**Area of Learning: Applied Design, Skills, and Technologies —
Computer Programming Grade 11**

**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 technologiescan 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 DesignUnderstanding 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 inferences 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
* **problem decomposition**
* **structures** within existing code
* ways to **modify** existing code to meet a particular purpose
* **strategies** to predict effects of code modification
* **pair programming**
* programming language constructs to support input/output,logic, decision structure, and loops
* **requirements** of a problem statement
* **ways** totransform requirements into algorithms
* translation of **design specifications** into source code
* **tools** to aid in the development process
* **pre-built libraries** and their **documentation**
* inline commenting to document source code
* **use of test cases** to detect logical or semantic errors
* **computational thinking** processes
* appropriate use of technology, including digital citizenship, etiquette, and literacy
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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 opportunities for feedback
* 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
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