**Area of Learning: Applied Design, Skills, and Technologies —   
Computer Programming Grade 12**

**BIG IDEAS**

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| The **design cycle**  is an ongoing reflective process. |  | Personal design choices  require self-exploration, collaboration, and evaluation and refinement of skills. |  | Tools and technologies can be adapted for  specific purposes. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to be able to do the following:*  Applied Design  Understanding context   * Conduct **user-centred research** to understand design opportunities  and barriers   Defining   * Establish a point of view for a chosen design opportunity * Identify potential users, intended impact, and possible unintended negative consequences * Make decisions about premises and **constraints** that define the design space   Ideating   * Identify gaps to explore a design space * Generate ideas and add to others’ ideas to create possibilities, and prioritize them for prototyping * Critically analyze how competing social, ethical, and sustainability considerations impact designed solutions to meet global needs for preferred futures * Work with users throughout the design process | *Students are expected to know the following:*   * design opportunities * design cycle * advanced **programming structures** * standardized source code **documentation** * **self-documenting** code * **collaboration tools** for programming * **advanced pair programming** * User **interface design** * **error handling** * **debugging** tools * management of **complexity** * uses of **pre-built data structures** * bug reports and feature requests from users * appropriate use of technology, including digital citizenship, etiquette, and literacy * **interpersonal skills** necessary to work effectively within  the IT sector |

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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Prototyping   * Identify and apply **sources of inspiration** and **information** * Choose an appropriate form, scale, and level of detail for prototyping, and plan procedures for prototyping multiple ideas * Analyze the design for the life cycle and evaluate its **impacts** * Construct prototypes, making changes to tools, materials, and procedures  as needed * Record **iterations** of prototyping   Testing   * Identify feedback most needed and possible **sources of feedback** * Develop an **appropriate test** of the prototype * Collect feedback to critically evaluate design and make changes to product design or processes * Iterate the prototype or abandon the design idea   Making   * Identify appropriate tools, technologies, materials, processes, and time needed for production * Use **project management processes** when working individually or collaboratively to coordinate production   Sharing   * **Share** progress while creating to increase feedback, collaboration, and,  if applicable, marketing * Decide on how and with whom to share or promote their **product**, creativity,  and, if applicable, **intellectual property** * Consider how others might build upon the design concept * Critically reflect on their design thinking and processes, and identify new  design goals * Assess ability to work effectively both as individuals and collaboratively while implementing project management processes |  |

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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Applied Skills   * Apply safety procedures for themselves, co-workers, and users in both physical and digital environments * Identify and assess skills needed for design interests, and develop specific plans to learn or refine them over time   Applied Technologies   * Explore existing, new, and emerging tools, **technologies**, and systems to evaluate their suitability for their design interests * Evaluate impacts, including unintended negative consequences, of choices made about technology use * Analyze the role technologies play in societal change * Examine how cultural beliefs, values, and ethical positions affect the development  and use of technologies |  |