**Area of Learning: Applied Design, Skills, and Technologies —   
Electronics and Robotics 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 the sequencing of skills. |

**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 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 * 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 | *Students are expected to know the following:*   * design opportunities * **Ohm’s law** * **electrical theory** using parallel and series circuits * breadboard circuitry * production of simple circuits from  schematic drawings * electronicdiagnostic and testing **instruments** * function and application of **components** * construction sequences involved in making a **working circuit** * function and use of **hand tools** and operation  of **stationary equipment** * **cases** for enclosing a circuit * sequencesinvolved in making a functional robot * robot **elements** * block-based coding or logic-based programming  for robotics * programming platformsfor robotics * flow charts related to robotics behaviour |

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**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| * Prototype, making changes to tools, materials, and procedures as needed * Record **iterations** of prototyping   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 circuitry * 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 |  |

| **APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Electronics and Robotics Curricular Competencies – Elaborations Grade 10** |
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| * **empathetic observation:** may include experiences; traditional cultural knowledge and approaches of First Peoples and those of other cultures; places, including the land and its natural resources and analogous settings; people, including users, experts, and thought leaders * **constraints:** limiting factors such as task or user requirements, materials, expense, environmental impact * **factors:** including social, ethical, and sustainability * **plan:** for example, pictorial drawings, sketches, flow charts * **iterations:** repetitions of a process with the aim of approaching a desired result * **sources of feedback:** may include First Nations, Métis, or Inuit community experts; keepers of other traditional cultural knowledge and approaches; peers, users, and other experts * **technologies:** tools that extend human capabilities * **share:** may include showing to others, use by others, giving away, or marketing and selling * **product:** for example, a physical product, process, system, service, or designed environment * **impacts:** personal, social, and environmental |

| **APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Electronics and Robotics Content – Elaborations Grade 10** |
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| * **Ohm’s law:** describes howvoltage, current, and resistance are related, as in V = IR * **electrical theory:** for example, source, load, control, conductor, voltage, current, resistance, insulator, alternating current (AC),  and direct current (DC) * **instruments:** for example, multimeter, power supplies, test probes, signal-generating devices * **components:** for example, light-emitting diode (LED), resistor, diode, light-dependent resistor (LDR), capacitor, voltage amplifiers,  audio amplifiers, rectifiers * **working circuit:** for example, current, amperage, load, resistance, power, control * **hand tools:** for example,screwdriver, pliers, cutter, wire stripper, desoldering pump, snips, punch, soldering iron * **stationary equipment:** for example, box and pan brake, bar folder, shears, punches, drill press, strip heater * **cases:** for example, wood, 3D printed, metal, plastic * **elements:** for example, input/output sensors, effectors, control systems, movement |