Area of Learning: Mathematics	**Apprenticeship Mathematics 12**
Big Ideas	Elaborations
• Experiential learning provides opportunities to apply mathematical concepts and competencies.	
• **Visualization** is essential in making sense of contextual problems.	• **Visualization:** ○ helps us process information, make connections, and solve problems
• Contextual problems are situational, and transferring mathematical skills between problems requires conceptual understanding.	
• Proportional reasoning enables us to make sense of multiplicative relationships and is frequently used when analyzing contextual problems.	
• Measuring naturally lends itself to the use of concrete materials, measurement skills and tools in a contextual way.	

Curricular Competencies	Elaborations	Content	Elaborations

Students are expected to do the following:
 	
Reasoning, analyzing, and modelling
• Engage in **spatial reasoning**
• Use **reasoning and logic** to analyze and apply mathematical ideas
• **Estimate** reasonably
• Use **tools or technology** to analyze relationships and test conjectures
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• **Visualize** to explore and illustrate
	• **spatial reasoning:**
	  ○ being able to think about shapes (real or imagined) and to mentally transform these shapes in order to notice relationships
	• **reasoning and logic:**
	  ○ inductive and deductive reasoning
	  ○ predicting, generalizing, drawing conclusions through experiences including puzzles, games, and coding
	• **Estimate:**
	  ○ being able to defend the reasonableness of an estimate across mathematical contexts
	• **tools or technology:**
	  ○ physical and digital tools,
		Students are expected to know the following:
		• **measuring**, including tools with graduated scales and conversions using metric and imperial
		• similar **triangles**, including right-angle trigonometry
		• 2D and 3D shapes, including area, surface area, volume, and nets
		• model and draw **3D objects** and their views (isometric drawing, orthographic projection)
		• **relationships** in formulae
		• circle geometry
		• awareness and knowledge of **mathematics in the workplace**
		• **financial literacy:** business
			• **measuring:**
			  ○ unit analysis
			  ○ precision and accuracy
			  ○ units are broken down into smaller divisions to get more precise measurements
			  ○ option to create a project or presentation to share measurement concepts and skills used in a field/career of interest to the student
			• **triangles:**
			  ○ in contextual examples such as stairs and roofs
			  ○ application of Pythagorean theorem
			• **3D objects:**

mathematical concepts and relationships • Apply **flexible strategies** to solve problems in contextualized situations • 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 **Communicating and representing** • Communicate mathematical thinking in many ways • Use mathematical vocabulary and language • **Represent** mathematical ideas in a variety of ways • Explain and justify mathematical ideas **Connecting and reflecting** • **Reflect** on mathematical thinking • Use mathematics to support personal choices • Connect mathematical concepts to each other and to **other areas and personal interests** • **Incorporate** First Peoples worldviews and perspectives to	including coordinate grids ○ dynamic software for architectural and/or interior design • **Model:** ○ using concrete materials and dynamic interactive technology • **Visualize:** ○ includes dynamic visualizations such as graphical relationships, simulations • **flexible strategies:** ○ from a repertoire of strategies, choosing an appropriate strategy to solve problems (e.g., guess and check, model, solve a simpler problem, use a chart, use diagrams, role-play) • **experiences:** ○ includes context, strategies and approaches, language across cultures • **Represent:** ○ concretely, pictorially, symbolically, including using models, tables, graphs, words, numbers, symbols • **Reflect:** ○ sharing the mathematical thinking of self and others, including evaluating strategies and solutions, extending, posing new problems and	investments and loans	○ creating and reading various types of technical drawings ○ option to create a project or presentation to share geometry concepts and skills used in a field/career of interest to the student • **relationships:** ○ Find a formula of interest and explore the relationship between variables. When you change (e.g., double) a variable, what happens to other variables? • **mathematics in the workplace:** ○ option to create a project or presentation to share mathematical concepts and skills used in a field/career of interest to the student ○ compare and contrast mathematics used in different workplace contexts ○ interview someone working in a field of interest to the student • **financial literacy:** ○ option to create a project or presentation to share mathematical concepts and skills used in a field/career of

make connections to mathematical concepts	questions
	• **other areas and personal interests:**
	  ○ to develop a sense of how mathematics helps us understand ourselves and the world around us (e.g., daily activities, local and traditional practices, the environment, popular media and news events, social justice, cross-curricular integration)
	• **Incorporate:**
	  ○ Collaborate with First Peoples Elders and knowledge keepers.
	• **make connections:**
	  ○ Bishop's cultural practices: counting, measuring, locating, designing, playing, explaining (http://www.csus.edu/indiv/o/oreyd/ACP.htm_files/abishop.htm)
	  ○ www.aboriginaleducation.ca
	  ○ *Teaching Mathematics in a First Nations Context*, FNESC (http://www.fnesc.ca/resources/math-first-peoples/)
			interest to the student
			  ○ business investments, loans (lease versus buy), graphical representations of financial growth, projections, expenses