**Area of Learning: MATHEMATICS — Computer Science Grade 12**

**BIG IDEAS**

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| Decomposition and **abstraction** help us to solve difficult problems by managing complexity. |  | **Algorithms** are essential in solving problems computationally. |  | Programming is a tool that allows us to implement **computational thinking**. |  | **Solving problems** is a creative process. |  | **Data representation** allows us to understand and solve problems efficiently. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to do the following:*  Reasoning and modelling   * Develop **fluent, flexible, and strategic thinking** to analyze and  create algorithms * Explore, **analyze**, and apply mathematical ideas and computer science concepts using **reason**, **technology,** and **other tools** * **Model** with mathematics in **situational contexts** * **Think** **creatively** and with **curiosity** **and wonder** when exploring problems   Understanding and solving   * Develop, demonstrate, and apply conceptual understanding through experimentation, **inquiry**, and problem solving * **Visualize** to explore and illustrate computer science concepts  and relationships * Apply **flexible and strategic approaches** to **solve problems** * Solve problems with **persistence and a positive disposition** * Engage in problem-solvingexperiences **connected** with place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures | *Students are expected to know the following:*   * **access variables** in memory * ways in which **data structures** are organized in memory * **uses** of multidimensionalarrays * classical algorithms,including **sorting and searching** * use of Big-O notation to help predict run-time **performance** * **recursive problem solving** * **persistent memory** * **encapsulation** of data * ways to **model mathematical problems** |

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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Communicating and representing   * **Explain and justify** computer science ideas and **decisions**  in **many ways** * **Represent** computer science ideas in concrete, pictorial, and  symbolic forms * Use computer science and mathematical vocabulary and language  to contribute to **discussions** in the classroom * Take riskswhen offering ideas in classroom **discourse**   Connecting and reflecting   * **Reflect** on mathematical and computational thinking * **Connect mathematical and computer science concepts** with each other, other areas, and personal interests * Use **mistakes** as **opportunities to advance learning** * **Incorporate** First Peoples worldviews, perspectives, **knowledge**,  and **practices** to make connections with computer science concepts |  |