Webinar Transcript: Seeing the 'Fun and Games' in Math

By: Jeff Richardson

[**Slide - Seeing the "Fun and Games" In Math**]
[*Text on slide*: Presented by: Jeff Richardson, OCT
Image of LD@home logo]

[Webinar Host: The LD at Home team is pleased to welcome our guest speaker, Jeff Richardson, your presenter for "Seeing the 'Fun and Games' in Math."]

[**Slide - This resource was made possible through a Parents Reaching Out Grant from the Ministry of Education**]
[*Text on slide*:
Image of LD@home logo
Please note that the views expressed in this webinar are the views of the presenters and do not necessarily reflect those of the Ministry of Education or the Learning Disabilities Association of Ontario.]

[Webinar Host: Before I introduce Jeff, however, I would like to thank the sponsors who've allowed us to make this a free event for you this evening. This webinar was made possible by a Reaching Out grant from the Parents Reaching Out grant from the Ministry of Education. Please note that the views expressed in this webinar are the views of the presenter, and do not necessarily reflect those of the Ministry of Education, or the Learning Disabilities of Ontario. Okay, now the lawyers have been covered off -- let me introduce our speaker to you.]

[**Slide – Welcome**]
[Text on slide: Presented by: Jeff Richardson, Ontario Certified Teacher]

[Webinar Host: Jeff Richardson has been in education for over 25 years. He's enjoyed various roles, including four years as a curriculum coordinator for the Hastings and Prince Edward District School Board, a three-year secondment to Sagonaska Demonstration School, a provincial school for students with learning disabilities, and most recently teaching grade nine math to students with developmental delays. Jeff has led numerous workshops on assessment and evaluation, mathematics education and technology and a recent focus on sessions exploring strategies on helping students with learning disabilities to be more successful in math. Jeff is also featured in an LD at School video on math manipulative and technology. I welcome you, Jeff, this evening. And with that, I will hand the cyber floor to you.]

[**Slide – Seeing the "Fun and Games" In Math**]
[*Text on slide*: Supporting Math Learning at Home
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July 2018
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[Jeff Richardson: All right, thank you very much, Lawrence. I hope you can see the screen there, coming to you tonight from Belleville, just on the north shore of Lake Ontario. So I hope the audio is working okay.]

[**Slide – Agenda**]
[*Text on slide:*
Math Concept

- Visualizing Numbers – 10-Frames
    - Practising Addition Facts
    - 100 Chart
- Number Lines - Differences
- Estimating / Reflecting on Answers
- Multiplying - When to Use and Learning Facts
    - Multiplication Chart
    - Connecting to Measurement
- Other Considerations
- Resources

Corresponding Game / Resource

- Tic-Tac-Ten
    - RISK
    - 99
- Subtraction Snap
- Hi / Lo Game
- Doubling Snap
- Multiplication Snap
- Area Game]

[Jeff Richardson: The agenda today is built on practice from my time at Sagonaska Demonstration School here in Belleville, a provincial school for students with learning disabilities, where I had the chance to teach math to grade nine students, as well as students in the elementary program. In that role I did a lot of research about what would work well for students with learning disabilities, and just made my own observations. One of the most powerful things I learned was the importance of students being able to attach a concept to numbers and all of the different procedures that they were going to learn, and to be able to visualize what they were working with. Students with learning disabilities often struggle with symbolic representations; in other words, when they're reading that would be letters and words, and in math it's even more complicated because we have so many different symbols -- numbers and some of the visual representations like graphs and number lines, and things like that. So I found that anytime we could make it not just about numbers and equations, but we could have a visual representation, then that really helped. And that's the main focus of this workshop. Just to make it generic, so that hopefully everybody can get something out of it, the focus is really on number sense. Number sense to me means students having a real understanding of numbers, so being able to visualize what a number looks like and what a number means, instead of just seeing it as a symbol on a page. Then I think they're able to work with it more easily. It helps students with working memory difficulties, for instance, so that they can draw on a representation of some numbers. So we'll be going through just that, visualizing numbers using 10 Frames, and then connecting that to addition, and then using a 100 Chart as well for addition. We'll look at number lines, especially in terms of differences. We'll talk a little bit about estimating, which is an important tool for students to make sense of numbers. Eventually we'll get into multiplying, so kind of the beginning stages in multiplying, when to use it, and then how they can use the Multiplication Chart. And at the end we'll connect it to measurement. The workshop is called "Seeing the Fun and Games in Math," because I think the practice, having students with learning disabilities trying to memorize a lot of facts, for instance, isn't really going to work that well. It's going to be frustrating, I think, for a lot of those students. So instead, I've tried to connect to different games that I've played in the classroom with students, with things that I have found successful in helping students engage with and improve their number sense.]

[**Slide – Introductions**]
[*Text on slide:*

- Secondary Math Teacher in Belleville
- Teaching for 25 years
- Taught elementary and secondary math at Sagonaska
    - Provincial Demonstration School for students with LDs

And you?
Poll Question: What grades are of interest to you? (click all that apply):

- Grades 1-3
- Grades 4-6
- Grades 7-8
- Grades 9-12

[Jeff Richardson: So just to get started, Lawrence did a great job with the introduction. So I think I'd like to know a little bit more about you, the audience, just so I can tailor some of the messages. So we'll start our first poll.]

[**Slide – Poll Question: What grades are of interest to you?**]

[Jeff Richardson: What I'd really like to know is, what grades are of most interest to you for your children? So in education we call it primary, junior, intermediate and secondary, but we'll break that down as grades one to three, four to six, seven to eight and nine to twelve. So if you could just submit that poll, and then we'll move along. That way I just know what to emphasize a little bit more. Okay, while we're waiting, I'll just start moving along here. Okay, and I can see the results there, that's great. One of the important things, I think, is when students, and even when I'm working with teachers and we start talking about math, we're going to start doing some math. Whenever I say that at a workshop, you can just feel anxiety in the room take place.]

[**Slide – Now Let's Do Some Math!!**]

[*Text on slide:*

- But first – how does that make you feel?
- A lot of students have math anxiety
  - Interferes with their ability to learn!
- Others believe they aren't good at math.
  - This may give them permission not to try
- IT IS REALLY IMPORTANT TO BE POSITIVVE WITH CHILDREN ABOUT MATH → EVERYONE CAN LEARN MATH!!
  - We might just learn differently!

Poll: Which statement best describes your feelings about math:

- ☐ I love math and am good at it!
- ☐ I like math and did OK in school
- ☐ I like math but never did well
- ☐ I don't like math but I'm ok at it
- ☐ I hate math and it scares me!]

[Jeff Richardson: With students, it happens in classrooms sometimes. They get used to it eventually, because they're exposed to it on a daily basis. But a lot of students do have math anxiety. We know that interferes with their ability to learn, because it shuts down their brain a little bit, they're so busy being anxious. We're [INAUDIBLE] about math that they sometimes don't do as well as they could. Other students just believe they're not good at math. It's almost like they've got permission for this, because somebody in their life might have said, "Oh, it's okay, your dad wasn't good at math," or, "I wasn't good math, so you're probably not going to be good at math either."]

[**Slide – Poll Question: Which statement best describes your feelings about math?**]

[Jeff Richardson: I just want to find out how people feel about math. Our second poll is going to be, which statement best describes your feelings about math? Do you love math and you feel like you're great at it? Do you kind of like math and you did okay in school? Do you like math but never did well at it? Or do you not like math, but you feel like you're okay at it, or do you hate math and it scares you? If you could just take a second and answer that. And while you're answering it, I'm going to say that no matter how you feel about math, I believe it's really important to be positive with your children about math. I know that when I went to school, the way math was taught, a lot of students couldn't learn in the way that it was taught, because it was taught all symbolically. The teacher would show us a couple of examples, and we would have to memorize those examples and then try to answer the next questions using the procedure that the teacher showed us. That, for a lot of students, wasn't great, especially students with LDs, because they're not great at memorizing. And they never really made sense of the math that they were shown. So today, what we try to do in the classroom instead is let students explore a little bit more math and come at it with a more conceptual understanding, so that they are able to be better at math. So we really feel -- I believe that all students can do math the way it's taught now. We try to show them in as many different ways as possible, so that they are able to all learn. So if we're going to be positive with students, that's half the battle right off the top, so they don't come in not feeling like they're good at math.]

[**Slide – Developing Automaticity with Numbers**]
[*Text on slide:* Important to help students visualize numbers so they can connect magnitude to the symbols.
One tool is the 10-Frame.
Two rows of 5.
Always fill top row first from left to right, then go on to second row.
Image of 10-Frame with two red tokens in first two boxes.
I have___. I need___.]

[Jeff Richardson: Okay. So we're going to start the actual math part now. The title on the slide says, "Developing Automaticity with Numbers." That's kind of a -- in a way, it's an edu-speak word there, educational jargon, "automaticity," but I think the word kind of hopefully explains itself. We want students to become automatic with their concept of numbers and with operations, simple operations with numbers. So students with LDs often have working memory problems or processing speed problems. So if they're having to stop and try to make sense of things as simple as numbers, or simple addition questions, then their brain is getting taken up, and they can't really be solving the problem at hand. So that's why we really want their ability to recognize and work with numbers to become much more fluent and automatic. So a tool that I use, I used this with my grade nine students this year in an essentials class, is the 10 Frame. And the 10 Frame is what you see on the slide in front of you. Like most manipulatives, we do want students to play around with them, but there's a very intentional way that students should use most manipulatives. So same with the 10 Frame. When we fill the 10 Frame, we always want to fill from the top row and then go down to the second row, and we always go left to right.

And the 10 Frame is divided into these two rows of five to replicate our hands. So the reason the number 10 is so important in our systems is because we have 10 fingers, and that's what the entire system is built on, really, 10s, 100s, 1000s -- are all multiples of 10. So when I am representing the number here, the number two, I didn't do one spot here and the second dot down below. Instead I started building left to right across the top. Again, that's going to become important a little bit later on. So the first thing I want to do with students is be able to have them recognize numbers automatically without counting. So we want to get way from counting with the 10 Frame, and then eventually we also want to get away from counting on our fingers when we're doing addition. That's when the automaticity comes in. So I want students to see this. And what we're starting to build is 10 facts, meaning things that add up to 10. So the first game we play with students when I'm doing this is, I'll put this up on the whiteboard, or the smartboard, and I'll have students say, "I have two," and then the "I need" part is, how many more do I need to get 10? So ideally, we would just get them to recognize I need 10, but a lot of students don't recognize that right away, and they have to count the empty spots. So one tool that we want students to realize is, they don't have to count all of the numbers on the bottom. This, a complete row, they should know is five, so they don't have to count, one, two, three -- all of these. They should start counting up here, one, two, three, four, five. Instead, they should recognize this as five and then continue counting from there. So all they do is say, "Five, six, seven eight. I have two, I need eight." So we would go through a number of examples like this until they become automatic with all of the different 10 facts. So from time to time in the presentation, I am going to be switching to a different tool that allows me to be a little bit more interactive.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So you'll see me doing this, and probably the odd time I will get mixed up and end up in the wrong application, so just a little bit of patience as I do that. So I would have these set up as class charts on my smartboard, so I would go through them as quickly as I can. Students would take turns, and I've made these available to you when the webinar was posted, I made this a PDF so you could print off these flash cards as well, if that's going to be useful for your son or daughter. I would want students to say, "I have six, I need four." Okay? Next one, "I have three, I need seven." So just really going like that until it becomes automatic. I have four, I need six.]

[**Slide – Uses of 10-Frames: 10-Facts**]
[*Text on slide:*
Develop automaticity with 10-Facts (e.g. 7+3=10)
Building block for other addition facts
    Start with 10-facts, more to near-10s
    Progress to two-digit addition
10-Facts: Start with “I have, I need”
Then have students state as fact: 7+3=10

Image of 10-Frame with 7 red tokens in boxes.
I have___. I need___.]

[Jeff Richardson: The next step after that is that I want them to now think about this in terms of addition. So the "I have," "I need," is really the same thing as recognizing the addition facts for adding up to 10. So instead of just saying, "I have seven, I need three," then I'll get the students to say, "I have seven, I need three. Seven plus three equals 10." Then we'd go on to the next number, and then we'd do the same thing. Again, practicing until it becomes automatic.]

[**Slide – Game Time: Tic-Tac-Ten**]
[*Text on slide:*
- Need a 3 x 3 grid
    - Best on dry erase board
- Roll a die, mark value on grid
- Goal: make row or column add to 10
- When you do, erase the values from that row or column
    - Or write small #s and cross out
- Can complete two rows at a time!
- Tally completed rows or columns
- Game is over when grid is full

Image of Tic-Tac-Ten grid]

[Jeff Richardson: So once we've got those mastered, and I feel like they've got a good feel for the 10 facts, and what you can do with your son or daughter, again, now it's time to go to a game to practice that. So I had an app that is kind of a game on my iPhone that made me think of this game. So I call it, "Tic-Tac-Ten." So the goal of the game is to roll the dice, and every time you roll the dice, you have to mark the value on a space in the grid. So there's a little bit of strategy about where you're going to put those numbers. The goal is to get a row or a column to add up to 10. If it does, then you get a point. You can erase those cells that you used to add up to 10 so you can use those cells again and keep the game going. You keep going until you end up filling up the grid, because there's no rows or columns that add to 10.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So we'll try to do a little demonstration here, to see how that works. I've got a little interactive die here that I can roll. So we're going to roll the dice, if it cooperates. There we go. So my first roll is a three, so I'm going to write a three somewhere on my grid. Then I roll the dice again. I get another three. So now I have to start thinking about what the combinations I want; where do I want to put this three? So I'm going to decide to put it down below here, and we'll roll again. I get a two. You can start to ask, at this point, let's see, if you've got a three and a three together, what do you want in order to complete a row of 10? So you can get students to kind of -- or your son or daughter -- thinking ahead, and that will develop their number sense as well. So I rolled a two, so now I'm going to put a two, say, here. So now I know, oh, I'm looking for three plus two, that's five. So I'm looking for a five here, or a four here. So you get them to anticipate before they roll. I roll the next one, uh-oh, I got a six. Well, I can still put that in the middle here, and that gives me quite a few more possibilities. Hopefully, we'll get something. Okay, here's a two. Ah, I've got a six plus a two in the column here, so if I put a two down here, that's going to give me 10. So I now have completed one column. So I get one point, and I now can erase these numbers and use them again. Some games go very quickly, depending on how the dice roll is, and some games go on for quite a while. But the longer it goes on, the more practice they get. Sometimes they'll complete two rolls with one, a row and a column, for instance, at the same time, if the numbers work out that way, so they get two points and get to erase a whole bunch of cells and keep the game going. I always kept a high score about how many rows or columns students could get, and high scores seem to motivate kids to want to play again. So you can do that, or you can have a few different players playing at the same time on their own grid. Just everybody using the same dice roll, so then it comes down to strategy and being able to recognize. We would do that, and it was amazing. Everybody had a different game board and got different scores. So it was kind of a fun game, and kids always liked to play that one.]

[**Slide – Uses of 10-Frames: Near 10-Facts**]
[*Text on slide:* Once students have automaticity with 10-Facts
Move to “Near-10s”
Once students know 7+3=10, they can do
7+2 and
7+4 (3 – to make 10; 1 – “left over”)
Some students may need counters at first to recognize they are getting 9 or 11
Image of 10-Frame with 7 red tokens in boxes and 2 yellow in following boxes to represent 7+2
Image of two 10-Frames, the first has 7 red tokens in boxes and 3 yellow in following boxes. The second 10-Frame has another yellow token in the first box. This represents 7+4.]

[Jeff Richardson: Okay, so that was practicing our 10s. Once we've got our 10 facts down, now we can move to what I call the "Near 10s." And "Near 10s," like the name implies, are things that add up to either nine or 11. So if they know that seven plus three is 10, then they should be able to do the seven plus two, because two is one less than three, so we didn't quite make it to 10, we made it to nine. It might still be useful to show that with counters, depending on where you're child's at with number sense. But now they're getting into a whole bunch of other facts that they can use for mental addition. The other one is seven plus four, then. So if we start with seven and we add four, well, that's one more than three. So what we can talk about with students is, well, we're breaking apart this four into three that they're going to use to complete the 10, and one more that is left over. Some students will really benefit from using two 10 Frames at this point, so that they can show the three going up to complete that first 10, and then the one more. That connects to a more symbolic procedure that students will use, like adding up seven plus four, where they've got the seven and then the four down below. You get them to, all of a sudden, they're using another column, a 10s column. And this will remind them of why that's happening. We've got one in the 10s column, and then one in the ones column. This will also connect to base 10 materials that they might have used in school.]

[**Slide – Game Time – Pile of Cards**]
[*Text on slide:*
- Give a group of 6-0 cards to student
    - May want to make the cards "friendly" by including some 10-pairs (e.g. 6 and 4, etc.)
- Student has to add them up
- Encourage student to group in "10 pairs"
- TIPS:
    - Model with think-aloud to show strategies
    - Use visuals on cards (dots)
        - 9+4=13 (I have 9, I need on)
        - Connect to 10-Frame language

Image of cards 4 of clubs, 7 of diamonds, 2 of spades, 9 of diamonds, 3 of hearts, and 8 of spades lined up. Below images of 7 of diamonds and 3 of hearts grouped together adding-up to 10; 2 of spages and 8 of spades grouped together adding-up to 10; and 9 of diamonds and 4 of clubs together, the 9 diamonds and 1 club are circled together, the 3 left over clubs are circled together. This represents 3 tens and 3 left over so 33.]

[Jeff Richardson: So once they've got these facts down now, so we've got our 10s, and we've practiced some with our Near 10s, now we can play another game. I don't know if it's really a game, or just a practicing. So using a deck of cards. So cards are great, because the students can use the spots as counters. So again, it's a very visual representation. It would be nice to have a set of cards, to be honest with you, that was printed like 10 Frames. You'll see that it's not quite done that way, but they can still count the dots on the cards. So I use a game called "Pile of Cards," and we try to get them to add up a whole bunch of numbers without writing anything down. So they're going to use their strategy at making 10 pairs, in order to do that. Here's how it might look.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So if I have this pile of cards, so I would deal anywhere from six to 10 cards I find works well with students. And then they're going to try to give you a total of this, again, without writing anything down. So I'm looking for 10 pairs, so I might recognize, for instance, oh, I've got four here and six here. So there's one 10. Oh, and I've got two here and eight here, so that's another 10. Then my other two -- this is kind of a Near 10. If I have seven, I know I only need three to complete another 10. So

I'm going to circle the three from my five, seven plus three is 10, I've got two leftover, so now I see that I've got one, two, three complete 10s, so that's three in the 10s column, and two in the ones column. So my answer would be 32. So they were able to add that up without writing anything down, without using a calculator. It's not too straining on working memory or processing speed. So again, I found students very successful using this kind of an activity. I know they're not really going to be adding up using playing cards all the time, but at least to a mental model, and again, students can visualize what they're doing, if they are adding up a group of numbers. So that was Pile of Cards. You might come up with a better name than that, but that worked for us.]

[**Slide – Uses of 10-Frames: Two-Digit plus One-Digit**]
[*Text on slide:* Once students have automaticity with near 10-Facts
Once students know 7+3=10, they can do
27+2 and 27+3 and:
27+4 (3 – to make 10 and 1 – "left over")
Some students, especially with working memory deficits, would benefit from counters to keep track of complete 10s (2 for the 27)
Image of 10-Frame with 7 red tokens in boxes and 2 yellow in following boxes to represent 7+2
Image of two 10-Frames, the first has 7 red tokens in boxes and 3 yellow in following boxes. The second 10-Frame has another yellow token in the first box. This represents 7+4.]

[Jeff Richardson: So now that we've got our 10s and Near 10 Facts down, now we can start to add up bigger numbers. So again, once students know that they have seven plus three is 10 -- just to keep using that example -- now, they should be able to do something like 27 plus two, or 27 plus three, using -- they might use two 10 Frames. What you'll see on this card is, I've got extra counters up top here. So when I'm using 10 Frames, I'm using counters to fill in the grids. So I've got two extra counters up here to represent my 10s. So in red, you'll see the number 27 represented; these are the two 10s for 20, and then the seven along the 10 Frame. So if I'm doing 27 plus two, students will see, oh, well, that gets me to 29. Twenty-seven plus three, well, that completes another 10. So now I would have three complete 10s, so that's 30. And you could even do 27 plus four. Again, visualizing this, I find, really helps them. So about four, they break down into three and one again, so the three completes the 10, so we've now got three 10s, and I've got one left over. So 27 plus four is 31. And you wouldn't believe how many students I have in grade nine that I have to -- if I was giving them seven plus four as a pattern, for instance, they would have to get the calculator out, let alone 27 plus four. As soon as the numbers got big, they seem to shut down or don't even think that they can answer it. But if they use a tool like this, I think they'll understand better and they will be able to answer those questions, so they don't have to take all that time to go to the calculator which, again, derails their working memory.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So let's do another example of that in the interactive tool here. So if I wanted to do 36 plus 25, I've got a section on my 10 Frame where I can show completed 10s. So in red already, I'm showing 36. So I've got my three completed 10s down at the bottom here, and then my six at the top, so 36. Now I need to add 25. So what I'm going to do is, well, I already know that I've got two 10s that I'm adding in for 25, so I'm going to use a different colour just to illustrate it. So there is my 20, and now I need to add five more, so I'm going to go, one, two, three, four -- oh, that's what I needed. I had six, I needed four to complete the 10, and then I've got one leftover. Like I said, it depends on the student's number sense how quickly they'll be able to transition from doing this with the 10 Frame, to being able to do it without. So their answer here, they've got five completed 10s that they're already showing at the bottom. They've got another completed 10 here, so that's six completed 10s. Then they've got the one leftover in the new 10 Frame, so that would be 61. So again, able to do that without talking about things like "carrying over." Instead, we are completing 10s, which will lead to that procedure later on when they do see it symbolically in the classroom.]

[**Slide – Game Time – RISK!**]

[*Text on slide:*

- There are four rounds (R, I, S, K)
- Object: score points for each round before a '1' is rolled
  - Each player stands to indicate they are 'in' for the round
  - The dice are rolled and the student should apply an addition strategy to add the total of the dice, and add to the running total for that round.
- Players then sit to take the total score for the round of RISK by rolling again to add to the scoare. If a 1 is rolled, players still 'in' receive a zero for that round.
  - Double 1 means zero for all rounds so far!
- A 1 or everyone sitting ends the round

Image of table:

	R	**I**	**S**	**K**	**=**
John	7	14	0	13	**34**
Paula	13	14	0	27	**54**
Mai	0	19	5	13	**37**
Anna	0	0	0	18	**18**

]

[Jeff Richardson: All right. So once they've got that, here's another game now that they've got all their different addition skills. So we'll be getting into some bigger numbers now, and it's a game we called "Risk." It's another dice game. This time we roll two dice beforehand, and there are four rounds. The letters really don't mean anything, it's just, like, round one, round two, round three, round four. And players can score points in each round. But it's called "Risk," because the risk is, as you roll the dice, whenever a one comes out in either of the dice, then that wipes out the scores from that round. So if you haven't already decided to play it safe and take your score, then you would get a zero for that round. So on the score card I'm showing you right now, John looks like he played it safe after the first roll of seven. Paula stayed in, and they must have rolled another six to get up to 13 for that round. So she took her 13. The last students, Mai and Anna, decided to risk it and go for a third roll, and it looks like that's when a one came up on one of the dice, so they ended up getting zero.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So just to make it a little more clear, this is what it might look like. This was probably my students' favourite game this past year. And the good thing is, they're all practicing their addition. So whoever rolls the dice, for instance, is responsible for adding up the numbers. So six plus two, so they would get eight. So we will record the eight for that roll. And let's say if a student decides he's going to play it safe, so he takes his eight, whereas Sam Pull -- gotta love those sample names I've got there, Stu Dent and Sam Pull, very funny -- Sam Pull decides he's going to risk it again. So he rolls the dice and gets -- oh, five plus five. There's a double that we're going to talk about in a minute. So he writes down that we've got another 10 here. So now they have to keep adding up to see, well, what's this round worth right now? Well, now it's worth 18. So let's suppose Sam Pull is feeling really lucky, he's going for the high score, so he wants to roll again. Let's keep pretending until -- oh, that would be a nice roll. Oh, okay, so let's suppose this was the roll -- oh, he got a one. So that means that all of this is wiped out. Instead, Sam Pull would get a zero, okay? Then we would go on to the next round. So we could erase these, and we start all over again for the next round. And when you get to the end, then they also have to add up to see what their total score was. So there's addition all over the place -- within the roll, adding the dice, and then adding up the total. So it's ended up being really good practice. It also connected to probability in math -- what's the probability of rolling a one? So talking about how it's kind of a one in three chance, connects to some of the probability stuff they'll do in school as well.

Okay, so I should say that this slide is really busy, and I didn't read everything, but because these slides will be available, all the rules are explained there, so hopefully you can make sense of it if you come back to this slide to see it. So a lot of the game slides I won't go through and read everything, I'll explain it and then you can come back and see all of the information on the slide.]

[**Slide – Reflecting on Answers/Looking for Patterns**]
[*Text on slide:*

- Have additional chart available – look for patterns
  - Odd + odd = even
  - Even + even = even
  - Odd + even = odd
  - Even + odd = odd
    - Summarize!
- School word: Commutative Property

- Means: 3+2 = 2+3

Poll: How familiar are you with Mathies website?

- Use it a lot
- Have seen it
- Never heard of it

Image of number chart:

+	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10

Check out mathies.ca for interactive number charts.]

[Jeff Richardson: Another thing that I want them to focus on is odd and even, right? That's a really useful tool for being able to reflect on your answers. So, well, you'll want to make sure that your child has a good understanding of what odd and even means, and what numbers are odd and what numbers are even, so that becomes automatic as well. Then I've highlighted on this chart all of the even answers. So, two, four, six and so on. Four, six in the next row, et cetera. I might ask, well, how do we end up with an even number? What two numbers add up to give us an even number? And they'll see oh, well here, it's one plus one to give me two, and here it was three plus one to give me four. So, oh, those are both odd numbers. So it looks like when I'm adding up two odd numbers, I get an even number. Okay. Then down in the next row, it's a little bit different. It's two plus two for a four, and a two plus four for a six. Oh, those are both even numbers. Then they'll want to go down and check to make sure that always works. So it turns out, you'll want them to come up with these rules, but an odd plus an odd is an even, and an even plus an even is an even. So the only way we can add two numbers together and get an odd number is if it's one odd number and one even number. And it doesn't matter which order we add them in. So that's another thing they can recognize from this chart. The school work, the education work for this is the commutative property, meaning "commute" to mean "to move," it doesn't matter what order we do it in. We can change the order and we still get the same answer. So they'll see that with the number five, for instance. So two plus three is five, same as three plus two is five. As adults that seems pretty obvious, but it's something that students need to be made aware of. It's really powerful if they can uncover it themselves by looking at an addition chart. So like I said, there's these tools available on the Mathies website. And the Mathies website is an awesome website, it's got lots of different tools and resources on it, including a lot of virtual manipulatives. So part of the seminar is connecting to what students are doing in schools, so not all of us have all of the manipulatives that our students might be using at school, but everybody can go to Mathies.ca if you have internet and use some of the tools. So I was just wondering how familiar people are with the Mathies website.]

[**Slide – Poll Question: How familiar are you with the Mathies website?**]

[Jeff Richardson: So this is going to be our next poll. So how familiar are you? Do you use it a lot? Have you tried it? You've heard of it and you've tried it a little bit, or have you never heard of it? So if you can just take a second to add into that poll, and I'll just quickly show you what the Mathies website looks like, what it has. Okay, so it looks like most people -- almost half the people haven't heard of it. But another half have used it a little bit, so that's great.]

[**Demonstration of Mathies website**]

[Jeff Richardson: So the Mathies website, I'll just really quickly show you here, if you go across the menu here, you'll see that there's home supports, those extra things you can do at home. There's a bunch of Activities, Learning Tools and Games. So I've gone to the Learning Tools section here, so these are where you might see some of the virtual manipulatives, using calculators and things, like number lines, fraction rods and decimal rods that students might use in school. A money kit, so you can play around with money, without having to let your kids have access to your actual money, just to work on their number sense. Then this is the one I was just talking about, the number charts. So you'll see that there's 100s charts, multiplication tables and addition charts. Okay? So really worth checking out the Mathies website.]

[**Slide – 100's Chart**]
[*Text on slide:*

- Practice addition facts:
    - Diagonally up and right the digits add to the top row
    - Down and right is the difference
- Adding as moving:
    - Tens move down
    - Ones more right
- E.g. 13+42=
    - Start at 13
    - Down 4, over 2

Image of 100's Chart.]

[Jeff Richardson: Okay. So let's have a look at another use of the 100s web Chart. This is kind of a neat thing, I'm going to flip to my interactive tool for this.]

[**SMART Notebook demonstration**]

[Jeff Richardson: So here's a 100s Chart. One neat pattern that I was showing on the other slide there is, if we wanted to just work on some really simple arithmetic, so kind of our things that add up to just one-digit numbers, let's take the number six, for instance. Any time, if you look at the diagonal going up and right towards it, the two digits in all of these numbers add up to six. So five plus one, four plus two, three plus three, two plus four, one plus five -- all equal six. So if you want, and your child needs, practice just with those becoming automatic, then having a 100s Chart printed off and working on some of these skills can be really -- and so you can ask your son or daughter, "Hey, what's four plus two?" They find four plus two, and then they work their way up to number six. It's just a way to, again, avoid counting, but recognizing some patterns. And another neat thing, if we look the other way, so going down and to the right, now we have differences. So the difference between seven and one, eight and two, nine and three is all six again. So kind of a neat pattern on a 100s chart that a lot of people aren't aware of. We're going to use it now, is to do a little bit of addition. So if I wanted to add up, say, 32 plus 41, so we were doing this with Near 10s. But now we can do it with any two-digit numbers that we want. Again, that's a very visual approach to addition. So because the number chart is in rows of 10, every time we move down another row, I'm really adding another 10 to my number. Anytime I just move one to the right, that's adding one. So we can use that to do 32 plus 41, as an example. So if I do 32 and I want to add 41, I'm going to start by adding the ones. I've seen it done both ways, but I kind of like this because it connects to the procedure they're going to do later. So I'm going to add one to get to 33, then I'm going to add 40. So I move down four rows. Ten, 20, 30, 40, and I get to 73. So 32 plus 41 -- 73. Here's a very visual way of seeing that. Let's do this slightly harder one; 28 plus 43. So again, I'm going to start at 28, and I'm now going to add in my 43, and I'm going to start with my one. So I have to go three to the right, one, two -- ah, three. So I've finished a 10. I've gone down to the next 10s. Now I have to add in my four 10s, so I'm going to go down four more, one, two, three, four, so 10, 20, 30, 40, and I end up with 71 as my answer. So this is an important concept that we will teach students when they're doing more of an algorithm, or more of a procedure. Sometimes this is the only way addition is taught, and that's very symbolic. So students really don't understand when the teacher says, "Okay, do eight plus three, that's 11. So you do one and you carry one." Well, what does that really mean? We're not carrying one, we've completed a 10. If students have the visual from the 100s Chart, this will make sense. I think it would be kind of nice if we actually wrote it as -- that's supposed to be a 10 right there, so zero, to write accurately on this computer. So we've got an actual one now, so 10 plus 20 is 30. Add another 40, that's our 70. So that's what that seven -- where the seven comes in. We usually just say one plus two plus four is seven, but it's really one 10 plus two 10s plus four 10s is seven 10s, so I would rather talk about it like that so that students are reminded of the base value. Okay. Moving right along. So lots of good uses for addition charts as well.]

[**Slide – Game Time - 99**]

[*Text on slide:* The Game: Keep a running total of cards played but you cannot exceed 99!

- All players start with 3 cards
- Take turns playing a card in discard pile and adding card value to total
    - Remember to pick up so you have 3 cards!

- If you must go past 99 you lose a life
    - Lose 3 lives and you're out of game!
- Special Cards: collect these!!
    - 2 – "back to you" –> direction changes
    - 9 – "99" → total goes to 99 immediately!
    - Jack: "Holding" → like adding zero
    - Queen: "Back 10" → substracts 10
- King: "Add 10" → Just like a 10
- Last one with lives remaining wins!
- Have any of the learning tools used so far available as needed:
    - Number line
    - 10 frames
    - 100 chart
    - Additional chart

Image of cards: 2, 9, Jack and Queen]

[Jeff Richardson: Now we've kind of given students tools to be able to add any two-digit numbers and one-digit numbers. So I would say having these tools available is really useful, so 10 Frames, 100s Charts, an addition chart -- whatever the student needs to help them. Calculators are okay too for various things, but if we're really working on addition, I would rather they don't use a calculator for the practice. If they're just doing problem solving, then a calculator can be great. Here's a game that I used to play as a kid with my family, actually, when I was a kid. And I've used it in classroom now, because there's so much addition and good practice with it. So the object of this game is to, everybody adds a card to the middle and you keep a running total going, but you may not go past 99. That's the name of the game. If you go past 99, you lose that hand, and we called it, you lose a life. Everybody starts the game with three lives, if you lose all three, then you lose the game. So the way to keep yourself alive is to collect special cards, so they're the ones that are pictured there, the two, the nine, the Jack and the Queen. So you might be -- somebody puts down a six and then somebody else puts down a 10, now the score is at 16, so on. So it builds, and when you get into the 90s, all of a sudden, you might not be able to put down a seven, because that would put you over a 99. So instead, what you might want to do is have a two. That doesn't add to the score, so that just changes direction. So if you're at 98 or 99 even, and you put a two down, it stays at 98 or 99, but just changes direction. So you stay alive, and it can be a fun way to get the person sitting on your other side. A nine automatically makes the score to go to 99, so you can play that as a first card of the round, and then you might catch somebody before they've had a chance to collect special cards, so that's kind of a fun gamble to play, as to whether you want to put the nine down. A Jack is like adding zero, so it's one of those special cards. It's, like, plus zero, so if you're at 99, you can still play a Jack. And a Queen also keeps you alive, but it gives the next player a chance too, because it subtracts 10s. If you're at 99 and you play a Queen, it goes to 89, and then the next person is going to be able to play any card as well. So it's probably the nicest of the special cards for your other people in the game. The King adds 10, just like any other game. So, like I said, getting students to -- or children to practice their addition as the game goes can be really valuable.]

[**Slide – Addition to Subtraction – What's the difference?**]
[*Text on slide:* Discuss as opposite of addition
Fact Families:
2+7=9
9-7=2 or 9-2=7
Subtraction means "the difference between" the two numbers: a number line is good for this kind of thinking.
Image of the 10-Frame demonstrating 7 red tokens and 2 yellow tokens.
Start at smaller number and count up to larger number.
Image of number lines that marks 0 to 20.
Image of numbers 7 – 8 – 9 – 10 – 11 – 12 – 13 with 6 being the difference (i.e. 13-7=6)
Check out mathies.ca for interactive number lines]

[Jeff Richardson: So let's switch gears a little bit, and we're going to talk a little bit about subtraction. We don't have a whole lot of time, but we'll quickly manage to do some subtraction. You can use a 10 Frame and Number Lines as well. So I'm showing on the 10 Frame, two -- well, I guess the first thing you want to do, the first connection, is to show students that two plus seven is nine is very similar to nine minus seven is two. We call those "fact families," and that also means nine minus two is seven. So we can look at subtraction as the difference between two numbers. So really, what we can do is count up from one number to the other number and see what the difference was when we counted. So to show nine minus seven, I'm going to start with the number I'm subtracting, the smaller number, and then I need to count up to nine to see what the difference was. So I went eight, nine -- oh, that was two. So the answer is two. Okay? That's the counting up approach; it's the same approach you might use if you're giving change, for instance. If you're doing $5.00 and the product came to $4.50, and you have to count up, what's the difference? You're doing subtraction by counting up. So you start at $4.50 and count up to $5.00. A number line can also be a great way to do this. The Mathies website has great number lines.]

[**Demonstration of SMART Notebook]**

[Jeff Richardson: So we'll just have a look at how you might use a number line for this. So if I wanted to do, say, 12, subtract five, I'm going to start at five and I need to get to 12, so I'm going to count up the difference. So one, two, three, four, five, six, seven. So 12 subtract five is seven. And the Mathies tool lets you do this just by dragging from one dot to the next. That's what you can see down at the bottom of this slide. That's what the number line looks like, the interactive one on Mathies.ca. That's really worth checking out as well. I think number lines are awesome, because again, it's a visual representation of where the numbers are relative to other numbers, and they're great for fractions and decimals, too, especially when you get into integers, for those of you who have older children in grades seven, eight, where they're doing integers. They're fantastic for that. On the Mathies website, you can make them vertical or horizontal.]

[**Slide – Game Time – Subtraction SNAP**]
[*Text on slide:*
- For 2 players
- Use a deck with face cards removed
- Deal all cards to players and stack in front
- Each player flips a card
- First to shout difference wins both cards
- Play until one player is out of cards
- If processing speed is an issue, take turns saying answers so time is not an issue. If correct get cards.

Give players numbers lines if that will help.
Image of cards 7 and 2]

[Jeff Richardson: So to practice some subtraction, some people played a game called "Snap." So I play subtraction Snap, so two players, they've got a deck. I would take the face cards out because they just become confusing. Deal all the cards at the players, they've each got a stack in front of them with the same number of cards to start with. Each player simply flips a card, and then the first to shout out the difference between those two cards wins both of those cards. Once you've gone through all your cards, you shuffle your cards you just won and keep going, until one player has won all of the cards. I often found with students with learning disabilities because processing speed is such an issue, sometimes timed things didn't work too well. Instead you can just have players take turns, or if you're only working on this with one child, then it can just be a practice thing for one child, or you can just give them a certain amount of time to try to get it as appropriate for that student.]

[**Slide – Practise number sense by estimating**]
[*Text on slide:*
- Estimating is important in math and the real world:
    - Develops number sense
    - Allows us to reflect on calculated answers to find errors
- Do whenever possible in real world:
    - Estimate total when shopping or at restaurant
    - Do with time (how long since…) or distance, or number of steps to the next corner, or money…

Image of brick fireplace
How many bricks to you estimate are in our fireplace?]

[Jeff Richardson: All right. So that's all we'll talk about for subtraction, just due to time constraints. But we'll switch gears again and talk a little bit about estimating. I think estimating is a really under utilized skill in math. I would always encourage students to make an estimate before they actually do a calculation, and that way they're making sense of the problem and making sense of the numbers that they're dealing with. In the real world at home, what you can do to estimate is all sorts of different estimates. For instance, estimating totals, if you go shopping, if you're buying a few things, or if you go to a restaurant, getting your children to estimate the total, you can estimate time. So how long has it been since we left the house? Or how long does it usually take us to do this? Or how long -- getting students used to time. You can deal with distance. How far do you think it is from here to there, wherever you're going, from here to the store? A really powerful one is just when you're walking, estimate how many steps is it going to be to the corner, or whatever it is. Estimating money, so if you squash out a whole bunch of money like this, for instance, and then trying to get students not to calculate it, but to actually do an estimate first and then calculate it.]

[**Slide – Game Time - Over-Under**]
[*Text on slide:*
- Come up with things to estimate
  - Throughout day in real world
  - More structured: give math addition problems
- Take turns giving estimate quickly
- Other player has to say "Over" or "Under"
  - If correct, get a point
  - If incorrect, the estimator gets the point
- Example: Show some coins.
  - Player 1 estimates dollar amount at $0.82
  - Player 2 says "Over"
    - If it IS over, Player 2 wins (gets point)
    - If it is not over $0.82, Player 1 wins
    - If estimate is exact, estimator gets 2 points

Create money problems using tool on mathies.ca!
Image of 2 pennies, 1 nickel, 3 dimes, 2 quarters]

[Jeff Richardson: That takes us to our next game called "Over-Under." So it's a game where no matter what you're dealing with, one person has to make an estimate as quickly as they can. Then the second person has to say whether it's over or under. Again, they have to do it without counting, ideally. So time is kind of of the essence here. So in this case, if we threw these coins down on the table, or if you went to the Mathies.ca website and used their coin tool and generated this picture, one student, one person-player might estimate, oh, I think that about, I don't know, 82 cents. The other person has to say if it's over or under. That person, if it is over 82 cents, they would win. If it was under 82 cents, then the person making the estimate would win. If it was exactly 82 cents, then the person doing the estimate would win two points. It's kind of a fun thing, so you could do it for a whole bunch of different things. Out for a walk, how many steps is it going to take to get to here? One person makes a guess, the other person says over or under, and get your points that way. Estimating prices of things even, to get students better with a sense of money -- that kind of thing. Time, all sorts of stuff. Just looking for any places in the real world where you can make those kinds of estimates. It could be the number of ceiling tiles in a room -- something like that.]

[**Slide – Doubling – The Beginning of Multiplication**]
[*Text on slide:* People are usually good at doubling

- Doubling 1 to 5 ok
- 6 to 9 are harder
- But they have "partners"
- For example: 2 and 7
    - 7 → 5+2
- What are other partners?
- Not just memorizing
- Have a visual model
- Helps with addition:
    - Doubles and near-doubles (e.g. 6+6 and 7+6 → 1 more than 6 doubled)

2 and 7 are "partners"!
Image of 10-Frames: First has 2 red tokens circled (i.e. 2 →4), second has 7 red tokens and two last are circled (i.e. 5 → 10; 2 → 4; 10+4=14).

[Jeff Richardson: Okay, we're going to switch gears again now, and get into multiplication. So we'll do a really quick introduction to multiplication. The cornerstone of multiplication is doubling. Students -- people in general are good at doubling, is what the research shows. What I have found is that students are good at doubling the numbers one to five, but then as soon as the numbers get a little bit bigger, that's where they struggle. Here's where our 10 Frame can come in handy. So in the example I've got shown here, I talk about partners. I talk about how most students can double two; for whatever reason they just know that two doubled is four. But if they had to double seven, they're not so good at that. But if they can see it as a 10 Frame and see that seven is five plus two, and we know that when we double five that's 10, so that just completes our 10, and then the two doubled is another four, so that's 14. So you can see why two and seven are partners; they both end in four. One is four and the other is 10 plus four. So once you introduce this concept to students, you might ask them, well, what are some of the other partners? So hopefully they'll say, well, three and eight would be partners, one and six would be partners -- that kind of thing. Then if they can double the smaller number, they should be able to double the larger number. You really need to work on doubles with students. You're basically doing the two times table at this point, so you can talk about -- that can be your introduction into multiplication. If you add two of the same thing, that's the same thing as multiplying by how many there are. In this case, multiplying by two, and another addition fact that it can help with is near doubles, just like we had Near 10s, now we've got near double. So if they can eventually do six plus six, recognizing that as 12, then they can do seven plus six -- oh, that's just one -- that's a near double. It's one more than six plus six, so it's got to be 13. It can add to both addition and multiplication skill.]

[**Slide – Game Time – Double SNAP**]
[*Text on slide:*

- For 2-4 players
- Use a deck with face cards removed
- Take turns flipping a card
- Whoever can give the double of the card wins the card
- Whoever has the most card at the end wins!

Give students 10-Frames if that will help
Image of cards 4, 7, 3, 2 and 9]

[Jeff Richardson: Once they get into doubles, then you can play "Double Snap." It's the same idea as the other Snap, except in this case, all the cards would stay in the middle, and players would just take turns flipping one card, and whoever can give the double of that card wins the card. Whoever has the most cards at the end of the deck would win. Of you can just do this, like I said, as practice with your child.]

[**Slide – Mastering Multiplication!**]
[*Text on slide:*

- Important to show when to use
    - Buying several items of same cost
    - Counting money (6x$2)
    - Determine number of bricks in a wall or tiles of a floor
    - Array around the house
        - Muffin trays, eggs, pegs on a Lego piece, buttons on a phone, …
- Efficient way of doing repeated addition

Images of muffin tray, Legos, box of soda cans]

[Jeff Richardson: Another thing about multiplication is recognizing when to use multiplication. Anytime you're out and you buy several things of the same cost, you can explain how that might be an example of when to use multiplication. If you're counting money and you've got a whole bunch of the same coin, instead of using an addition model, we can use multiplication. You might do it from determining the number of bricks in a wall or tiles on a floor or ceiling, that kind of thing. Here's a fancy word we'll use in school called "arrays." You can introduce that at home as well. Arrays are all things like pictured at the right -- a muffin tray is on the right. Anywhere where you've got a repeated row a certain number of times, so in this case, say, rows of three repeated four times -- that's an array. It could be the little nibs on a Lego piece. There's all sorts of different arrays. We can use multiplication to figure out the total number here. Again, just introducing that as an efficient way of doing repeated addition, so one set of three plus three plus three plus three -- that's three times four. Students get a feel for when they can use multiplication.]

[**Slide – Multiplication Facts**]
[*Text on slide:*

- Look for patterns on multiplication chart (e.g. only odd x odd = odd)
- Difficult to memorize: Need strategies:
  Examples – document will be provided
  - 2x → doubling
  - 4x → double-double!
  - 3x → double plus another (and digits add to 3, 6, 9)
  - 5x even ends in 0, odd in 5
- Focus on one family for a week and practice – apply strategy
- Be realistic for you child:
  - Up to 5 to start then add more
- Give a chart instead of a calculator

Image of multiplication chart]

[Jeff Richardson: So then that means that students need all of their multiplication facts. We've introduced doubling. So memorizing an entire multiplication table like the one pictured can be very daunting for students, and for any student, let alone a student with an LD. So instead, I think it's important that students have strategies for all the different multiplication tools. So a document will be provided that shows the different strategies. So we'll just really quickly talk about those. We just have the two times tables like doubling, so four times tables like a double-double. You just have to double twice. So four times six is like six doubled, and then doubled again. So six doubled is 12, double that again, that's 24. So now they've got a strategy they can use for a four times table. The three times table, that's like a double plus another. So three times four, for instance, is like four doubled, which is eight, plus one more four, which is 12. So introducing all of these strategies. What I would suggest is working on one of the times tables per week, and really practicing that until they get it down. Again, depending on your child, doing all the way up to 10 might be too much. You might just start with the red square, just go up to five, one, two, three, four and five times table, and then add in up to 10 after that. You can show students that the bottom orange square is the same as the top orange square. So they're not memorizing all of these, because they're repeated. Because seven times six is the same as six times seven, so that they don't get too overwhelmed with what they're doing.]

[**Slide – 2-Digit Multiplication**]
[*Text on slide:*

- Students use Base 10 materials in early grades to represent numbers:
    - Unit tile (red square)
    - 10-rods (yellow rod)
    - 100-flats (blue flat square)
- Important model for multiplication is area
    - Connects to measurement
- Also leads to good mental math as it is visual

14x12

Image of manipulatives used to represent 14x12]

[Jeff Richardson: So the last thing we'll talk about is just a visual way to do two-digit multiplication. This one gets a bit of attention sometimes because we were all taught multiplication the old way, where we have the 14 on top of the 12, and there's all this carrying numbers, and all that stuff, and making sure you line them up. I think a much more valuable way to do two-digit multiplication is the visual model. They might start it, hopefully, with Base 10 blocks, which they're familiar with in school. So 14 times 12, base 10 materials are these yellow 10-rods, and the unit tiles are worth one, so 14 would look like this: 10 plus four, 12 plus 10 plus two, down the side. So to do the multiplication, it's almost like you can say, I have a 14-metre field by a 12-metre field, what's the total area of the field? And they break it down into chunks of 10 times 10 -- they should know it's 100. Ten times four is 10 four -- or four 10s, so that's 40, and then we come down here and do two times 10, that gives us our 20 in here, two 10s. Then two times four is eight, and they've got a very visual way of seeing the answer now. It's 140 plus 20 -- well, that's six 10s, that's 60 -- 168. So it connects to measurement, and reminding students that they can always use area as a model for multiplication. It probably be the best model because it works for fractions and everything.]

[**Slide – Home Connection: Drawing 2-Digit**]

[*Text on slide:*

- Can reinforce visual image by having students draw out the facts
- Choose numbers that are small enough: 59x48 would not be fun to draw!
- Helps students with magnitude of numbers
- Have them start to make estimates first to develop number sense
- Remind them this is like calculating area: e.g. dividing a field into four parts.

23x15

Image of drawn out facts]

[Jeff Richardson: At home, you probably don't have base 10 materials -- I do, but I'm a math geek. Most people wouldn't. Instead now, we can transition to drawing it out. This is the exact same thing, but drawn out. And it reminds students that if they have 10 10s, they can trade that in for an extra 100. So that's why the answer here is 100, 200 -- these are 10 10s, that makes 300, and so on, and the same thing with ones, making a group of 10.]

[**Slide – Now Symbolic (Using Numbers)**]
[*Text on slide:*

- Often called Boxed Method
- Connects right back to Base 10 materials
- Connects forward to algebra in Grade 9 and 10
- Good for mental math
    - Multiplying by 10
- Talk out strategy for adding at end
- Students may need organizer:
    - Tally hundreds, tens, ones

14x27

Image of student work in grid:

	10	4
20	200	80
7	70	28

378]

[Jeff Richardson: Then eventually, drawing some of these out, like doing 78 times 89 this way would be a lot of drawing for your individual dots there, nine times eight, nine rows of eight dots -- that's kind of a pain to do. Instead, we do eventually want to get to using numbers. So in school, they might learn something called the "box method." It connects directly to that visual model. But if the teacher doesn't do the visual model first, that's where you can step in and recognize how to do that visually. Here we're doing 14 times 27, and we're breaking up the numbers, 14 into 10 plus four, 27 into 20 plus seven. Then they got their areas in the middle, and then they have to add them up. They can use different tools, so you'll have access to this slide -- we're almost out of time. But they might keep track of how many 100s they have, how many 10s they have, and how many ones they have in columns in order to be able to add it up if they have working memory problems, especially. But this kind of strategy really lends itself well to mental math as well.]

[**Slide – Multiplying in Measurement: Area**]
[*Text on slide:*

- Student will learn:
    - Rectangle = L x W
    - Triangle = b x h ÷ 2
- Form of equation matters
    - Should be conceptual:
    - A = ½ b x h is not conceptual
    - We don't visually take half the base

    - A = b x h ÷ 2 is conceptual: a rectangle (b x h) cut in half (÷2)
- Great opportunity to practice multiplication!

Image of grid being used to measure area]

[**Slide – Game Time – Area Game**]

[*Text on slide:*

- Goal: Cover as much as your 10 x 10 grid as you can (1 or more players)
- Play: roll 2 dice
    - The rolls become length and width of rectangle
    - Draw rectangle of required size on your grid (each player does own)
    - Multiply to calculate area and write in middle of rectangle
- Repeat. As soon as you can't fit rectangle on board, game is over
- Add all areas to determine total area covered
- Keep a high score record to motivate
- Could do with triangles too!

Image of demonstration of game]

[Jeff Richardson: This also leads us to our final game. I call it the "Area Game." So students start with a 10 by 10 grid, and again we roll the dice. So in this case, we might roll, say, a three and a five, so the students have to represent a three by five rectangle on a grid. Then you roll again, and the goal is to fill up as much of the grid as you can, until you eventually roll numbers that you can't fit in somewhere. You have to be strategic about how you place your rectangles, so you leave yourself the best chance of being able to put one down. Again, we kept a high score for this, and students always wanted to play this game. You can also connect it to percentage, because if you have 100, if you have a 10 by 10 grid -- mine's actually only nine by nine on this slide. But if you do have a proper 10 by 10 grid, then you've got 100 possible squares. So if the student was able to cover up like in this example 47, then you can talk about how that's 47 percent. In this case the game is over, because there was nowhere to fit a six by three. Different students though, if you're playing with the same dice roll on different grids, each student has their own grid, or each child in the game has their own grid. Then depending on how you lay it out, some kids will get out sooner than other kids, depending on the strategy that they've used.]

[**Slide – Other consideration for your learner**]

[*Text on slide:*

- Have learner use a whiteboard!
    - Many schools are using groups at whiteboards
    - Student will try things more on a whiteboard (not afraid of errors)
- Capturing Learning:

- Book Creator!! Pictures and Voice
- Combine with notes on mathies tools
- On Chrome or iPad
  - https://app.bookcreator.com/

Image of book creator being used for a volume problem]

[Jeff Richardson: A couple of other considerations -- I always find that using the whiteboard is really powerful for kids. They can erase much more easily than they can with paper and pencil, and they're more willing to try things because they don't feel like they're making mistakes. It also connects to a strategy that a lot of schools are using, using groups of vertical whiteboards. So whiteboards mounted on walls to solve problems, instead of having kids work individually. Then the final thing I'll talk about is capturing learning. Because we're doing a lot of visual work and using manipulatives and tools a lot, it's great if students can capture pictures of what they're doing, and students with LDs often don't like to write down a lot of words, but they don't mind speaking. So an awesome app, if you haven't seen it, is Book Creator. It's a paid app on an iPad, you have to buy it for about $6, I think. But there is now, just as of the last year, a free website that they can go to, app.bookcreator.com, and they can very easily add in pictures. They can annotate it with text or a pen tool, so draw around things. What I found really useful is, they can record their voice. This can be a great way for students to summarize their learning once they get home. What did you do at school today? Well, draw a picture and do a voice note, and they can have, like, a book for each unit that they've been working on a school. It's an awesome tool.]

[**Slide – Resources**]

[*Text on slide:*

- Mathies: Interactive Learning Tools:
  - www.mathies.ca
- Ministry: EDUGains Home Supports:
  - www.edugains.ca/newsite/math/homesupport.html
- Book Creator:
  - www.App.bookcreator.com
- Game Templates and this presentation available on LD@home website

Image of Mathies' Home Support page]

[Jeff Richardson: Finally, some resources that are useful -- we've talked about Mathies, we've talked about Book Creator. But another one that the Ministry has provided is, Edugains. And here's the link to it. There's all sorts of home supports available for students, so there are extra games that you can do, different activities, the curriculum -- only for grades one to three right now, but just so you know what's going on at school, they've got a visual curriculum and other things like that. So it is definitely worth exploring as well. And that is the end of the formal presentation. Let's see, we've only got a few minutes left for questions. We went a little bit over time there.]

[**Slide – Q & A**]
[*Text on slide:* Ask your questions!]

[Jeff Richardson: I'll turn it back to -- I don't know if it's Lawrence that's going to be taking any questions that people might have?]

[Webinar Host: Thanks Jeff, sorry about that. I left my Mute button on for a second. Thank you so much. Who knew math could be so much fun? So we are running a little short of time, folks, but we do want to offer you the ability to answer any questions that may come up. So Jeff, I've got one to start with, here. For those of you that may want to ask a question, you can use your box to come through to me. The first question, I guess, is about frequency. So there's a lot of games here, a lot of exercises. Any guide to how often you should be doing this with your child?]

[Jeff Richardson: Can you still hear me okay?]

[Webinar Host: Yes, we can.]

[Jeff Richardson: Okay. I would say almost daily. But if you're working -- I would chunk the skills, so if you're working on addition, for instance, then really focus on addition. And just try to do it for 10 or 15 minutes each day, and it can be partly a drill and partly a game. Making sure that they understand the concept, or whatever, at school you're hoping that they'll use, whether it's a 100 Chart or an addition chart, teaching them how to use that addition chart, and then playing the game where they can use that tool. But I think five times a week or something, while you're working on that, is the way that it's really going to sink in and become much more automatic. If they see it much more sporadically than that, especially if the student has memory problems, then I think it's harder for it to reach that level of automaticity that we're looking for, so that it frees up their processing for other things.]

[Webinar Host: Okay, perfect. Second question, Jeff -- you talked a little bit about not always having a calculator present. I just wanted to ask you if you could add a bit of clarity about when it's good and when it's not so good, just how you differentiate the use of the calculator.]

[Jeff Richardson: What I have found, and there's some research to back this up, is that using the calculator can actually help students develop number sense. So if the student is doing a problem, say, on area -- so the point of the problem is to solve a situation, to solve a problem involving area. I think they should be using a calculator as needed for that, so that they're not getting bogged down in the calculations. Whenever the intent, though, is to work on an operation, and learning a different learning tool, then I would take away the calculator and have them use a different learning tool that maybe is a little bit more visual. There are times when they can use the calculator to recognize patterns as well. So some calculators, for instance, you can go four plus four equals -- and then keep hitting the equals button. So if the student has a hard time, say, with counting by fours, which is an important step in learning your multiplication table, you can use the calculator as a learning tool as well. So if the focus is on operations, typically the rule of thumb I would give is not to use a calculator if the problem solving is -- or the operation is sort of incidental or just necessary to solve that problem, then I would let them use a calculator, because it's the most efficient way for them to get their answer.]

[**Slide – NEW VIDEO**]
[*Text on slide:* www.LDatHome.ca
Parent Resource Kit
Building Math Skills at Home
Image of LD@home logo]
[Webinar Host: Okay, perfect. All right, well, in the absence of other questions, folks, we're going to call an end to our Q and A, and make sure we honour your time and finish on time tonight. Just the site I've currently put up, LD at Home recently launched a new video, and a parent resource kit around building math skills at home. This webinar is kind of a complementary piece to that. So there's information, resources there to take some of this learning, and also some other new documents as well. Make sure you check that website out. It's LDatHome.ca. When you get there, look under the What's New tab on the Home page. We'll also be sending a direct link out when you get the follow-up emails to this webinar.]

[**Slide – Thank You!**]
[*Text on slide:* www.LDatHome.ca
Image of LD@home logo.]

[Webinar Host: So with that, on behalf of the LD at Home team, I want to thank you again, Jeff, for your presentation; lots for us all to chew on, I think, as parents helping their kids with math. And to those of you that joined us tonight, thank you. We know that time is always short and schedules are busy. So we hope that you got some value, and that you'll give us your feedback, which can be put on the survey. With that, I hope that now you're going to have more fun with math going forward, and help the student in your life to get a great success, and certainly cope with any math anxiety they may be currently struggling with. Until the next time, on behalf of all the team here, I wish you a very good evening.]