**Math 8 Lesson – Rectangular Prisms**

**Big Idea**

The relationship between surface area and volume can be used to describe, measure, and compare spatial relationships.

**Curricular competencies**

* Use reasoning and logic to explore, analyze, and apply mathematical ideas
* Model mathematics in contextualized experiences
* Apply multiple strategies to solve problems in both abstract and contextualized situations
* Visualize to explore mathematical concepts
* Engage in problem solving experiences that are connected to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures
* Explain and justify mathematical ideas and decisions
* Communicate mathematical thinking in many ways
* Represent mathematical ideas in concrete, pictorial, and symbolic forms
* Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts (design and measurement)

**Center Based Learning (Not for this lesson)**

1. Musical Rhythmic – build two Cajons of different sizes. Listen to the sounds they make. What do you think the volume of the Cajons has to do with the depth and tone?
2. Visual Spatial – blueprints
3. VL –
4. BK – build models of longhouses
5. LM – measure volume of longhouse
6. Naturalist – rectangular prisms in nature
7. Interpersonal – how does measuring shapes allow us to communicate and share information
8. Intrapersonal – How does the measurement of shapes impact your life? (e.g. foods)
9. Existential – how have shapes reflected our culture and interconnections with the natural world?

**GRADE 8 MATH**

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| **Big Idea** | **Access Point** | **Beginning** | **Developing** | **Mastery** | **Excelling** |
| Number represents, describes, and compares the quantities of ratios, rates, and percents | Uses numbers to make simple comparisons (e.g. more/less) | Recognizes that numbers can be used to make comparisons in a number of ways | Models common uses of numbers for comparison (e.g. sports statistics, prices), uses mental math to make simple comparisons and calculations related to rates and percents | Estimates, compares and contrasts numbers using varied forms of proportional representation and reasoning using appropriate tools and technologies | Solves problems using proportional reasoning, justifies choices (e.g. why use a percent versus a ratio in a given circumstance) |
| Computational fluency and flexibility extend to operations with fractions | Identifies common fractions | Describes relationships between functions in general (e.g. addition & subtraction) | Explains direct relationships between functions in relation to fractions | Flexibly selects strategies for solving problems connectedwith place, story, cultural practices, and perspectives relevant to local Indigenous and local communities and other cultures with fractions, models reasoning using appropriate tools and technologies | Applies understanding to develop algorithms to solve complex, real world problems |
| Discrete linear relationships can be represented in many connected ways and used to identify and make generalizations | Interprets simple line graphs | Understands that  variables can  influence each  other in  predictable ways | Produce, using appropriate tools and technologies, and explain how an equation or graph describes a discrete relationship that is constant, with supporting examples | Models how a real world, functional relationship can be represented by an equation, proposes solutions based on patterns / predictability | Evaluates solutions to  problems connectedwith place, story, cultural practices, and perspectives relevant to local Indigenous and local communities and other cultures based on both mathematical and social variables, justifies importance of resolution (i.e. some problems may affect more people, but be  of less severity, and  vice-versa) |
| Identifies relationship patterns (e.g. when x happens, y increases) | Interpolate and extrapolate values within a graph | Evaluate whether a graph represents a linear situation or equation | Create an infographic to present data regarding a local  issue which includes a linear equation and its graph |
| The relationship between surface area and volume of 3-D objects can be used to describe, measure, and compare spatial relationships | Identifies 3D objects  Measures 2 D objects | Estimates and measures surface area of 2D and 3D shapes | Estimates and computes surface area and volume using provided algorithms | Compares spatial relationships between and among area and volume and 3D shapes using appropriate tools and technologies | Designs and formulates diagrams for context-based problems. Can combine formulas to hypothesize surface area/volume of irregularly shaped objects. |
| Analyzing data by determining averages is one way to make sense of large data sets and enables us to compare and interpret | Identifies trends in data (e.g. most of the numbers are around \_\_\_) | Defines “average” mathematically | Models the reasoning behind calculating average (each score is equally weighted, looking for common value) | Estimates averages, compares and interprets large data sets using averages | Argues pros and cons of calculating averages to represent a data set |

**Student Handout**

Ceremonial events of the Squamish people are customarily conducted in the Longhouse. During pre-contact, certain Longhouses were utilized as community dwellings, and others were set aside for the exclusive use of the winter spiritual dances. The Longhouse is a sacred place that plays a significant role in the culture of the Coast Salish people.

In June Baker’s description of the *Legacy of the Longhouse*, she notes the following:

“In modern times, the main events held in the long house are the winter spiritual dances… An important part of the ritual of the longhouse is the witnessing ceremony.  Whenever one is doing ‘work’ of any consequence and a spokesperson or ‘floor manager’ has been selected, the first order of events is to call witnesses.  These people are required to take note of the work that is taking place and to speak about the work when it has been completed…”

“To do work in the Longhouse involves any one of a number of significant events, such as bestowing a traditional name, memorial rite for a deceased family member and apologizing for a mistake or mishap…other situations that require the calling of witnesses are the many rituals that accompany the sponsorship of a new dancer.”

Longhouses were typically built in two parts:

1. The rectangular base was built
2. A triangular roof was added on top
3. Finally, a totem pole was added at the doorway to tell the story of the community or celebrations that had taken place.

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**Your Job:**

1. Research the spiritual significance of the longhouse. What needs to be understood and respected by non-Indigenous people about the sacred aspects of the longhouse?
2. Design and build a model of a longhouse for a community of 100 people.
3. Consider the amount of space needed for ceremony.
4. Sketch your design on paper, to scale. For instance, if you think the building should be 50 meters long, you could build the model 50 centimeters long.
5. Consider that totem poles ranged from 3 to 18 metres in height, and the building had to support at least the bottom third of the pole for stability.
6. Draw a blueprint with the measurements of your building, and then construct it:
   1. Build the rectangular base first. What is the length, height, and width of your longhouse, and why did you make it this size?
   2. Add the triangular roof, what are the length, height, and width of the roof section?
   3. Calculate the volume of your longhouse – how much space is there overall?
   4. Design the totem pole – what is the story it tells?

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