**Area of Learning: Applied Design, Skills, and Technologies — Metalwork Grade 10**

**BIG IDEAS**

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| User needs and interests drive the design process. |  | Social, ethical, and sustainability considerations impact design. |  | Complex tasks require different technologies and tools at different stages. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to be able to do the following:*Applied DesignUnderstanding context* Engage in a period of researchand **empathetic observation**

Defining* Identify potential users and relevant contextual factors for a chosen design opportunity
* Identify criteria for success, intended impact, and any **constraints**
* Determine whether activity is collaborative or self-directed

Ideating* Take creative risks in generating ideas and add to others’ ideas in ways that enhance them
* Identify and use **sources of inspiration**
* Screen ideas against criteria and constraints
* Critically analyze and prioritize competing **factors** to meet community needs for preferred futures
* Maintain an open mind about potentially viable ideas

Prototyping* Choose a form for prototyping and develop a **plan** that includes key stages and resources
* Evaluate a variety of materials for effective use and potential for reuse, recycling, and biodegradability
* Prototype, making changes to tools, materials, and procedures as needed
* Record **iterations** of prototyping
 | *Students are expected to know the following:** design opportunities
* proper storage and organization of tools and equipment
* selection of metal for size, shape, and finish
* common gauges of metal
* identification of ferrous and non-ferrous materials and **carbon content**
* start-up, shutdown, and handling procedures for compressed gas cylinders
* **precision measurement**
* **cutting threads**
* mechanical fasteners and fastening methods
* methods for laying out, forming, and joining metal
* precision grinding
* computer numerical control (CNC) applications
* reading and preparing drawings, plans, and cutting lists
* ethics of **cultural appropriation** in design process
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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Testing* Identify **sources of feedback**
* Develop an appropriate test
* Conduct the test, collect and compile data, evaluate data, and decide on changes

Making* Identify and use appropriate tools, **technologies**, materials, and processes
* Make a step-by-step plan and carry it out, making changes as needed
* Use materials in ways that minimize waste

Sharing* Decide on how and with whom to **share** product and processes
* Demonstrate product to users and critically evaluate its success
* Identify new design goals

Applied Skills* Demonstrate and document an awareness of precautionary and emergency safety procedures
* Develop competency and proficiency in skills at various levels involving manual dexterity and metalwork techniques
* Identify the skills needed, individually or collaboratively, in relation to specific projects, and develop and refine them

Applied Technologies* Choose, adapt, and if necessary learn more about appropriate tools and technologies to use for tasks
* Evaluate **impacts**, including unintended negative consequences, of choices made about technology use
* Evaluate the influences of land, natural resources, and culture on the development and use of tools and technologies
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