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Math Catcher: Indigenizing mathematics through culturally-based storytelling

Introduction

In British Columbia, the redesigned curriculum encourages teachers to "incorporate Aboriginal content into all subject areas from Kindergarten to Grade 12" (BC curriculum). However, teachers tend to be "nervous to venture into the realm of Aboriginal education because they have very little knowledge of Aboriginal culture and are afraid of making mistakes or offending" (Hodge, p. 164). As a teacher, I relate to this statement as trying to incorporate Aboriginal education into mathematics has been a personal struggle. I find myself periodically introducing one-off, superficial examples of First Nations' culture, and only doing so to fulfill curriculum requirements, not to enhance my lessons or benefit my students' learning. To move away from this type of tokenism and towards teaching mathematics with more authentic Aboriginal perspectives, I would like to see how indigenizing mathematics through culturally-based storytelling with films from *Math Catcher* affects student engagement and understanding in mathematics. I feel that the marriage between these two elements is a tangible way to enrich students' learning, indigenize the curriculum and give students a different outlet through which to explore mathematics.

The creation of Math Catcher

The *Math Catcher* program was created in 2011 in response to the low mathematics completion rate of Aboriginal high school students. "Presently only 2% of BC's Aboriginal population completes Principles of Mathematics 12 compared to a completion rate of 25% for the whole BC population" (Math Catcher). Veselin Jungic, the creator of *Math Catcher* and a professor in the department of mathematics at Simon Fraser University feels that the cultural component in the *Math Catcher* films makes mathematics more relatable to Aboriginal students "because students see themselves and their practices" in the stories (V. Jungic personal communication, Feb 5, 2018). This personally connects them to the mathematics found in the film and the subsequent math activities that align with these films. That being said, the Aboriginal content of these films do not only benefit Aboriginal students. Research underscores the benefits to "identity, well-being and achievement [of all students] when Indigenous knowledge systems are at the heart of learning" (BC curriculum).

About the films

The *Math Catcher* film series incorporates problem solving and Aboriginal traditions into three to four minute long animated stories. In these films, students watch *Small Number*, "a bright and playful [Aboriginal boy] who recognizes patterns and calculates quickly," engage in Aboriginal traditions, go on adventures, participate in day-to-day activities and get into mischief (Math Catcher). The majority of scenes in these films contain some type of mathematical

component, increasing students' awareness about the presence and importance of mathematics in life. Jungic feels that storytelling, accompanied by pictures and open-ended questions helps students experience mathematics in action. Thus encouraging "young people to enjoy math and dispel myths that math is boring and abstract" (Math Catcher).

The stories in these films are not traditional First Nations' stories but are anecdotes inspired by First Nations' traditions and based on Jungic's personal experiences with the Aboriginal community. Every aspect of these films has been "researched, check and double-checked" by Jungic, his team of researchers and Aboriginal colleagues to insure the culture is respected as well as historical and cultural accuracy and respect to the culture (Math Catcher). Due to this, multiple First Nations' communities have have translated the Math Catcher films into their traditional languages.

Each of the films ends with a broad open-ended question inviting students to think critically about a topic related to the film. These questions are not attached to one specific mathematics unit allowing teachers to use these films as "an opening to ask questions that are related to their unit of study or curriculum and enrich the context for subsequent mathematics activities" (V. Jungic personal communication, Feb 5, 2018).

The First Attempt

I decided to introduce the *Math Catcher* films to my grade 4/5 students with the film *Small Number Counts to 100*. I chose this film out of the nine films on the *Math Catcher* website because I thought the context of the story was very straightforward and relatable to my students. It also ended with an open-ended question that I knew my students would enjoy - *How did Small Number know that the 100th tipi is the one just south of his grandparents' tipi without actually counting them?*

In this film, Small Number chases a black cat with a white stripe into the forest and finds out too late that the cat is actually a skunk. The skunk sprays Small Number, and due to his smell, his grandmother wants to keep him out of her tipi. To occupy him and keep him outside, she instructs him to figure out which is the 100th tipi in the circle of seven tipis (if he first starts with his own). Without counting the tipis, Small Number quickly figures out that the 100th tipi is his Auntie Rena's which is the tipi just south of his grandparents' tipi.

I was quite eager to play this film for my class. I quickly asked my students to watch for examples of the First Nations' culture while watching the film, then without further explanation, I played *Small Number Counts to 100*. While student watched the film, I noticed a student glance at the clock, one student sign out to go to the washroom and other students were shift in their seats. As soon as the film ended, students slowly turned their attention to me and I immediately asked them what examples of the First Nations' culture they saw in the film. After about ten seconds of wait time, a few hands went up and some students gave some examples of cultural components:

- Small Number lives in a tipi
- He wears clothing made from animal skin

- He has long hair
- He bathes in the river

After students shared these examples with the class, I put my students into pairs and they set out to figure out how Small Number found the 100th tipi accompanied with various extension questions (Table 1). During this math activity, I did not have to ask any group to stay on task or encourage students to challenge themselves to find different ways of solving the problem. All of my students were intently trying to find creative and unique ways to get to the 100th tipi (Image 1).

Accompanying Math Questions
1) There are seven tipis in a circle. If Small Number starts on tent A (his grandmother's tent) and the rest of the tipis are labeled B,C,D,E,F,G which letter is the 100th tipi (his Auntie Rena's tipi)?
2) How did Small Number do this without counting all of the tipis?
3) Try to find different mathematical ways to get the 100th tipi.

Table 1: During this mathematics activity, every student started with question #1, and when they needed a challenge, I gave them question #2 and then question #3.

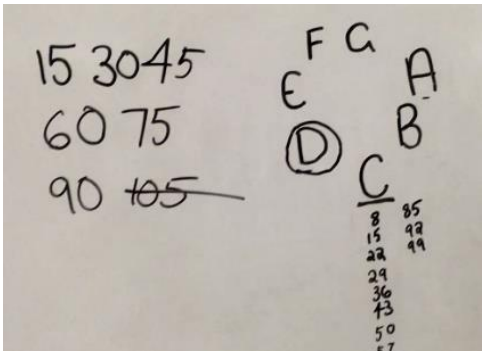

Image 1: This is an example of a student's solution on how Small Number found the 100th tipi. She determined that Small Number's tipi was "C" and his Auntie Rena's (the 100th tipi) is "D". To do this, she explained that she noticed that every 15th tipi lands on the subsequent tipi. 15th= C 30th= D 45th= E 60th= F 75th= G 90th= A. She explained that the 15th tipi after 90 would be B but that would be the 105th tipi (crossed out). Since that tipi is about 100, she went back to A (the 90th tipi), counted 10 from there and landed on D.

While my students actively participated in the mathematics problems, I walked around the class listening to their conversations and didn't hear any of my students mention anything about the First Nations' culture or the film. With this lack of independent discussion about the Aboriginal culture I realized hat throughout the entire lesson, my students did not actually have the opportunity to make any personal connections with the content of the film. Why would they discuss a topic that has nothing to do with them? That being said, without engaging my students in the lesson or with the film (with an Aboriginal focus) was I actually indigenizing the curriculum?

What went wrong?

In my opinion, my students did not fully engage with the First Nations' culture in my first lesson due to my initial question- "look for examples of the First Nations' culture." When I gave my students this task, I was feeding into the tokenism that I was trying to avoid, and I was setting my students up as observers instead of participants. I put too much emphasis on the content of the film and focused on having students find information about First Nations'

culture, which did not allow them to experience the film or engage with the culture. This first attempt highlighted that in order to indigenize the mathematics curriculum in a beneficial way using the *Math Catcher* resource, I needed to give my students opportunities to interact and engage with the First Nations' culture and the films in a genuine way.

Incorporating the First Peoples' Principles of learning

To encourage students to engage with the film and its cultural content in a meaningful way, I tried to incorporate aspects of the First Peoples' principles of learning while using the *Math Catcher* films in my mathematics lessons.

- Learning requires exploration of one's identity.
- Learning is embedded in memory, history, and story.
- Learning requires time and patience.
- Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).

These principles of learning "contribute to a more holistic and experiential experience of mathematics and benefits all learners" (First Peoples' Principles of Learning). I feel having students experience mathematics with these principles while using the *Math Catcher* films, is a more natural way to structure a lesson compared to my first lesson.

New and improved

Using the First Peoples' Principles of Learning as inspiration, I created a lesson plan framework that focused on connecting students to their learning. Before watching the films, to hook students into the lesson, I asked them a personal question pertaining to the plot of the film. While watching the film, students were asked to make connections between them and Small Number (the main character of these films). After watching the film, students were encouraged to share their connections with their peers as well as think of possible solutions to the open-ended question asked at the end of the film. For the rest of the films in the *Match Catcher* series, I structured math lessons using this framework. This created predictable parameters and helped students connect to First Nations' culture in meaningful ways. In using this framework, I found that there was a big difference in student engagement compared to the first lesson using this resource.

***Small Number and the Salmon Harvest*: An account of using the *Math Catcher* resource**

I have incorporated significant parts of the math lesson using the *Math Catcher* film *Small Number and the Salmon Harvest* as a resource to indigenize the curriculum. I feel that this lesson highlights the benefits of using *Math Catcher* films as a resource and incorporating the First People's principles of learning into mathematics. My students were particularly interested in the plot of this film and I found the discussion at the end of the film demonstrated students' knowledge of the First Nations culture and their mathematical thinking skills: reasoning, making connections between ideas, strategies and justifying their answers.

Learning requires exploration of one's identity

The first few minutes of a lesson tell students how interesting and engaging the lesson is going to be for them. Thinking back on my first attempt using the *Math Catcher* film, I now realize in my first lesson, the first thing I did was remove my students from the activity because I did not make this activity about them. To connect students to the film, frame their thinking and guide their understanding, I started each *Math Catcher* lesson with a personal question that encouraged students to explore their identity, so they could better connect to the film. I found that starting lessons with a connection question reinforced to students that their opinions and ideas were valued, and that their learning experience was going to be personal. This helped them stay focused during the film, participate in the follow up discussion and carry the film (the context of the math question) to subsequent math activity. Furthermore, while watching and interacting with the *Match Catcher* films on a personal level, many non-Aboriginal pupils see components of the traditional Aboriginal culture in their personal identity. Which I feel helps students make deeper connections to the film, enhance student participation with the mathematics activity and might make them start to realize that the Aboriginal culture is more similar to their own culture than they might have previously thought.

Account of students' responses to the personal question: *Have you ever gone fishing?*

Students are in a circle sitting on desks, on chairs or on the carpet learning forward and waiting for the personal question that will connect them to the film. This is the fourth *Small Number* film they have watched and most of them are getting to know this routine.

Me: Have you ever gone fishing? [Hands fly up and students lean forward. Some students immediately turn to the person next to them, eyes wide and hands moving, talking about their experiences. It takes over 30 seconds for me to get everyone settled.] Cole?

Cole: I go fishing all the time with my dad. I caught a huge [demonstrates with his hands] salmon this summer at the lake. Islay (one of his friends in the class), and her family comes with us (to the lake) sometimes.

Islay: [cuts in smiling] We ate Cole's fish! It was so good. [Cole is beaming and excited chatter erupts amongst some students with this remark while other students are stretching their arms up, waving their hands with wide eyes. I chose a few more students to share their connections, and they have similar experiences to Cole.]

Reflection

Cole was excited to be able to share his fishing story with the class. This is a big part of his life and through the enthusiasm in which he told his story; I could tell that he feels this is a big part of his identity. Cole is not usually someone who readily shares ideas and participates during math lessons but was one of the most engaged students during this discussion and his participation continued throughout the math activity.

Learning is embedded in story

While watching the *Math Catcher* films, I wanted to connect students to the storyline of the film and its characters, demonstrating that stories can transmit knowledge. To do this, as previously stated, while students watched the films, they were expected to make connections with Small Number and the subject matter that they saw in the film. In my opinion, having students interact so deeply with the context of a question is rare in mathematics. Students are

often taught various strategies to help them *efficiently* solve "story problems" (math problems that are put into words), and the majority of these strategies include stripping away the context of the story-question to highlight the mathematical components.

For students, this reinforces the fact that mathematics is an abstract subject that needs to be taken out of context in order to be understood. That being said, I feel that encouraging students to value the context of the story in *Math Catcher* films makes the ensuing mathematics activity more relatable to them and proves that learning can be imbedded in story.

Learning takes patience and time

I noticed that while using the *Math Catcher* films as a resource, there was an increased amount of discussion at the beginning of math lessons. On average, students talked about the film, the open-ended question at the end of the film, and the mathematics activity connected to the film for about 20-30 minutes before they started solving the math problem or engaging with the math task. At first, I was worried that this amount of discussion time was taking away from students engaging to the mathematics activities, but student discussion after *Math Catcher* films demonstrated mathematical thinking and in depth understanding of the First Nations culture. Allowing students to discuss for (up to) half of the math period honored the fact that learning takes patience and time and is not all about numbers- two parts of mathematics that are not frequently valued in math class.

Account of student-student discussion after the film

After watching the film, without teacher instruction, students immediately turned to their peers next to them and started chatting about the film. The room was buzzing with their conversations. I overheard some students discussing their connections, observations, questions and possible answers to the open-ended question. Here are some statements I overheard:

- I went on a canoe once, and I almost fell in.
- Small Number and his family fish with a net, but I fish with a fishing rod.
- I didn't know salmon were red and green!

Reflection

These connections, observations and questions from students were so much more natural and interesting compared to my first attempt of indigenizing the curriculum. More students were participating and students were talking to each other happily. Furthermore, this more relaxed way of indigenizing the curriculum increased students' understanding of the Aboriginal culture and intrinsically motivated them to participate with Indigenous content.

Learning is experimental

The open-ended questions at the end of the film encouraged my students to thinking mathematically and share their ideas without the fear of being wrong. I noticed that students who rarely participated in mathematical discussions opening up and offer their ideas to their peers. The openness of the question removed the pressure of giving the "correct" answer

because there simply was not *one* correct answer. These questions valued creativity and personal experiences. Furthermore, this openness gave students with different experiences and strengths an opportunity to contribute confidently to the discussion. I found that this confidence and engagement with the context of the film continued into the subsequent math activities.

Account of student to class discussion

When asked to share some ideas with the class, most students were shifting in their seats, arms stretched up high and hands waving. Although given the choice to share their observations, connections or questions students who participated in the class discussion were the most interested in sharing their solutions to the open-ended question: *Why did Small Number think that during a low tide the catch would be much smaller?*

Me: Does anyone have anything to share? Andrew?

Andrew: I think they would catch more salmon because during a high tide, the current pushes the salmon into the net and makes it harder for them to swim out. In a low tide, the current would be going the wrong direction. I don't think they would catch any fish in low tide, and they might lose their net.

Me: Elaina?

Elaina: I agree with Andrew. It would also be better in a high tide because they wouldn't have to carry their canoes as far to get from their tipi to the water.

Me: Nicole?

Nicole: I don't think it matters if Small Number fishes during high tide or low tide. The only thing that matters is that they went in the morning because that's when the salmon wake up and need breakfast. I learned at the Salmon Festival that they swim to the surface to find food and that's where Small Number's net was, so that's why they caught so many fish.

Reflections

In this part of my students' discussion, I feel that their mathematical responses showed advanced critical thinking: they were justifying their answers by using prior knowledge, making connections to each other's ideas and thinking of reasonable solutions to the questions. Furthermore, the dialogue amongst students demonstrates a good understanding of First Nations' culture.

Creating the math tasks

The open ended questions at the end of each *Math Catcher* film inspired me to create mathematical tasks and problems in a similar style of question: open ended questions that encourage reflection, computational skills and value the story in the film (Appendix A). I feel that these types of questions are the most valuable type of mathematical questions because they cannot be directly translated into a numerical question and it makes learning personal for each student. I feel that these aspects give value to the context of the question, shows students that math is not all about numbers and proves that they have mathematical experiences outside of the classroom.

Student engagement with the mathematics tasks

Student engagement with the film carried over to the problem-solving component of the lesson, and students actively found solutions to the problems. Furthermore, during lessons

using this resource, while walking around the class and eavesdropping on students' conversations, I noticed students referencing components of the *Math Catcher* film while problem solving. Usually these references did not help them solve the mathematics problems but pertained to the subject of the film.

Aboriginal student engagement

I do not have any Aboriginal students in my class and I wanted to gain perspective on how Aboriginal students engage with this resource. I asked other teachers at my school with identified students in their classes if I would be able to lead a math lesson in their class and I was fortunate enough to be invited into a grade 4/5 class that has an identified Aboriginal boy.

While teaching this class, I tried to focus on this student's engagement. I expected him to make a stronger connection with the film and the activities compared to the non-Aboriginal students in the class due to the Indigenous content of the film and activities to which he would be able to relate. That being said, I found that his engagement watching the film and participating in the math activities to be equal to those of the non-Aboriginal students in the class. When I spoke to the classroom teacher about this student's engagement, she mentioned that his engagement during the lesson was similar to how he usually participates but the fact that he was participating with a new teacher and partaking in a math activity format with which he is unfamiliar meant that he felt comfortable with the resource. From this discussion, the word comfortable stood out to me. In my opinion, this demonstrates that this is a valuable and relatable resource.

Account of students solving the mathematics question

This mathematics task was well received by students. Their engagement with the Math Catcher film carried over to this task, and they were eager to answer my questions. My students quickly figured out that I divided their combinations based on if the numbers were all the same (column A), if there were two numbers that were the same (column B) or if all baskets held different amounts of salmon (column C).

The class was divided between if column B or C would have the most combinations. I split students into partners and together, they worked on solving how many combinations they could create respecting the given parameters. As this is a grade 4/5 class, students are proficient in adding three numbers to 24, but the focus was on how students would organize their combinations and track the combinations systematically. When students worked with each other, they quickly figured out that the combinations that needed to be created with two of the same numbers were much more limited compared to the combinations that have all different numbers.

- I hope they have a big freezer where to put all these fish.
- I really like fishing.
- My uncle is a pretty cool guy. He's my dad's brother.

Reflection

In my class, this type of discussion in mathematics is rare. Usually when I hear students chatting while problem solving, it is about something unrelated to the task or they are simply are not talking. In my opinion, this unmonitored and on topic discussion amongst students demonstrates that using this resource and focusing to the context of the question increased student enjoyment and interest in the mathematics problem.

Account of student discussion to the accompanying math task

Me: In the film, we saw that Small Number went salmon fishing with his uncle, grandpa and dad. Let's say they caught 24 fish. His uncle asked Small Number to divide the salmon into three fair groups. How would you divide the 24 salmon in three groups fairly? [Some hands go up.] Meha

Meha: Easy. 8, 8, 8. [Some students nod their heads. Some eyebrows go up. I draw a table with three columns labeled A, B, C and write this combination in column A.]

Me: Good idea. That's even, but is that fair? [A few students look at each other. The class is completely silent and after about 30 seconds of wait time, one hand (Devon's) goes up slowly.] Devon?

Devon: Well, I think it depends on how big each guy's family is. Like, I don't think the grandpa has any kids at home anymore, so he should get the least. Then the uncle, he should get more because he probably has some kids and maybe some pets. Maybe the uncle and the dad should get the same amount. So 9, 9, 6 or 10, 10, 4. [I write these two combinations in column B and more hands go up.]

Me: Alexis.

Alexis: I think that the grandpa should get the most because he's older, and it's probably harder for him to go out. He could dry them or freeze them for winter so he doesn't have to go out again. That would be the nicest thing [to do].

Me: Wow! I can tell you're thinking really hard about how to make things fair. Can you give me three numbers?

Alexis: Oh yah. Ummm. [pause] 12 for the grandpa, and 6 and 6 for the uncle and the dad. [I write this combination in column B.]

Me: Danny?

Danny: I'm think about what Devon said, and I think he's right about the amount of kids at home so they [the dad and the uncle] should get the most but Small Number went out to help his dad so they [Small Number and his dad] should get the most. Like why didn't the uncle's kids come out and help? So 12, 8, 6… I mean 12, 8, 4. [I write this combination in column C.]

My table now looks like this

A	B	C
8,8,8	9,9,6 10,10, 4 12, 6, 6	12,8, 4

Me: How are these combinations categorized and which column do you think is going to have the most combinations?

Reflection

Students created a connection with the characters of the film and emotionally invested themselves in helping Small Number complete his task of dividing the salmon into three groups fairly. The context of the film was important for students to understand the mathematics question, and I feel hooked students into the subsequent math task.

What students think

My students enjoyed mathematics lessons using the *Math Catcher* resource. Whenever I mentioned Small Number, students would excitedly positon themselves around the projector and start chatting excitedly. Furthermore, during discussions, students expressed how much they liked the quality of the of the films.

After playing the nine *Math Catcher* films for my class, I asked my students to write what they thought about using this resource in mathematics. The majority of the responses

students wrote were about enjoying the math challenges accompanying the films, the interesting plots of the films and that using this resource gave them a unique and engaging mathematical experience.

Some examples of student responses

- I liked the videos because it teaches people to find math in places you would not usually look for math.
- I liked all of the videos. Also I loved how good they described stuff.
- I liked the story of the kit foxes because it is fun and I definitely want to do more of this.
- I like it. It was fun because the stories were good.
- I liked how we had to answer the questions that the movies gave us because they were pretty hard and I like challenges.
- The movies are cool because they're like mysteries that we need to solve.
- I like how it's always different and never a boring worksheet.

What other teachers think

Through trial and error, I feel that I developed a lesson plan format to help incorporate the Aboriginal culture into the math curriculum, but I realize that there are many ways to do this, and I know that this style of teaching will not fit into each educator's personal teaching philosophy. From having the privilege of teaching in another teacher's classroom and from speaking at a professional development day, I received positive comments and constructive feedback about the *Math Catcher* series of films and their place in the mathematics classroom.

Many educators said they saw themselves using the Math Catcher films in their classes and thought it was a fantastic resource because in most resources, First Nations' students are underrepresented. Furthermore, they like the strong context that the story provided for the math tasks. Other teachers felt that the fact the film ended with such a broad question that doesn't tie into a specific math unit left them unsure of how to use the *Math Catcher* series with their students and expressed their concerns with their abilities to be able to create activities around the film.

Regardless of an educator's opinion about using the *Math Catcher* website as a way to indigenize the curriculum, it is only when teachers first accept the First Peoples' Principles of learning as valuable teachings *and* then incorporate First Nations perspectives into their instruction, that a lesson will be indigenized beneficially.

Conclusion

In conclusion, I feel that incorporating Aboriginal perspectives in the curriculum benefits both Indigenous and Non-Indigenous students, but I do not think that there is a simple "fix all" method to do this, nor that incorporating culturally based stories is the best solution. From experimenting with how to use the *Match Catcher* films as a resource in my class, I feel that indigenizing the curriculum is not about teaching students facts about the First Nations' people

but instead it pertains to encouraging teachers to immerse their students into Aboriginal pedagogical practices. Thus, allowing students to experience the First Nations' culture.

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Film	Personal Question	Open-ended questions	Math questions/ activities
Small Number and the Basketball Tournament	Do you like playing basketball?	How does Small Number know that if Perfect Number were to play with him and his friends, they would be able to have twenty different teams on the court during the tournament?	There are 6 players on the entire team and 3 players need to be on the court at all times. 1) How does Small Number know that there are 20 different combinations of players that they can make for the tournament? What if one player has to play the entire time (Like Big Circle). How many combinations would you be able to make now?
Small Number and the Salmon Harvest	Have you ever gone fishing?	Why did Small Number think that during a low tide the catch would be much smaller?	Small Number, his dad, uncle and grandpa caught 24 salmon. Small Number has to separate the salmon into three different baskets fairly. 1) How many different ways can Small Number separate the salmon so no basket holds the same amount of salmon? 2) How many different ways can Small Number separate the salmon so two baskets hold the same amount of salmon? How many different ways can Small Number separate the salmon so all three baskets hold the same amount of salmon?
Small Number and the Kit Foxes	Have you ever seen an animal in the wild?	If the kit fox leaves her den at regular intervals, how often does the kit fox leave her pups to come up to hunt?	The boy kit fox and the girl kit fox never go out hunting on the same interval of nights. 1) If the boy kit fox goes out hunting every 2nd night and the girl kit fox goes out hunting every 3rd night what is the first night they will see each other? How many times will they see each other in the first 100 nights? 2) What interval of nights do the boy kit fox and the girl kit fox have to go out hunting to see each other six times in the first 100 nights? Five times? Four times?
Small Number and the Old Totem Pole	What animals have you seen on a totem pole?	Why did the eagle, the raven, the bear, the wolf, and the beaver need help from a little frog to pull the salmon on to the shore?	The beaver, the wolf, the bear, the eagle, the raven and the frog were all pulling the salmon, and together they were able to pull the salmon out of the water. The salmon weighs 100 pounds. 1) How much weight can each animal lift? Think of different justifiable options. 2) The bear can lift ten times as much weight as the frog and five times as much weight as the raven. How much weight can each animal lift? Think of different justifiable options.
Small Number and the Old arrowhead	What's the oldest thing you own?	How can an artifact reveal its age?	Small Number's sister, Perfect Number and an anthropologist found an old arrowhead buried 10m below ground. The anthropologist said that the arrowhead was 1000 years old. They kept digging another 0.5m and found

			another arrowhead. How old do you think that arrowhead is? Justify your answer.
Small Number and the Big Tree	Why do or why don't you like exploring the forest?	How wide was the Bear Tree?	Draw different circles. With a tape measure, measure the circumference of each circle and the diameter. What do you notice?
Small Number and the Old Canoe	How many people are in your family?	Why did Small Number think that his great-grandpa might have two, three, four, five or more brothers?	How many siblings do you have? When someone goes into your house, how are they able to tell how many kids live there. Imagine you had two more siblings? How would your house change?
Small Number and the 100th Tipi	N/A	How did Small Number know that the 100th tipi is the one just south of his grandparents' tipi without actually counting them?	1) There are seven tipis in a circle. If Small Number starts on tent A (his grandmother's tent) and the rest of the tipis are labeled B,C,D,E,F,G which letter is the 100th tipi (his Auntie Rena's tipi)? 1) What if there were only 5 tipis in a circle (A,B,C,D,E). Which tipi would be the 100th tipi? Keep making tipi circles with different numbers of tipis until you find a pattern of how to figure out which tipi is the 100th without counting.
Small Number and the Skateboard Park **(Computer activity)**	What do you know about skateboarding?	How did Full Angle know which ramp to choose in order to have enough time in the air to spin around twice before landing?	A ramp at the skate park has to have a 90-degree angle at the base to be sturdy. Go to http://www.learnalberta.ca/content/mejhm/index.html?l=0&ID1=AB.MATH.JR.SHAP&ID2=AB.MATH.JR.SHAP.TRIA and experiment with the size of the right triangle. 1) What do you notice about these lengths of the three sides of the triangle? Draw your own ramps with a 90-degree angle at the base and label the lengths of each side.