

## BIG IDEAS

Products can be  
**designed for life cycle.**

Personal design interests require  
the evaluation and refinement of skills.

Tools and technologies can be adapted  
for specific purposes.

## Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p><b>Applied Design</b></p> <p><i>Understanding context</i></p> <ul style="list-style-type: none"> <li>• Conduct <b>user-centred research</b> to understand design opportunities and barriers</li> </ul> <p><b>Defining</b></p> <ul style="list-style-type: none"> <li>• Choose a design opportunity and point of view</li> <li>• Identify potential users, intended impact, and possible unintended negative consequences</li> <li>• Make inferences about premises and <b>boundaries</b> that define the design space</li> </ul> <p><b>Ideating</b></p> <ul style="list-style-type: none"> <li>• Take creative risks to identify gaps to explore as design space</li> <li>• Generate ideas to create a range of possibilities and add to others' ideas in ways that create additional possibilities</li> <li>• Critically analyze how competing social, ethical, and sustainability considerations impact designed solutions to meet global needs for preferred futures</li> <li>• Prioritize ideas for prototyping and <b>designing with users</b></li> </ul> <p><b>Prototyping</b></p> <ul style="list-style-type: none"> <li>• Identify and use a variety of <b>sources of inspiration</b> and <b>information</b></li> <li>• Choose an appropriate form, scale, and level of detail for prototyping, and plan procedures for prototyping multiple ideas</li> <li>• Analyze the <b>design for life cycle</b></li> <li>• Construct prototypes, making changes to tools, materials, and procedures as needed</li> <li>• Record <b>iterations</b> of prototyping</li> </ul>	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> <li>• interaction of robotic <b>subsystems</b></li> <li>• how <b>structure</b> and <b>power</b> relate to <b>motion</b></li> <li>• how <b>sensors</b> and <b>control</b> relate to <b>logic</b></li> <li>• friction and traction</li> <li>• power and torque</li> <li>• developments in robotic technology</li> <li>• robotic technologies in the community</li> <li>• similarities and differences between radio-controlled and autonomous robots</li> <li>• programming related to microcontrollers</li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<p><i>Testing</i></p> <ul style="list-style-type: none"> <li>• Identify feedback most needed and possible <b>sources of that feedback</b></li> <li>• Develop an <b>appropriate test</b> of the prototype</li> <li>• Gather feedback from users over time to critically evaluate their design and make changes to product design or processes</li> <li>• Iterate the prototype or abandon the design idea</li> </ul> <p><i>Making</i></p> <ul style="list-style-type: none"> <li>• Identify appropriate tools, technologies, materials, processes, <b>potential funding sources</b>, and time needed for production, and where/how these could be available</li> <li>• Use project management processes when working individually or collaboratively to coordinate production</li> </ul> <p><i>Sharing</i></p> <ul style="list-style-type: none"> <li>• <b>Share</b> their progress while making to increase feedback, collaboration, and, if applicable, marketing</li> <li>• Decide on how and with whom to share or promote their <b>product</b>, creativity, and, if applicable, intellectual property</li> <li>• Critically evaluate their design thinking and processes, and their ability to work effectively both as individuals and collaboratively in a group, including the ability to implement project management processes</li> <li>• Identify new design issues, including how they or others might build on their concept</li> </ul> <p><b>Applied Skills</b></p> <ul style="list-style-type: none"> <li>• Demonstrate an awareness of safety issues for themselves, co-workers, and users in both physical and digital environments</li> <li>• Identify and evaluate their skills and skill levels, in relation to their project or design interests, and develop specific plans to learn or refine their skills over time</li> </ul> <p><b>Applied Technologies</b></p> <ul style="list-style-type: none"> <li>• Explore existing, new, and emerging tools, <b>technologies</b>, and systems and evaluate their suitability for their design interests</li> <li>• Analyze the role and impact of technologies in societal change, and the personal, social, and environmental impacts, including unintended negative consequences, of their choices of technology use</li> <li>• Analyze how cultural beliefs, values, and ethical positions affect the development and use of technologies</li> </ul>	