

LESSON PLAN

Lesson Title	The finger multiplication algorithm – an exploration into ethnomathematics in education	Grade Level 3 to 4
Subject	Mathematics (With an integration of ethnic studies)	
Developed by Nicole Langevin (Mathematics Major at the Werklund School of Education, University of Calgary 2023 Graduate) – in consultation with the research team (Miwa Takeuchi and Mahati Kopparla)		

IDENTIFY DESIRED RESULTS

Visions	Resources What materials/resources/technology will be required?
<ul style="list-style-type: none"> - To challenge the misconceptions around the use of body parts in mathematics learning - To think about how some methods and ideas they were taught as students are not always necessarily ‘right’ or ‘better than’ other methods. 	<ul style="list-style-type: none"> - Illustrated book on website. - Attached document: <i>Finger multiplication method explanation</i>. - Two worksheets: One for measurement activity, one for finger multiplication method.

LESSON PLAN SEQUENCE

Introduction
<p>Talk about the history of ancient cultures using measurement with the body as their first form of math. For example, the length of a foot, the length of a stride, the span of a hand, and the breadth of a thumb were all classified as measurements used by multiple cultures. The foot is said to have been measure off King Henry’s foot, and the width of the thumb was used to create the measurement of an inch.</p>
Learning/Activity Sequence How will students ENGAGE, EXPLORE, EXPLAIN, ELABORATE, and/OR EVALUATE their understandings of the outcomes.

What is the TEACHER doing? What is your plan for the body of the lesson? What steps are taken during the lesson?	What are the STUDENTS doing? How are they engaged while you are teaching the lesson?	Approx. time
<p>First discussion: How do we use our bodies in our lives naturally to measure the world around us?</p> <p>Potential leading questions for discussion:</p> <ul style="list-style-type: none"> ● Have you ever had to measure distance along a large field by counting the strides you take? ● In a game like Bochy, how do you measure which ball is closer to the target? ● When is it useful and when is it bad to use our body to measure things? <p>For example: It is useful for measuring in a game, or the length of supplies you need for a project, but it is bad to use it to measure in a chemistry lab when you shouldn't be approximate.</p>	<p>Students should be participating in the discussion.</p>	<p>5 mins.</p>
<p>Measurement activity part 1:</p> <p>Ask students to pick four things around the room to measure, and find a way to measure it with their body. Have them write down how long it is (for example: one hand width), and then measure that against a ruler at their desk to get an approximation (for example: if they measured one hand width, at their desk they would measure their one hand width and see how long that is on a ruler to approximate the size of the object).</p>	<p>Students will be participating individually in the measurement activity.</p> <p>Students will write down:</p> <ul style="list-style-type: none"> ● The four objects they measured. ● The body measurement of each object. ● The translation of the body measurement to their ruler. <p>For example: Object 1: Sticky note. Body measurement: 4 and a half thumb widths. Translation to standardized measurement: 80 cm</p>	<p>10 mins.</p>
<p>Measurement activity part 2:</p> <p>Have the students pair up. Each student will give their partner the four objects they measured, and have them measure those objects themselves. (For example, if one student measured their pencil case with their finger</p>	<p>Students will continue the measurement activity in pairs.</p> <p>Students will write down:</p> <ul style="list-style-type: none"> ● The four objects their partner measured. 	<p>10 mins.</p>

<p>length, they would tell their partner to measure the same pencil case. That partner can choose to measure the pencil case however they want).</p> <p>In the same way as activity 1, each student will write down the body measurement for each object, and then use a ruler to approximate that body measurement.</p> <p>(If you are short on time, they can measure less objects)</p>	<ul style="list-style-type: none"> • Their own body measurement of each object. • The translation of the body measurement to their ruler. <p>For example: Object 1: Sticky note. Body measurement: 6 and a half pinky widths. Translation of measurement: 75 cm</p>	
<p>Second discussion and comparison:</p> <p>Ask the students in their pairs to compare the measurements they used on their body, and how close they were with the ruler measurements.</p> <p>As a class, discuss how close everyone’s answers were:</p> <p>Leading questions:</p> <ul style="list-style-type: none"> • Were some pairs closer to each other than others? Why might that be? <ul style="list-style-type: none"> o Did some students try to be more precise? • Was it close enough? Does it matter how accurate the measurements were? • Why might it be better to measure things with our bodies rather than with rulers everytime? • When might it be bad to use our bodies to measure things? <ul style="list-style-type: none"> o It might not be as good to use approximate measurements if you’re building a house. 	<p>Students will discuss with partners and then with the class.</p>	<p>10 mins.</p>
<p>Third discussion: What are other ways, besides measurement that we use our body for math? (This discussion can happen in small groups or as a class)</p> <p>Some ideas:</p> <ul style="list-style-type: none"> • Counting <ul style="list-style-type: none"> o Can also talk about multiple cultures that count with their hands differently: 	<p>Students will be participating in the discussion.</p>	<p>5 mins.</p>

<ul style="list-style-type: none"> o Chisanbop method (used in China) o Hand arithmetic (https://www.maa.org/press/periodicals/convergence/an-arabic-finger-reckoning-rule-appropriated-for-proofs-in-algebra-finger-reckoning) • Multiplying (using the 9-multiplication finger trick, and the other finger trick as described later) 		
<p>Lesson: The finger multiplication method.</p> <p>Show students how to do the finger multiplication method (Lesson shown in attached document – <i>Finger multiplication method explanation</i>)</p>	<p>Students will be learning the algorithm behind finger multiplication and if there is extra time practicing examples on their own.</p>	<p>15 mins.</p>
<p>Third discussion: The stigmatization of using the body in math.</p> <p>Leading questions:</p> <ul style="list-style-type: none"> • Is it bad to use your fingers when doing math for anything? Why or why not? • Is there ever a time we shouldn't use our hands to count or multiply? • How does it make you feel when people tell you not to use your hands to count or multiply? 	<p>Students will be participating in discussions as a class.</p>	<p>5 mins.</p>
<p>Conclusion</p> <p>How will you ensure students walk away with a sense of understanding the PURPOSE of the lesson and its IMPORTANCE to their learning?</p>		
<p>Connect to next lesson: In the next lesson, we will be continuing with these ideas looking at different multiplication methods from around the world.</p> <p>OR</p> <p>Review key points from the lesson: Discuss the key outcomes of the lesson - who decides what is the 'right' way to do math.</p>		