**Area of Learning: Applied Design, Skills, and Technologies — Electronics 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 DesignUnderstanding 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 impacts, and possible unintended negative consequences
* Make inferences about premises and **constraints** that define the design space, and develop criteria for success
* Determine whether activity is collaborative or self-directed

Ideating* Identify and examine gaps for potential design improvements and innovations
* Critically analyze impacts of competing social, ethical, and sustainability considerations on design
* Generate ideas and add to others’ ideas to create possibilities, and prioritize them for prototyping
* Evaluate suitability of possibilities according to success criteria, constraints, and potential gaps
* Work with users throughout the design process
 | *Students are expected to know the following:** complex circuit design and construction
* Ohm’s law, Watt’s law, and Kirchhoff’s law, and the conservation of current and energy within electrical circuits
* functions of logic **gates and devices**
* **chemicals** used in electronics
* **testing equipment** for measurement and comparison of expected values
* computer software for designing printed circuits
* circuits for **analog systems**
* circuits for **digital systems**
* uses of **microcontrollers**
* alternating current (AC) and direct current (DC) circuit comparison and analysis
* electromagnetic induction as it relates to motors, electrical generation, and distribution
* standard layout and symbols for wiring and schematic diagrams
* interpretation of schematic drawings
* use of fibre optics in communication
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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Prototyping* 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**
* Visualize and construct prototypes, making changes to tools, materials, and procedures as needed
* Record **iterations** of prototyping

Testing* Identify and communicate with **sources of feedback**
* Develop an **appropriate test** of the prototype, conduct the test, and collect and compile data
* 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 results from testing of the prototype
* Use materials in ways that minimize waste

Sharing* Decide how and with whom to **share** creativity, or share and promote design 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
* Evaluate new possibilities for plans, products and processes, including how they or others might build on them

Applied Skills* Apply safety procedures for themselves, co-workers, and users in both physical and digital environments
 | * design for the life cycle
* future career options and opportunities in electronics
* **interpersonal skills** for interacting with colleagues and clients
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**Area of Learning: Applied Design, Skills, and Technologies — Electronics Grade 12**

**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| * Individually or collaboratively identify and assess skills needed for design interests
* Demonstrate competency and proficiency in skills at various levels involving manual dexterity and complex circuitry techniques
* Develop specific plans to learn or refine identified skills over time

Applied Technologies* Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for design interests
* Evaluate impacts, including unintended negative consequences, of choices made about technology use
* Analyze the role that changing technologies play in electronics-related contexts
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