to nurture in my learners a sense of curiosity and wonder. The next few slides in this presentation are going to be examples of things that I think can nurture a sense of curiosity and wonder about math. They fall into three categories:

- Discovering interesting human stories behind math. Math to some degree is a human story of discovering patterns and relationships.
- Discovering the interesting patterns in math
- Discovering the connection to world view

Discovering the human stories:
Leonardo Fibonacci and the Fibonacci series

Wrote ***Liber Abaci*** (The Book of Calculation) in 1202 which introduced Europe to a new system of numbers (including decimals) that had been developed by Hindu and then Arabic mathematicians. This Hindu-Arabic system of numbers then took over from the Roman numeral system.

Roman	*Hindu- Arabic*
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Leonardo Fibonacci
1175 – 1250

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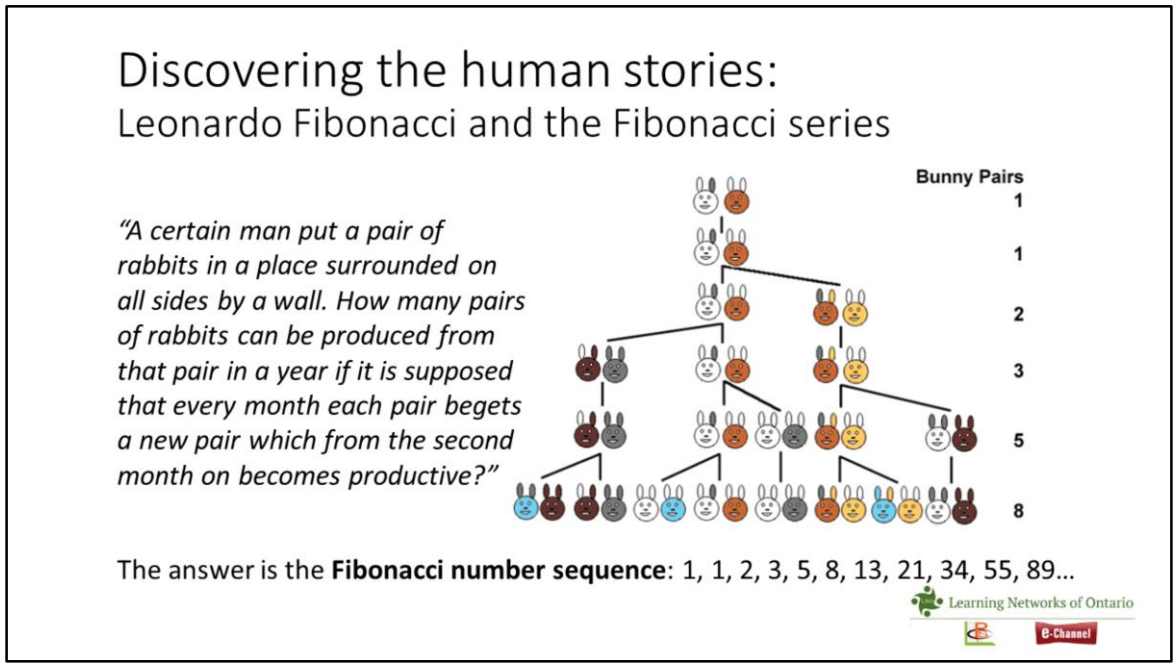
First, lets look two human stories behind numbers and math.

Leonardo Fibonacci was born in 1175 in the town of Pisa – where almost 200 years later workers would build a tower with a terrible lean in it.

His father was a customs official that was posted to North Africa – an area that was part of the Arab Empire. Fibonacci studied under some Arabic mathematicians in North Africa. In Italy, Roman numerals were the numbers used in business and education. But the Arab mathematicians taught him a new system of numbers which they had probably learned from Hindu mathematicians. That new system of numbers is the root of the Arabic system we use today. Fibonacci discovered that the Arabic numbers with their place values were far easier to use than the system of Roman numerals. In 1202, he wrote a book about what he had learned and introduced Europe to Arabic numerals which eventually replaced the Roman numerals (except for movie credits!)

http://www.famousmathematicians.com/tag/hindu-arabic-numerals-fibonacci/



But Fibonacci is best remembered for a puzzle he posed about rabbits:

" A certain man put a pair of rabbits in a place surrounded on all sides by a wall. How many pairs of rabbits can be produced from that pair in a year if it is supposed that:

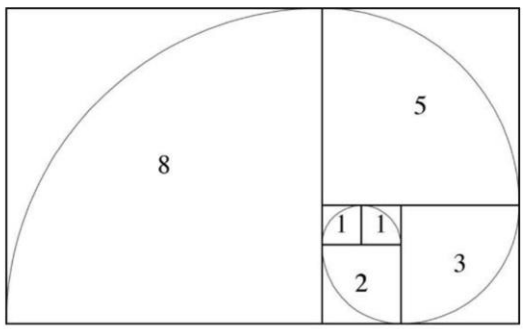
- *every month each pair begets a new pair*
- *every new pair from the second month on becomes productive?""*

If you look at the slide, you can see the bunny pairs. It creates a really interesting sequence of numbers at the bottom of the slide which is the Fibonacci number sequence. One thing that is interesting is that if you pick any number in that sequence, and it is the sum of the two previous numbers in the sequence.

Discovering the human stories:

Leonardo Fibonacci and the Fibonacci series

The Fibonacci number sequence 1, 1, 2, 3, 5, 8, … gives us the Fibonacci Spiral which appears in so many places in nature.



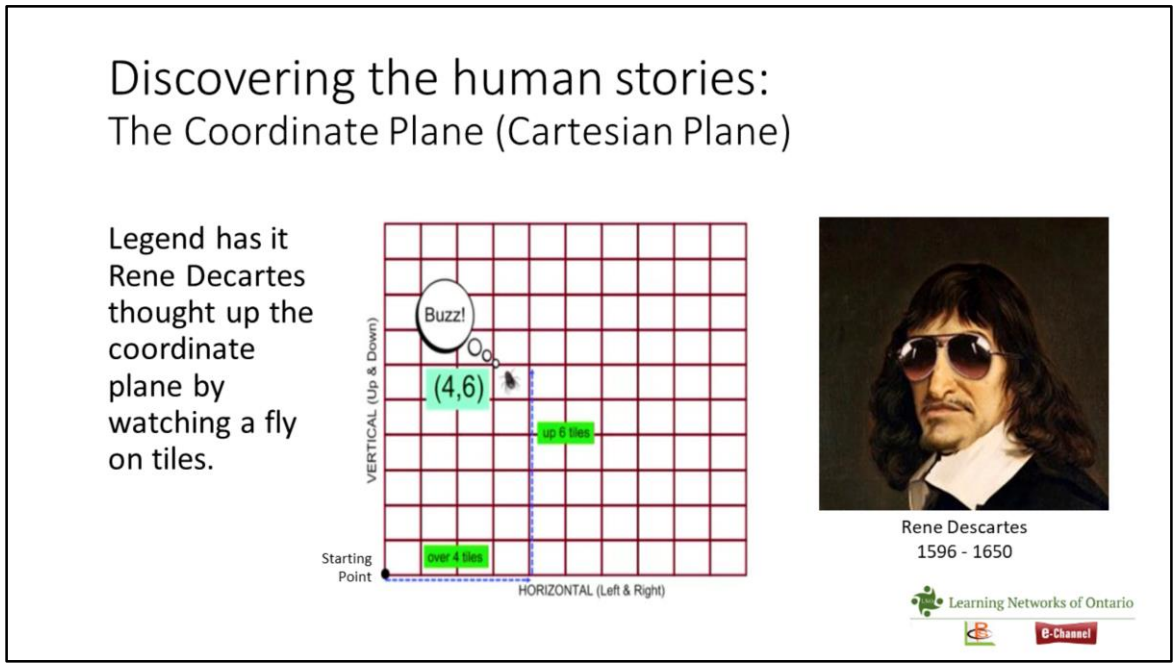
Over the years, the numbers of the Fibonacci sequence has been discovered in many patterns in nature. The numbers 3 and 8 are in the Fibonacci sequence and we find them in the arrangement of flower petals, such as lilies and irises. On average, flower petals do coincide with the Fibonacci numbers.

This curious resemblance extends to a wide range of plants and objects in the natural world from the arrangement of scales on a pine cone to the seeds in a sunflow

The Fibonacci sequence can be used to build the Fibonacci spiral, which is on the slide. It, too, appears in many places in nature including in the spiral of this nautilus shell.

And now we're back to the sea horse and the snail. The Fibonnaci spiral , generated by the Fibonnaci sequence, can also be found in the spirals of a snail's shell, the spiral in the petals of a rose, a hurricanes' swirls, or the curl in the tail of a sea horse, and in the spiral of the Nautilus shell. I think that's a big wow. It's interesting how Fibonnaci discovered that sequence of numbers that shows up in so many places.

The numbers of the Fibonnaci sequence have been called nature's code.



Here's the second human story. I don't know if René Descartes was fond of sunglasses, but the picture says he was. This story is probably more legen than fact, but it gives a humourous way to introduce graphing.

Graph paper is an example of a coordinate plane – a two dimensional flat surface where every point can be given an address with an ordered pair (such as in the illustration: 4,6). The coordinate plane is also called the Cartesian plane as a nod to Rene Descartes - the person that first thought of it.

It is taken as fact that Rene Descartes suffered from fragile health. It is known that he needed lots of rest and spent a lot of time in bed.

Legend says that while he was resting in his bed, he watched a fly walk around on his tiled ceiling. His mind began to wonder if there was a way that he could name the location of the fly at any moment in time. He noticed that the gridline in the tiled ceiling gave him a way to measure distance away from the starting point which was one corner of the room (think of this as 0,0).

He used the grid lines running in one direction to measure how far the fly was to the

right of the starting point (4 in the image). He used the gridlines running in the other direction to measure how far up the fly was from the starting point (6 in the diagram above). He now had a pair of numbers and then decided to put the pair together always in the same order: right/left first and then up/down second – separated by a comma and held together by brackets. This is called an ordered pair (4,6).

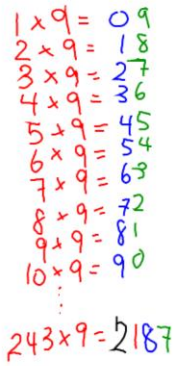
We use Descartes's Cartesian plane to this day.

There are so many other interesting human stories about math that are just a Google search away. We saw a video at the beginning of the presentation. A fascinating story is the development of the Metric System during the time of the French Revolution. It was out of a system where people had different systems of measurement, and there was a push for a common system. During the French Revolution, they tried to decimalize, i.e., making everything have a base number of 10, which the Metric System does have. They even went to the point of having a 10-hour clock and a 10 day week. Those didn't last very long. Googling the Metric System gives you a fascinating history and a whole new perspective on this thing that we sometimes consider a thorn in our side. It was certainly a thorn in the side of the people who spent seven years surveying the distance across Europe.

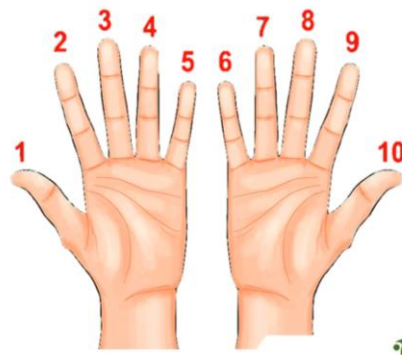
Another story that you might be familiar with is that of the Gimli Glider, an Air Canada Boeing 767 that ran out of fuel over Gimli, Manitoba because someone calculated the amount of fuel in pounds instead of kilograms.

Discovering patterns and relationships:
Nine times tables

9x tables patterns



9x tables on fingers



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On now to discovering patterns and relationships in math. Who is familiar with multiplying on your fingers like we are seeing here?

I know for me that the 9 times table was probably the one I memorized last, but the patterns in it are stunning.

On the left of the slide is a part of the 9 times table. The answers are written with the tens digits in blue and the ones digits in green.
One pattern jumps off the page: the ones digits are decreasing as you go down the page, and the tens digits are increasing.

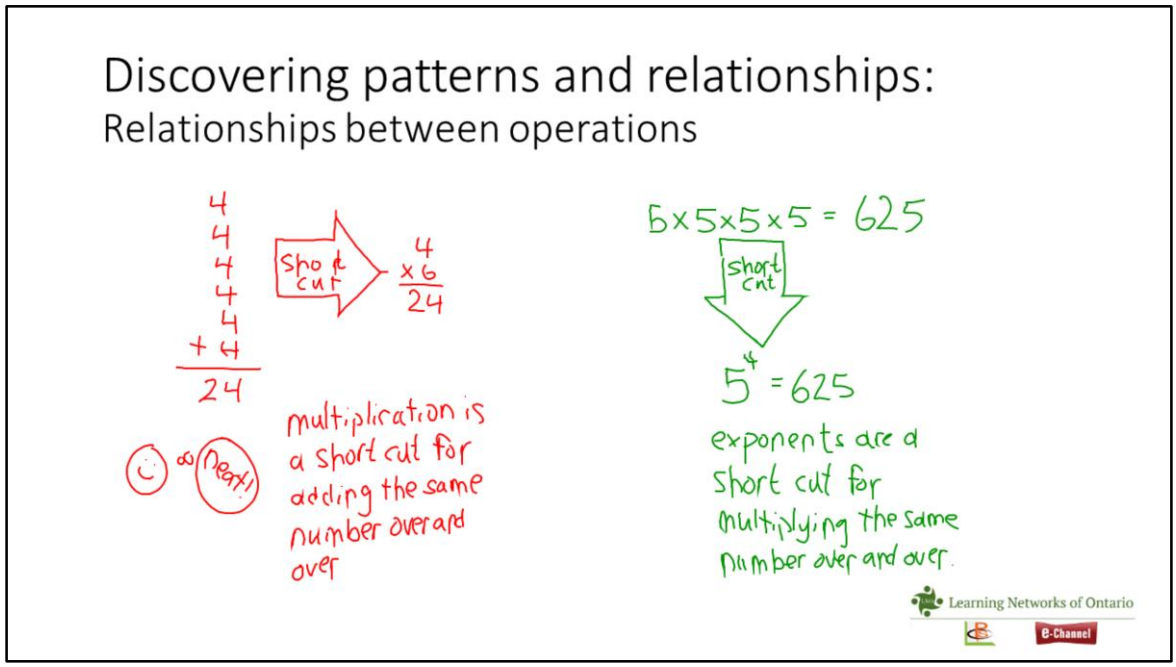
Another pattern that is less obvious is also there. If you add the blue tens digit to the green ones digit of the same answer, you will always get nine. For example, pick 27. 2+7 is 9. Or pick 36. 3+6 is 9. This can give you a quick test to see if you've got the right answer for the 9 times table. This pattern extends well beyond 9x10. I randomly chose 9x243 which gives the answer 2187. If you add all digits of the answer, you get 18. Add the digits of 18 and you get 9 again! That's pretty neat.

To the right on the slide is a pattern for calculating the nine times tables on your

fingers. This only works for the 9 times table.

As in the picture, imagine that as you hold your hands palms-up, each finger is numbered from left to right one to 10.
To get the answer for 9x7, bend finger 7 down. There are 6 fingers to the left of finger 7 and this gives you the 10s digit of the answer. There are 3 fingers fingers to the right of finger 7 and this give the ones digit. Another really neat pattern.

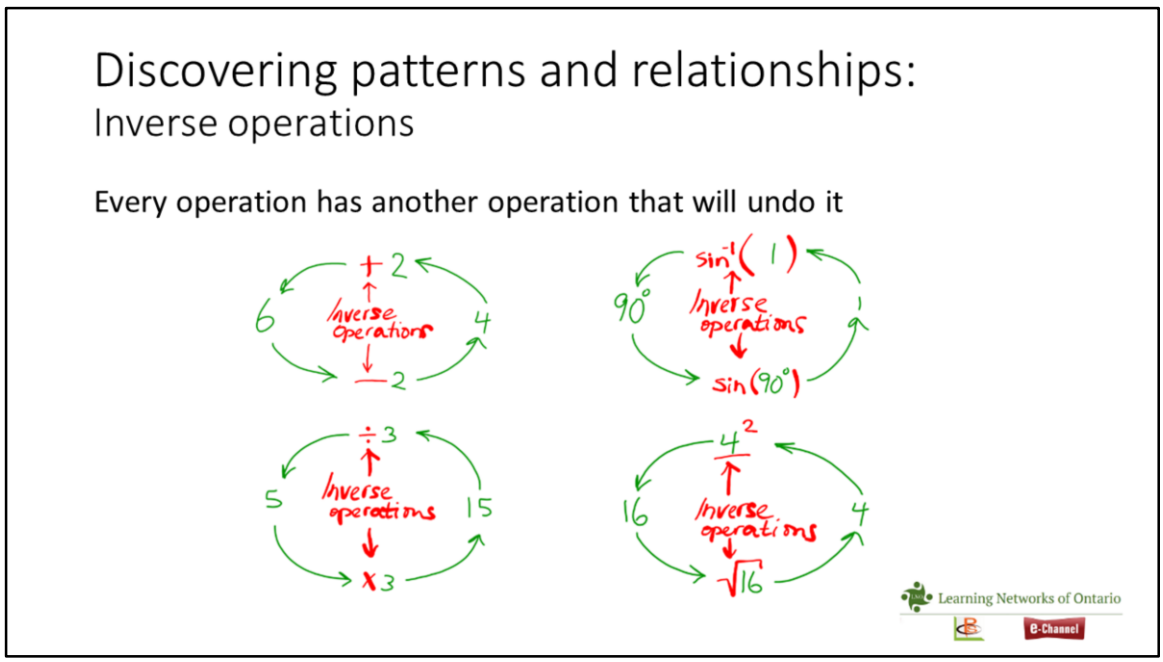
These two things that are on the slide right now are often things that I will show to people. I'll often show a learner this on the first day if they have articulated any fear , dislike or anxiety around math. Almost always it puts a smile on their face – and I will point out that smile just in case they did not notice it. This is something that creates a "wow" factor. People go home and show their friends and families.



It is also interesting to find relationships between the math operations. I find it really helpful for problem solving. You can think of multiplication as a short cut for adding. You can also think of division as repeated subtraction. The one that is in front of us is pretty clear. I'm adding the number 4 six times, and when I say it that way, what number just pops out? 6 x 4. So then we transition to multiplication which gives us the same answer. So multiplying is a short cut for adding the same number over and over again. When I'm doing this on the white board, I'll draw the smiley face and the thought bubble and be explicit about my own sense of wonder.

On the right side of the screen, there is a relationship between operations. Repeated multiplying of a number can be short cutted by turning it into an exponent. So 5x5x5x5 give 625, or 5 times itself 4 times is the same as 5 to the exponent four.

Creating links between operations like this is a way of creating a web of information that people holds in their minds rather than disconnected thoughts.



I will often make a joke in class that one of the beautiful things about math is that anything you do, there will be something to undo it. Then I'll say that I wish we could do that in life.

Let's start with the oval in the upper left. I find that the ovals make a neat visual way to show how inverse operations are related to each other.

If we start with the 6 on the left and follow the green arrows counterclockwise, we start with 6 and then subtract 2. the answer is 4. To undo what we just did, we start with the answer 4 and do the inverse of what we just did. We just subtracted 2, so now add 2. Lo and behold, we get our beginning number back. What subtracting did, adding undid. It's what we do when we double check our answers. It's the principle of inverse operations.

In the oval below it, multiplying and dividing are the inverse operations. What multiplying by 3 did to the 5, dividing by 3 will undo it.

This truth of each operation having an inverse goes well beyond these basic 4 operations of add, subtract, multiple and divide. We know these four operations as

arithmetic. By the way, arithmetic comes from the Greek word for number art.

Let's look at the ovals on the right hand side. This relationship of operations extends into trigonometry, Sin is an operation that works on angle numbers. If we start with the angle of 90* and take the sin of it we get an answer of 1. If you undo that by taking the Sin-1 (sin inverse), you get the 90 back. What I did with sin, I was able to undo with inverse sin. I mentioned that we do this to check our answers, but it's also what we do with algebraic equations because when we're isolating a variable, we look to see what's being done to the variable. So if that is what is being done, let me undo that by using the inverse operation.

Below that oval, we start with 16. If you take the square root of 16, you get 4. Now let's undo that by doing the inverse operation of squaring. 4 squared gives us back the 16.

This is a really neat idea that came to me much too late in my math life, but this idea that every operation has an operation that will undo it is neat.

Discovering patterns and relationships:
Inverse operations

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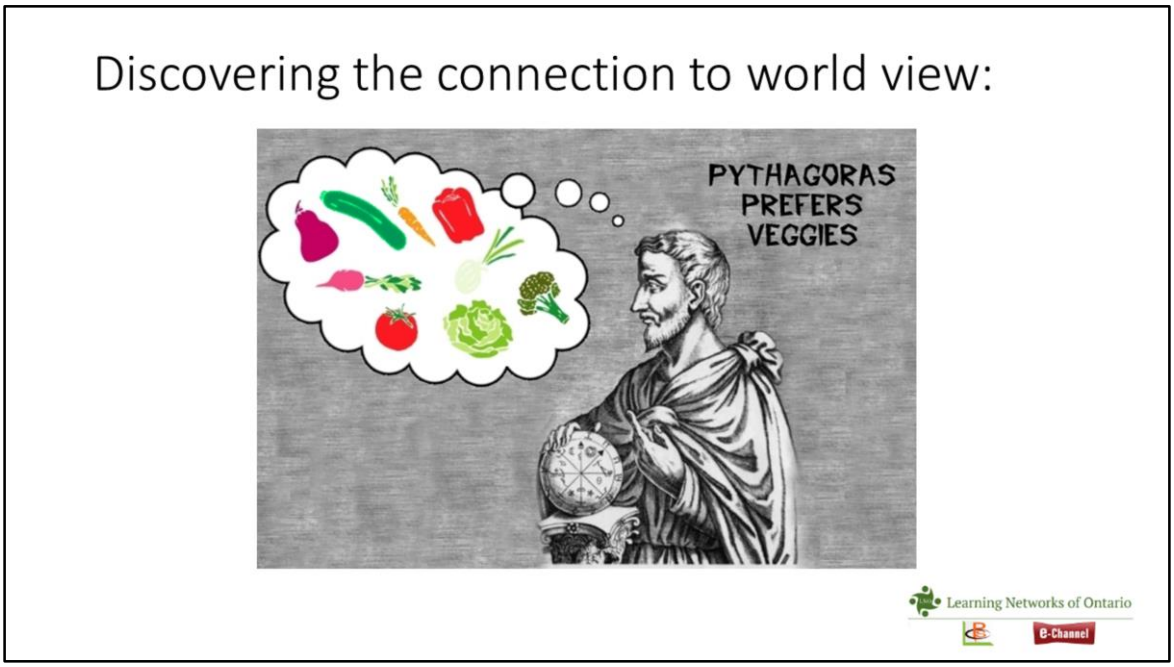
That relationship that we just pointed out is found on calculator keyboards.If you look at the keyboard on the screen, there is the sin button. The button that is related to it by pushing the second function button is the inverse operation right above it. The same thing with cos. Its inverse operation is right above it in yellow. Right above the square root button is the inverse operation that will undo square root. Even some calculator keyboards group operations that are inverses of each other.



This slide is about thinking about math in the context of a person's world view (which can include a religious perspective) can also increase interest and wonder. I believe that if we can integrate our belief system and math or anything for that matter, it will enrich our experience of that subject.

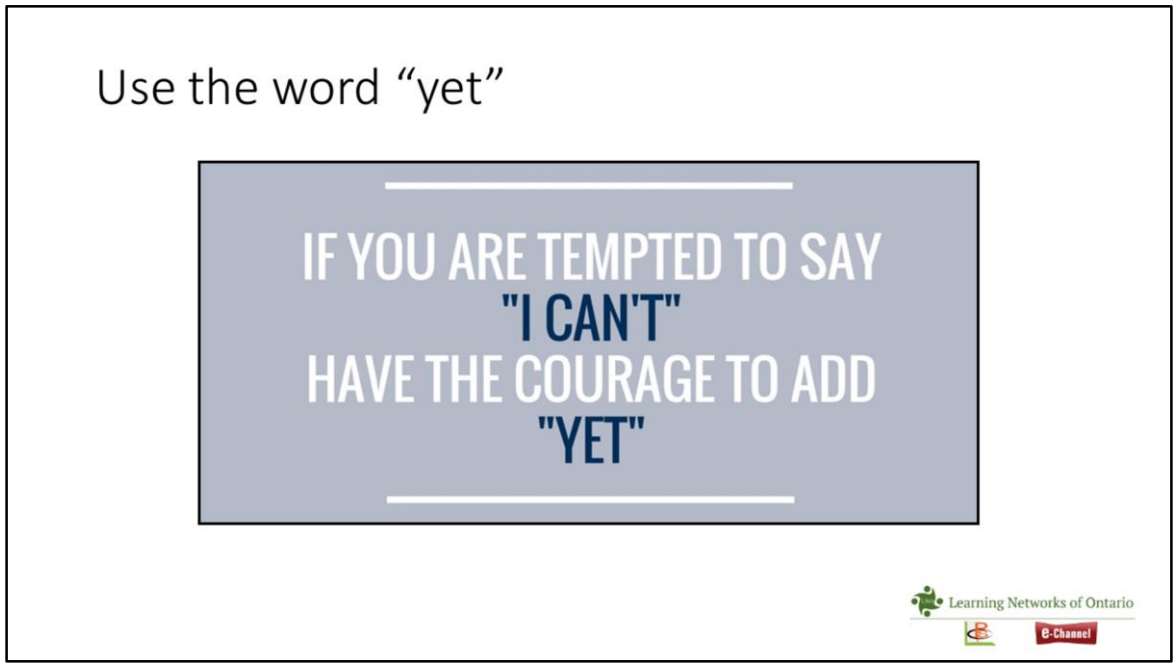
Here I don't mean turning numbers into a religion. Pythagoras did that. He founded a religious brotherhood called the Pythagoreans. Interestingly, that is thought of as the first society to be vegetarian – and hence the slide.

Since we don't often get into conversations with learners about world view in our classes, this slide might be more about nurturing our own sense of wonder and curiosity as instructors.

Back to that school where I taught in Malawi. It was a Christian school. It gave me as a Christian an opportunity to articulate how math is a part of my Christian Worldview. For example, I found that the permanence that is found in 1+1 equals 2 says something about the permanence of the Creator. I believe that the beauty found in the patterns of math is a reflection of the creator that made it and that when we study math, we are studying the fingerprints of God. In that math class, that added an

incredible richness to our studying math because it grounded us in the belief system of the people within that room.

Thinking about how math fits into the way a person understand the world and our place in it can enrich the way we see mat and our own sense of wonder and curiosity.

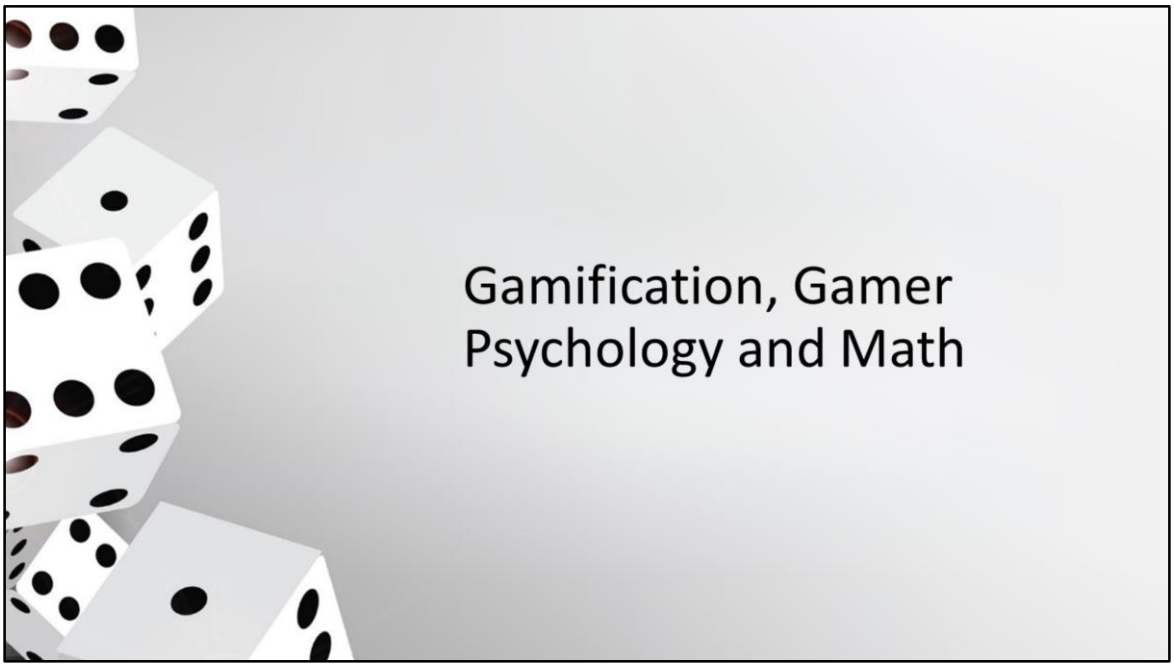


I love adding “yet” to the end of statements. When students or learners say they don’t get it, it’s great to drop the word “yet” to the end of that statement. It’s a hopeful little word. It’s a word that says I won’t ever get this, but it keeps us hopeful that with time and effort sustained by wonder and curiosity, soon enough it might make sense.

Now over to Summer.

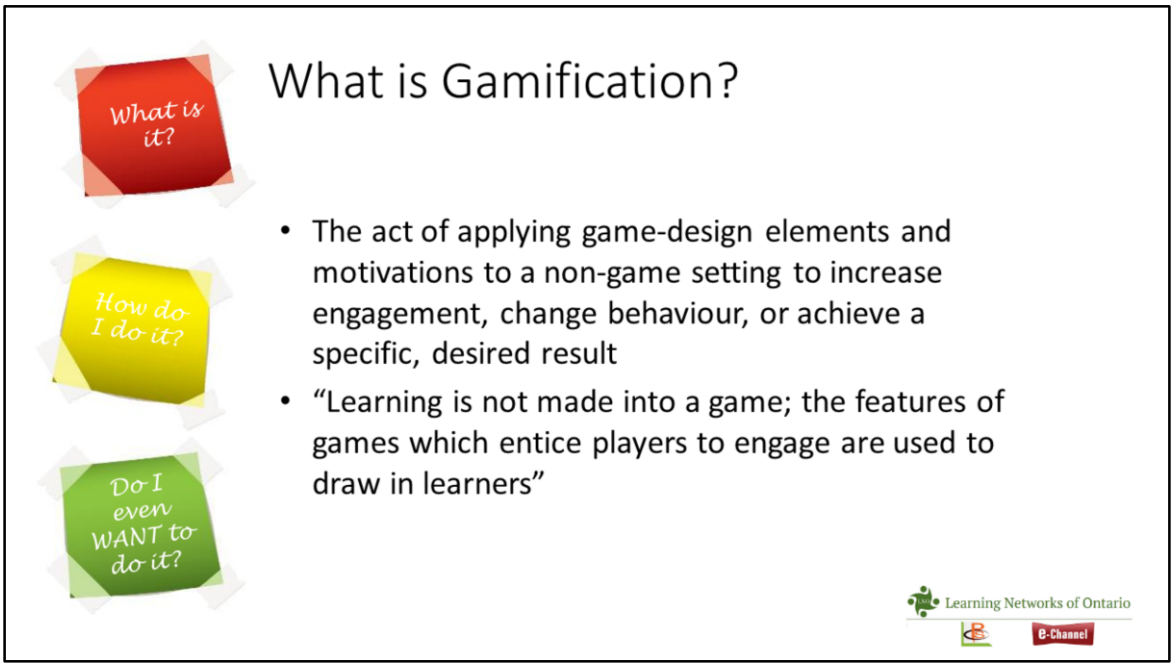
Andrea: Thank you very much, Wayne. An excellent presentation. Just as I thanked Barb for incorporating humour and a positive attitude, I’d like to thank you for the intention of curiosity and wonder in relation to math. I’ll now turn things over to Summer.

Summer: Thank you, Andrea. I’d also like to take a moment to say that I love the idea of incorporating humour as Barb mentioned, and wonder into math as Wayne just discussed.



When we surround mathematical concepts with excitement and fun, it removes so many barriers to learning.

What I'm going to share today is closely tied to that idea – it's both the theory behind, and some real-life examples of adding gaming psychology to adult education.



Gamification is a term you may have heard before, but for those who haven't, I'd like to clarify what it means… gamification is the act of applying game-design elements and motivations to a non-game setting in order to increase engagement, change behaviour, or achieve a specific, desired result.

One quote I really like about gamification came from Assistant Professor Brian Arnold at the National University of California, who said that with gamification, "learning is not made into a game; the features of games which entice players to engage are used to draw in learners".

That's something important to keep in mind – it's not about turning all learning activities into games, but adding game-design elements (those "enticing features" Professor Arnold mentioned), which may include an opportunity to explore, built-in competition, clear goals, an ability to measure progress towards them, and a place to try and fail without lasting consequences.

So what makes people want to play games, anyway? When we're playing games, we often find ourselves feeling a sense of camaraderie with those we're playing with (or against), a rush of excitement when we accomplish a task, and a general sense of engagement and fun. Why are we feeling these things, and what keeps us coming back for more?

Gamification researchers like Yu-Kai Chow have examined the elements of games that give us those feelings, and Chow's work breaks it down into what he calls the 8 core drives of gaming. I'll list each of the drives on your screen, but I'll put them into gamer language as we go.

★ The first is Epic meaning & Calling (what makes me want to participate in this game? Why is it important to me? Maybe it's the opportunity to lead a rebellion to success, or come together to beat a pandemic)

★ Next is Development & Accomplishment (how do I know I'm progressing while I play? Do I get to level up, earn badges, points, or rewards? Being only a few hundred points from "leveling up" in your game is to blame for a lot of late nights)

★ Then we have Empowerment & Creativity (can I do things over again in a new way to see if it improves my game? The ability to pause, reset a level, and start again at full health so I can avoid the pitfall that almost got me last time – actually, that's something we wish we could do in real life all the time!)

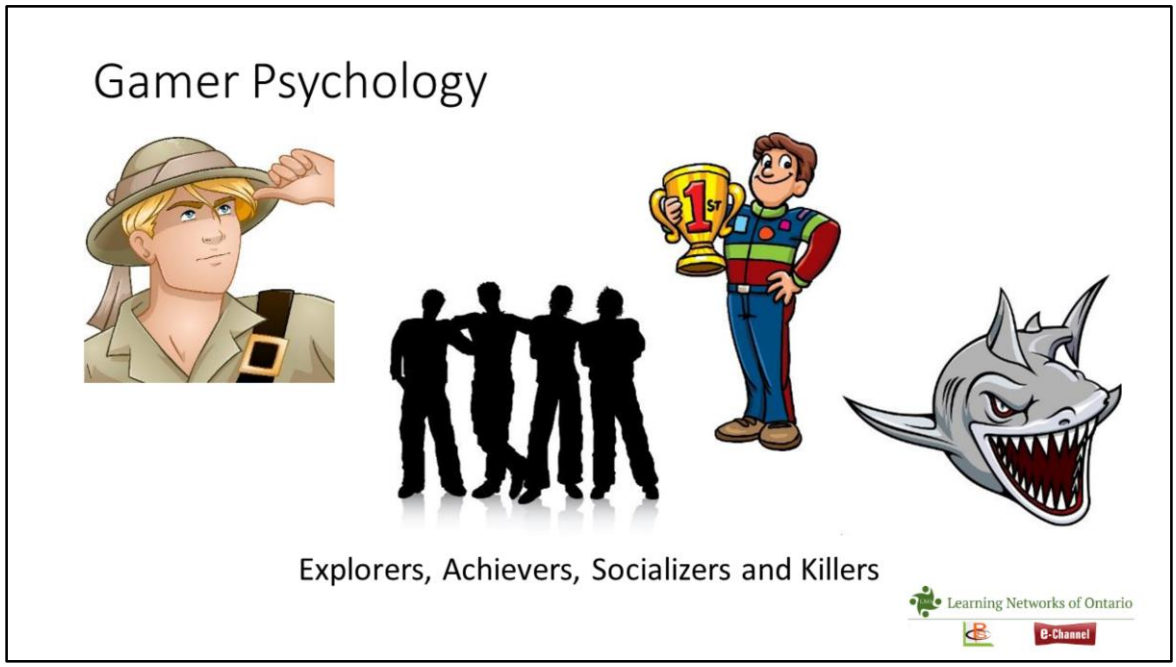
★ Next is Ownership & Possession (this game, this journey is **mine**, and I care if it's successful. I will not let that invading army take my castle!)

★ Then we have Social Influence & Relatedness (there's a feeling of community with those I'm playing with, and a great opportunity for me to measure my skills against theirs too. Bring on the leaderboard, or the ability to be "in charge" of a team)

★ We also have Scarcity & Impatience (if something in the game is limited - in either number available or time period when you can get it - I'll work harder & longer for it as a result. Items like "Rare gems", or knowing there are only a limited number of bonus prizes can be very motivating)

★ Then there's Unpredictability & Curiosity (that's the "woah – I didn't expect that!" moment – the card I pulled just took the game in a whole new direction - and now I want to stick around to see what will happen next)

★ And finally there's Loss & Avoidance (if I don't keep playing, or check in on my game every day, I'm going to miss out on something. My Farmville crop or cows will die, and I **can't** have that on my conscience.)



Understanding the core drives of gaming gives us some great tools to motivate people to play, but Gamification isn't a one-size-fits-all solution. To design a meaningful gamified experience, you need to understand your individual audience and what drives them, specifically. This is a bit like what Barb referred to earlier about seeking input from learners when you are planning your lessons. One method of learning about your audience from a gamification perspective is through testing their Gamer Psychology.

There are several online multiple-choice assessments that analyses the users instincts and choices against four gamer types with different learning styles. Many gamification experts and practitioners use the Bartle Test of Gamer Psychology, but it is just one of several available online. Knowing which gamer type your audience most closely associates with can help you design gamified activities that resonate with the learners you're trying to reach.

We'll use the Bartle Test as our primary example. It weighs the learners answers into the categories of Explorer, Achiever, Socializer, and Killer.

- Learners who score high in the **Explorer** category are gamers that like the freedom to wander and discover things about elements of the game through

experimentation. They like to figure out how things work and are probably the person you want on your Friday night trivia team.

- Those who score high in the **Achievers** category will be pretty happy to hear that – they are point-oriented gamers who enjoy being at the top of the leaderboard, or who want to be rewarded for being the first to finish something. Goal-oriented, these learners may not see the value in a game unless there is a clearly defined winner – and it can be them.

- Learners with high **Socializer** scores are motivated by meaningful interaction and relationships, and often view gaming as a way to make or connect with friends. They are the networkers in our midst, and seek out other like-minded gamers to work together to achieve more than they could alone. And they probably want to stay the heck away from:

- Those who score high in the **Killer** category. While Achievers take pleasure in the act of winning, Killers tend to enjoy the act of defeating an opponent more than the act of winning itself. Because winning is often secondary to the game, Killers are not as discouraged by failure and tend to be risk-takers as a result.

Other quizzes use the same input pattern, but change the names of the categories, so you might end up with Innovators, Strategists, Effectors and Aces at the end, but the philosophy is much the same. And understanding how (and why) gamer psychology impacts your learners is a great tool to help you craft effective math exercises in your classroom.

That said, helping adult learners upgrade their math skills so they can be successful is serious business, so why would we even want to encourage a gaming mindset in adult literacy programs? Just look at the commitment being shown by the average gamer who's just one level away from an *epic win* in the game of their choice. The passion… the dedication… the drive… who wouldn't want that from their learners?

Gaming traits including problem solving, collaboration skills, focus, and continual skill development. Perhaps most importantly, gamers fail **all the time**. Okay, so maybe a game piece gets thrown across the room, or the controller gets slammed down on the table out of frustration, but you know what happens next? The gamer thinks "alright, well I know that didn't work"… and they pick that controller back up and try again, learning from what went wrong last time so they achieve a different, and hopefully better, outcome this time. And frankly, people don't get excited about mastering an element of the game that's really easy. Overcoming the challenge is what gives the gamer a sense of pride and accomplishment in their skills. Harnessed in an educational setting, these are hugely powerful traits for success.

In the unique environment of an adult literacy classroom, I would argue that there are even greater benefits. Consider using gaming elements as a motivational tool to allow

learners to gain confidence just by doing something better than they did last time, even if they aren't successful. Replace the measuring stick, and clients can recognize and celebrate success by learning from their mistakes and making small improvements, rather than by comparing their skills to other people who may have very different skills, abilities and barriers, than they do.

As the use of gamification grows in fields like marketing, healthcare, and education, we have to look at the ways it **doesn't** work, as well as the ways it **does**. With its growing popularity as a tool, a lot of people are adding concepts of gamification into their initiatives. That doesn't mean it's being done well though – as I said earlier, adding game elements to something that your target audience doesn't connect with isn't going to suddenly "make it work". Successful gamification strategies must go beyond just adding points, levels and rewards – otherwise a blank screen that invites the user to repetitively click a single button to earn points would be the most exciting and popular game in the world.

Some of the most common mistakes people make when trying to incorporate gamification into a learning environment include:
★ Misinterpreting what motivates their audience – as an example, just because competition drives some gamers doesn't mean it drives everyone. In fact, adding a ranking chart to compare the math scores of a room full of people who feel self-conscious about their skills and abilities can motivate them in a very different way – right out the door.

★ Adding badges, levels or point values on everything is a mistake as well. Don't get

me wrong, these tools can be very motivating. But rewarding users for easily obtained tasks will make the points seem arbitrary or even condescending. Adult learners are unlikely to invest time and energy in learning mathematical concepts if they feel they're being pandered to.

★ Adding out-of-context gaming elements – At the beginning of my presentation I mentioned that gamification is about the process of engaging people in learning using the same things that engage them in games, not necessarily turning the learning itself into a game. While there are lots of great examples of learning games, simply making a learning activity into a game is not actually gamification, and out of context it can be downright confusing.

Getting It Right

Examples of gamification can be found in:

- Marketing
- Health care
- Education

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If we're talking about what goes wrong when gamification is done poorly, there must be a flip-side to the coin, right? We have a host of examples of gamification in the marketing, health care, children's education, and adult education fields. Since the majority of us work with adult learners attempting to grow their skills and become successful, I'll focus on sharing examples of gamification in action in an adult literacy environment. The two I'm sharing today have deeply embedded math content that I think you'll find interesting.

Using Gamification with Learners:

Gateway's ArduCopter Course

- Think-outside-the-box course with a specific focus on appealing to disengaged adults under 30
- Piece by piece: both the course work and the ArduCopter build
- Learning style identification, tool safety, literacy skills and of course… mathematics (including area & perimeter)

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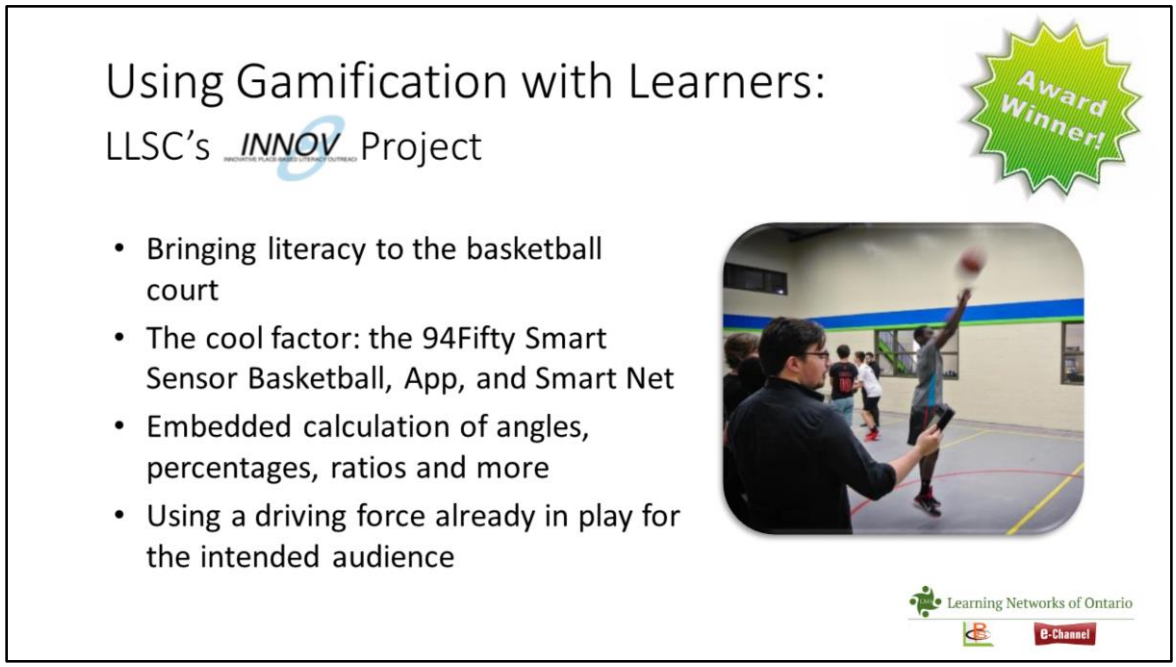
First, the Thames Valley District School Board's Gateway program developed a cutting-edge training opportunity for their students to learn traditional literacy concepts in a very non-traditional way. The course is called ArduCopter, and includes elements of math, technology, geography, and hands-on learning, all used as participants build a remote-controlled drone from scratch and send it on actual test flights.

The course takes learners, who are highly motivated by the concept of both hands-on building and the "cool factor" of building and flying a drone, through exercises about their own learning style, workshop safety, technical terminology and diverse mathematical concepts. Lessons bounce back and forth from research based, to hands-on building, to exercise based, keeping learners active and engaged in each component of the course in small chunks. And best of all, they see their progress being built, bit by bit, as they assemble their class quadcopter together.

What I think is particularly cool about this course is the embedded mathematical concepts. If you were to say to most adult learners "hey, do you want to spend a couple of hours learning about calculating area and perimeter?!?" I suspect you'll get a pretty lukewarm response. Ask some of those same learners "hey, do you want to spend a couple of hours learning how to fly a drone quadcopter? We'll need to know

how to calculate area and perimeter to program the flight software – are you in?" I think you'll get a pretty different response.



The second example I wanted to share is a program that was piloted in London, and has garnered national attention, having won an honourable mention in ABC Life Literacy's Canada-wide 2016 Innovation awards.

Targeting male youth aged 19-29 who were not in education, employment or training, Literacy Link's INNOV-8 project is a place-based learning initiative bringing literacy programming to basketball courts using a trio of really cool tools. At the heart of the program is the 94Fifty Smart Sensor Basketball. It's a basketball that looks and feels just like any other, but has sensors embedded within that measure any force applied to it – spin, acceleration, dribble speed, and more. Used with the 94Fifty App and the Smart Net, players and facilitators get a full 360 degree view of what's happening with the ball, and the player that moves it. The modules that are designed to accompany this trio of tools take learners through not only basketball drills to improve their skill, but give them an opportunity to learn and apply mathematical concepts as they calculate angles and speeds, and track their individual and squad stats. As their skills and knowledge increase, learners progress through levels including Rookie, Starter, All Star, MVP and more.

Not only does this project use some pretty fascinating technology, but it demonstrates

a really neat take on one of the keys of successful gamification. Rather than taking existing curriculum and adding gaming elements that they hoped would appeal to the intended audience, the team looked at what was already a driving force in these young men's lives and created curriculum around it. They were avid basketball players who, while not committed to working or attending school, **were** committed to practicing their basketball skills – so why not meet them where they're at?

So those are just a two examples of what's already happening with gamification in adult literacy – and it begs the question… what else could we be doing?

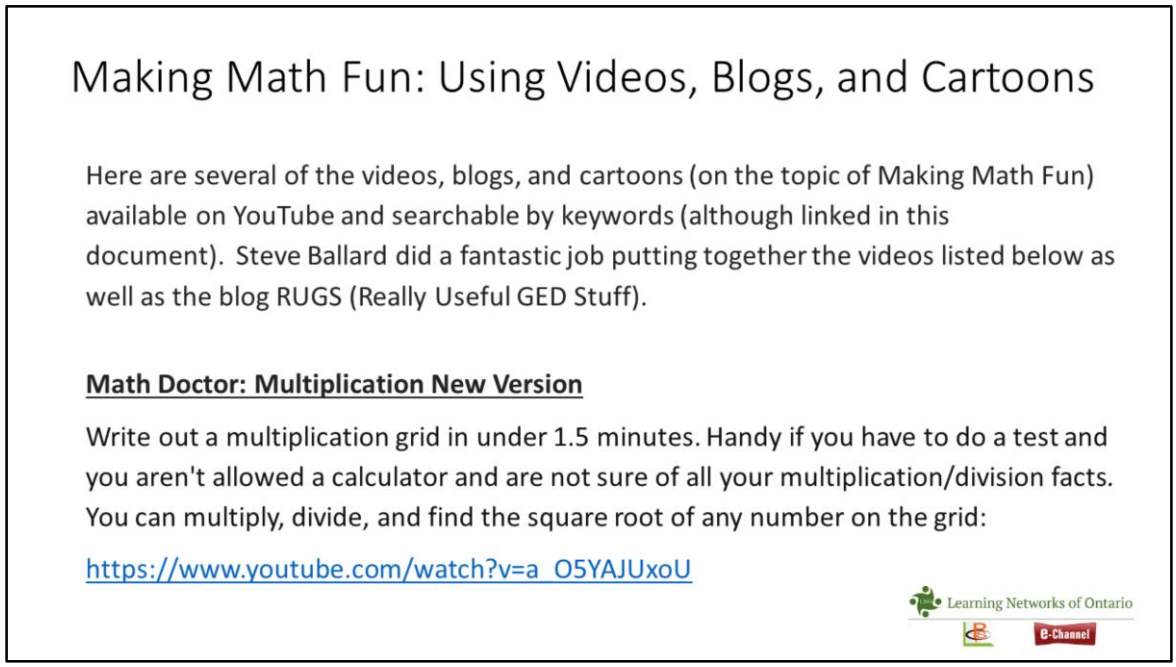
One idea I'm excited about is working with Smart Soccer Balls, because there's such universal appeal to "the beautiful game." And the idea of creating activities for learners to compare the stats of their favourite teams and players is ripe for possibilities – I know a few people who would like to dig into Manchester United vs. Liverpool from a stats perspective! I think it could be a good motivator.

Escape Rooms, for those of you who've done them, offer lots of opportunities for problem-solving, mathematical and otherwise. And the world of Augmented Reality continues to grow in leaps and bounds – it's within the realm of possibility that we could have a virtual version of Rene Descartes himself explaining the Cartesian plane to adult learners in your classroom.

I invite you to consider the possibilities, and feel free to add them to the text chat so we can share them with others!

With that, I will hand it back to Andrea for our Q&A.

Andrea: Thank you very much, Summer, for an excellent presentation. We really appreciate you sharing creative and playful approaches to making math fun.



I just wanted to mention that there are resources that have been shared with us about using videos, blogs and cartoons. These were put together by Sue Gould, Learning Facilitator from the Adult Learning Centre in Owen Sound. She told us that Steve Ballard did a fantastic job putting together the videos listed below as well as the blog RUGS (Really Useful GED Stuff).

Making Math Fun: Using Videos, Blogs, and Cartoons

YouTube is a great visual aid for creating fun and easy-to-follow math instruction, including the ones shown below.

Dividing fractions:

https://www.youtube.com/watch?v=sNhg7HHM1kY

Multiplying fractions:

https://www.youtube.com/watch?v=Z28J4jJeUOM

Additional videos about fractions:

https://www.youtube.com/results?search_query=steve+ballard+%2B+fractions

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We have time for questions and answers. I will just make quick mention of these first.

One of the videos is about multiplication. We have a number of videos about fractions. These will be in the presentation package that you will receive.

Making Math Fun: Using Videos, Blogs, and Cartoons

There are several great videos about percents on YouTube as well:

Type 2:

https://www.youtube.com/watch?v=0Bx6eki3OxU&t=5s

Type 3:

https://www.youtube.com/watch?v=ZCcIGod1Jvk

Type 4:

https://www.youtube.com/watch?v=oHF3gQL2wrc

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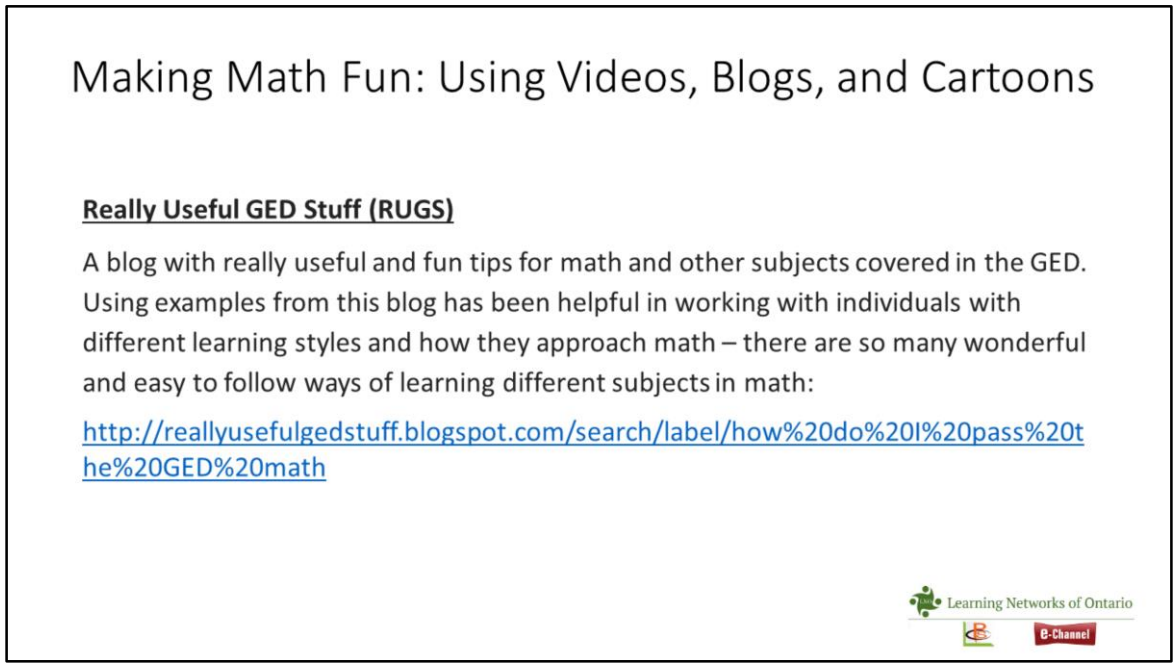
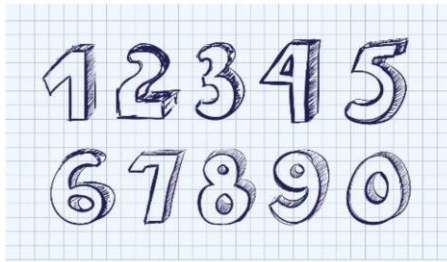
Videos on percents.



This is the information about the blog

Making Math Fun: Using Videos, Blogs, and Cartoons



Basic-Mathematics.com

A website/webpage that is used for tips on making adding, subtracting, multiplying, and dividing easier to do, mentally, using compensation:

https://www.basic-mathematics.com/compensation.html

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We've got a couple of websites

Making Math Fun: Using Videos, Blogs, and Cartoons

Khan Academy.org

A fantastic (and free) website that covers many topics, including math starting at Early Math and going to Calculus, Differential Equations, Linear Algebra, and more! YouTube videos that are narrated with great visuals for different types of learners with practice tests and quizzes so that an individual can review and test their skills as they go:

https://www.khanacademy.org/math

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Additional Gamification Resources

- "Gamification and Adult Literacy: Investigating the history, impact and execution of gamification principals in adult education"
- "Using Gamification Techniques to Increase Learner Comfort with Typing",
- "Gamification Tips for Educators"

https://www.llsc.on.ca/resources1#InnovationinLiteracy

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There are additional resources for gamification. We encourage you to research these further. Some of what Summer shared with you today is available in Literacy Link South Central's report "Gamification and Adult Literacy: Investigating the history, impact and execution of gamification principals in adult education".

For a free activity ready for use in your classrooms, you can download the document called "Using Gamification Techniques to Increase Learner Comfort with Typing", and for some quick and easy reminders to keep in mind while you work, don't forget to look over the summary document called "Gamification Tips for Educators".

All of these documents, and many more, are available on the Literacy Link South Central website using the link shown on your screen.

There are truly hundreds of resources available online to help you learn more about gamification. The bibliography of the report I mentioned on the last slide has many great reference documents, and here are two more for you.

The first is Capterra's blog – they have a database that offers over 200,000 user reviews to help businesses chose appropriate software for their needs – it's a bit like TripAdvisor for software. Their Gamification post shares 15 webinars, books, websites and videos to help you grow your gamification skills. The second is the online bibliography posted by the Gamification Research Network…. Beware, there's so much interesting information available that you should probably use the washroom and grab a fresh cup of coffee before you dive in!

At this point, I'd like to thank our presenters and contributors to this webinar for sharing their thoughts and experiences. However, they are not quite finished for today because we are going to move into the Q and A segment of today's webinar.

We're been keeping an eye on Text Chat since the webinar began. If you have a question that you haven't already asked in Text Chat, please use the raised hand icon and we will take questions in the order in which you raised your hands.

Sarah: While folks are thinking, please let me know when we should go to our evaluation screen. We know that many people have expressed their appreciation for our wonderful presenters, and we don't want to miss getting evidence of that.

Andrea: Thank you for bringing that to my attention. Now on to the questions.

Jim asks: How has anyone used gamification? Please add in text chat anything you have been doing.

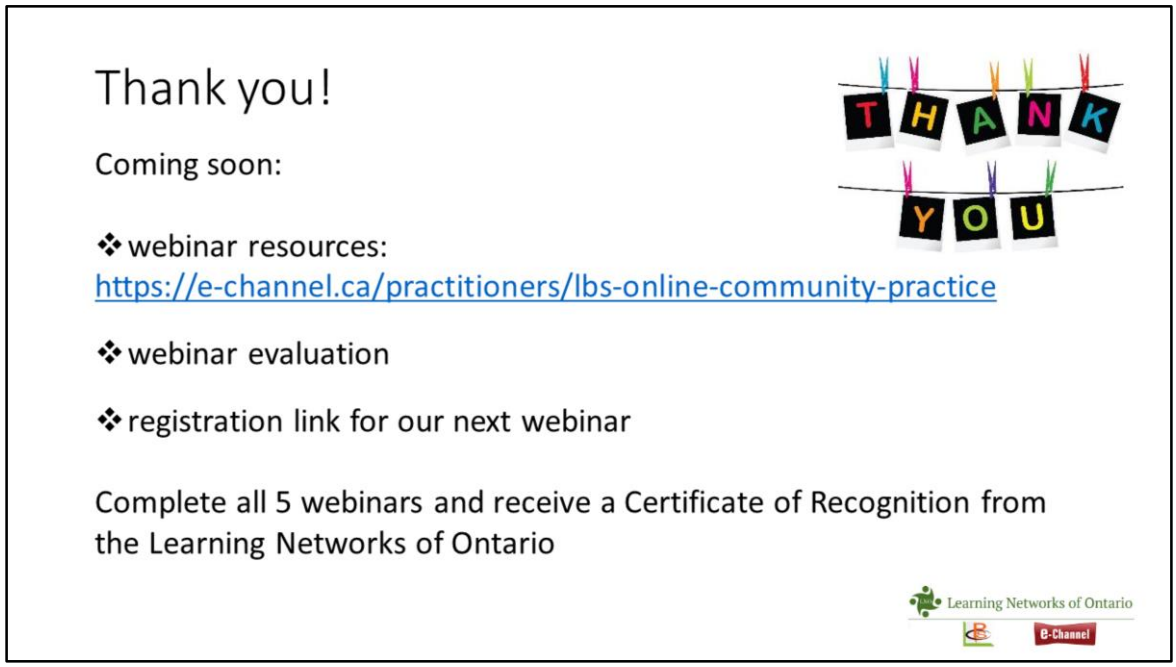
Paula asks Wayne: What are your go-to resources?

Wayne: Number Sense became Math Sense, which we use. I am trying to encourage people to find their own resources. I might encourage them to use the Khan Academy or go to YouTube. I think there is real value in people realizing that I am not the only source of content and that they can look up stuff and continue to learn themselves.

Khan Academy is the first place I refer people to if they are looking for an alternate explanation.

Andrea: Jacqueline asks what website is recommended to evaluate a learner's gaming style?

Summer: Thanks to TM who found a URL for us. Matthewbarr.co.uk/bartle



This is the final slide of today's presentation, but please don't leave quite yet!

A quick reminder that you may wish to browse other Online Community of Practice topics that have been addressed in the past. The web link is on your screen.

We'd really appreciate it if you could take 3-5 minutes of your time to complete a quick evaluation. Your feedback is very important to us. So important in fact that we're having a draw. If you complete the evaluation and provide your name and an email address, you will be entered into a draw for a $25 gift card!

If you're interested in this topic of math/numeracy, please consider registering for the next webinar in the series which is on a topic many of us will be familiar with – Math Resources. This webinar is on January 24th from 2:00 pm – 3:30 pm. I believe we have already had quite a few registrants, so don't delay if you're thinking of attending.

New this year for the Online Community of Practice – if you take all 5 webinars, you can request a Certificate of Recognition – good for the professional development portfolio. Thanks to our presenters and thanks to you, today's audience.

Thank you for your participation, and we hope this webinar helps you in your work promoting the wonderful world of math.