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

**BIG IDEAS**

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| Design for the life cycle includes consideration of social and **environmental** **impacts**. |  | Personal design interests require the 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   * Engage in a period of **user-centred research** and **empathetic observation** to understand design opportunities   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,  and develop criteria for success * Determine whether activity is collaborative or self-directed   Ideating   * Critically analyze how competing social, ethical, and sustainability considerations  impact design * Generate ideas and add to others’ ideas to create possibilities, and prioritize them  for prototyping * Evaluate suitability of possibilities according to success criteria and constraints * Work with users throughout the design process   Prototyping   * Identify, critique, and use a variety of **sources of inspiration** * Choose an appropriate form, scale, and level of detail for prototyping, and plan procedures * Analyze the design for the life cycle and evaluate its **impacts** | *Students are expected to know the following:*   * complex metalworking and design * operation and safety of **welding equipment** * casting **methods** * incorporation of **non-metal material** in metalwork products * **finishing** purposes and processes * metal selection for specific applications * sequence of steps when working with powered and non-powered equipment * dimensional tolerance * operation, **maintenance, and adjustment** of stationary powered and non-powered equipment * areas of **metal specialization** * sheet metal layout, forming, and fabrication * heat treatment purposes and processes * **design for the life cycle** * ethics of **cultural appropriation** in design process * future career options and opportunities in metalworking contexts * **interpersonal and consultation skills** to interact with clients |

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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| * Visualize and construct prototypes, making changes to tools, materials, and procedures as needed * Develop an appropriate test of the prototype, conduct the test, and collect and compile data * Record **iterations** of prototyping   Testing   * Identify and communicate with **sources of feedback** * Evaluate design according to critiques, testing results, and success criteria to make changes   Making   * Identify appropriate tools, **technologies**, materials, processes, cost implications, and time needed * Create design, incorporating feedback from self, others, and testing prototypes * Use materials in ways that minimize waste   Sharing   * Decide on how and with whom to **share** or promote design, creativity, and processes * Share the product with users and critically evaluate its success * Critically reflect on their design thinking and processes, and identify new design goals * Identify and analyze new design possibilities, including how they or others might build on their concept   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 * Demonstrate competency and proficiency in skills at various levels involving manual dexterity and complex metalworking techniques   Applied Technologies   * Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for their design interests * Evaluate impacts, including unintended negative consequences, of choices made about technology use * Examine and analyze the role that changing technologies play in metalworking contexts |  |