BIG IDEAS

Design can be responsive to identified needs.	Complex tasks require the acquisition of additional skills.	Complex tasks may require multiple tools and technologies.

Learning Standards

Curricular Competencies	Content
Students are expected to be able to do the following: **Applied Design** *Understanding context* • **Empathize** with potential **users** to find issues and uncover needs and potential design opportunities ***Defining*** • Choose a design opportunity • Identify key features or potential users and their requirements • Identify criteria for success and any **constraints** ***Ideating*** • Generate potential ideas and add to others' ideas • Screen ideas against criteria and constraints • Evaluate personal, social, and environmental impacts and ethical considerations • Choose an idea to pursue *Prototyping* • Identify and use **sources of information** • Develop a plan that identifies key stages and resources • Explore and test a variety of materials for effective use • Construct a first version of the **product** or a prototype, as appropriate, making changes to tools, materials, and procedures as needed • Record **iterations** of prototyping	*Students will experience a minimum of three modules of Applied Design, Skills, and Technologies 6–7 in each of Grades 6 and 7. Schools may choose from among the modules listed below or develop new modules that use the Curricular Competencies of Applied Design, Skills, and Technologies 6–7 with locally developed content. Locally developed modules can be offered in addition to, or instead of, the modules in the provincial curriculum.* **Computational Thinking** *Students are expected to know the following:* • **simple algorithms** that reflect computational thinking • **visual representations** of problems and data • **evolution of programming languages** • **visual programming** **Computers and Communications Devices** *Students are expected to know the following:* • computer system architecture, including hardware and software, network infrastructure (local), intranet/Internet, and personal communication devices • strategies for identifying and troubleshooting simple hardware and software problems • function of input and output devices, including 3D printing and adaptive technologies for those with special needs • ergonomics in use of computers and computing devices • effective and efficient keyboarding techniques

Learning Standards (continued)

Curricular Competencies	Content
Testing • Test the first version of the product or the prototype • Gather peer and/or user and/or expert feedback and inspiration • Make changes, troubleshoot, and test again *Making* • Identify and use appropriate tools, **technologies**, and materials for production • Make a plan for production that includes key stages, and carry it out, making changes as needed • Use materials in ways that minimize waste *Sharing* • Decide on how and with whom to **share** their product • Demonstrate their product and describe their process, using appropriate terminology and providing reasons for their selected solution and modifications • Evaluate their product against their criteria and explain how it contributes to the individual, family, community, and/or environment • Reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space • Identify new design issues **Applied Skills** • Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments • Identify and evaluate the skills and skill levels needed, individually or as a group, in relation to a specific task, and develop them as needed	**Digital Literacy** *Students are expected to know the following:* • **Internet safety** • digital self-image, citizenship, relationships, and communication • legal and ethical considerations, including creative credit and copyright, and cyberbullying • methods for **personal media management** • search techniques, how search results are selected and ranked, and **criteria** for evaluating search results • strategies to identify **personal learning networks** **Drafting** *Students are expected to know the following:* • technical drawing, including sketching techniques and manual **drafting techniques** • elements of plans and drawings • simple computer-aided **drafting programs** **Entrepreneurship and Marketing** *Students are expected to know the following:* • role of entrepreneurship in designing and making products and services • **market niche** • branding of products, services, institutions, or places • pricing product/service, including decision to seek profit or break even • role of basic financial record-keeping and budgeting

Learning Standards (continued)

Curricular Competencies	Content
Applied Technologies • Select, and as needed learn about, appropriate tools and technologies to extend their capability to complete a task • Identify the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use • Identify how the land, natural resources, and culture influence the development and use of tools and technologies	**Food Studies** *Students are expected to know the following:* • basic food handling and simple preparation **techniques** and **equipment** • factors in ingredient use, including balanced eating/nutrition, function, and **dietary restrictions** • factors that influence food choices, including cost, availability, and family and cultural influences
	Media Arts *Students are expected to know the following:* • **digital and non-digital** media, and their distinguishing characteristics and uses • **techniques** for using images, sounds, and text to communicate information, settings, ideas, and story structure • media technologies and techniques to capture, edit, and manipulate images, sounds, and text for specific purposes • influences of digital media for the purpose of communication and self-expression
	Metalwork *Students are expected to know the following:* • characteristics and uses of metals • metalworking **techniques and processes** using **hand tools** • metals as a non-renewable resource
	Power Technology *Students are expected to know the following:* • power is the rate at which energy is transformed • **forms of energy** • energy is **conserved** • devices that **transform energy**

Learning Standards (continued)

Curricular Competencies	Content
	Robotics *Students are expected to know the following:* • a robot is a machine capable of carrying out a complex series of actions automatically • uses of robotics • main components of robots: **sensors**, **control systems**, and **effectors** • various **ways** that objects can move • programming and logic for robotics components • various **platforms** for robotics
	Textiles *Students are expected to know the following:* • range of **uses** of textiles • variety of textile **materials** • **hand construction techniques** for producing and/or repairing textile items • consumer concerns that influence textile choices, including availability, cost, function (e.g., waterproof), and textile care
	Woodwork *Students are expected to know the following:* • ways in which wood is used in local cultural and economic contexts • characteristics of wood as a material • **woodworking techniques** and **basic joinery** using **hand tools**

BIG IDEAS

Design can be responsive to identified needs.	Complex tasks require the acquisition of additional skills.	Complex tasks may require multiple tools and technologies.

Learning Standards

Curricular Competencies

Students are expected to be able to do the following:

Applied Design

Understanding context

- **Empathize** with potential **users** to find issues and uncover needs and potential design opportunities

Defining

- Choose a design opportunity
- Identify key features or potential users and their requirements
- Identify criteria for success and any **constraints**

Ideating

- Generate potential ideas and add to others' ideas
- Screen ideas against criteria and constraints
- Evaluate personal, social, and environmental impacts and ethical considerations
- Choose an idea to pursue

Prototyping

- Identify and use **sources of information**
- Develop a plan that identifies key stages and resources
- Explore and test a variety of materials for effective use
- Construct a first version of the **product** or a prototype, as appropriate, making changes to tools, materials, and procedures as needed
- Record **iterations** of prototyping

Content

The curriculum is designed to be offered in modules or courses of various lengths. Schools are required to provide students with the equivalent of a full-year "course" in Applied Design, Skills, and Technologies. This "course" can be made up of one or more modules. Schools may choose from among the modules listed below or develop new modules that use the Curricular Competencies of Applied Design, Skills, and Technologies 8 with locally developed content. Locally developed modules can be offered in addition to, or instead of, the modules in the provincial curriculum.

Computational Thinking

Students are expected to know the following:

- software programs as specific and sequential instructions with algorithms that can be reliably repeated by others
- debugging algorithms and programs by breaking problems down into a series of sub-problems
- binary number system (1s and 0s) to represent data
- programming languages, including **visual programming** in relation to **text-based programming** and **programming modular components**

Computers and Communications Devices

Students are expected to know the following:

- design and function of digital infrastructures, from personal communication systems to **wide area networks** and the **Internet of Things**
- social, cultural, and economic impact of mobile devices
- systems for information transfer and communication, including videos, blogs, podcasts, and social media
- **keyboarding techniques**

Learning Standards (continued)

Curricular Competencies	Content
Testing • Test the first version of the product or the prototype • Gather peer and/or user and/or expert feedback and inspiration • Make changes, troubleshoot, and test again *Making* • Identify and use appropriate tools, **technologies**, and materials for production • Make a plan for production that includes key stages, and carry it out, making changes as needed • Use materials in ways that minimize waste *Sharing* • Decide on how and with whom to **share** their product • Demonstrate their product and describe their process, using appropriate terminology and providing reasons for their selected solution and modifications • Evaluate their product against their criteria and explain how it contributes to the individual, family, community, and/or environment • Reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space • Identify new design issues **Applied Skills** • Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments • Identify and evaluate the skills and skill levels needed, individually or as a group, in relation to a specific task, and develop them as needed	**Digital Literacy** *Students are expected to know the following:* • **elements of digital citizenship** • ethical and legal implications of **current and future technologies** • strategies for curating personal digital content, including management, personalization, organization, and maintenance of digital content; e-mail management; and workflow • search techniques, how search results are selected and ranked, and **criteria** for evaluating search results • strategies to engage with **personal learning networks** **Drafting** *Students are expected to know the following:* • manual and computer-aided **drafting techniques** • elements of technical plans and drawings • advantages of **using** vector files • **virtual creation** using CAD **Entrepreneurship and Marketing** *Students are expected to know the following:* • **characteristics** of entrepreneurial activity • characteristics of social entrepreneurship in First Nations communities • recognition of a market need and identification of target market • development of a product or service, including its features and benefits • **forms** of advertising and marketing that can influence a potential customer or buyer • differences between consumer **wants** and **needs** • role of money management in financing an idea or developing a product

Learning Standards (continued)

Curricular Competencies	Content
Applied Technologies • Select, and as needed learn about, appropriate tools and technologies to extend their capability to complete a task • Identify the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use • Identify how the land, natural resources, and culture influence the development and use of tools and technologies	**Food Studies** *Students are expected to know the following:* • cross-contamination, including prevention and management • food preparation practices, including elements of a recipe, techniques, and equipment • effects of removing or substituting ingredients, including nutritional profile, food quality, taste • social factors that affect food choices, including eating practices • variety of **eating practices** • local **food systems** • First Peoples food use and how that use has changed over time
	Media Arts *Students are expected to know the following:* • **digital and non-digital** media technologies, their distinguishing characteristics, and their uses, including layout and design, graphics and images, and video production techniques for using images, sounds, and text to represent characterizations and points of view of people, including themselves, as well as settings and ideas • **story principles** and **genre conventions** • media technologies and **techniques** to shape space, time, movement, and lighting within images, sounds, and text for specific purposes • processes for manipulating and testing digital media data • issues in ethical media practices, including cultural appropriation, moral copyright, reproduction, and privacy • **elements** of media arts used to communicate meaning • influences of digital media, including on communication and self-expression

BIG IDEAS

Social, ethical, and sustainability considerations impact design.	Complex tasks require the sequencing of skills.	Complex tasks require different technologies and tools at different stages.

Learning Standards

Curricular Competencies

Students are expected to be able to do the following:

Applied Design

Understanding context

- Engage in a period of **research** and **empathetic observation** in order to understand design opportunities

Defining

- Choose a design opportunity
- Identify potential users and relevant contextual factors
- Identify criteria for success, intended impact, and any **constraints**

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, including social, ethical, and sustainability considerations, to meet community needs for preferred futures
- Choose an idea to pursue, keeping other potentially viable ideas open

Prototyping

- Identify and use **sources of inspiration** and information
- 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

Content

The curriculum is designed to be offered in modules or courses of various lengths. There are more Content learning standards for Grade 9, as schools often offer these as full courses. Schools are required to provide students with the equivalent of a full-year "course" in Applied Design, Skills, and Technologies. This "course" can be made up of one or more of the modules listed below. Schools may choose from among the modules provided in the provincial curriculum or develop new modules that use the Curricular Competencies of Applied Design, Skills, and Technologies 9 with locally developed content. Locally developed modules can be offered in addition to, or instead of, the modules in the provincial curriculum.

Drafting

Students are expected to know the following:

- drafting technique, including dimensioning and standards
- drafting styles, including perspective, mechanical, and architectural
- **CADD/CAM**, **CNC** and 3D printing
- function of models
- **basic** code
- digital **output devices**
- **virtual creation** using CAD/CAM

Learning Standards (continued)

Curricular Competencies	Content
	Metalwork *Students are expected to know the following:* • characteristics and uses of ferrous and non-ferrous metals • metal fastening techniques, including basic **welding** and fabrication practices • metalworking **techniques and processes** using **hand tools** and **power equipment** • elements of plans and drawings • reclamation and repurposing of metals
	Power Technology *Students are expected to know the following:* • uses of power technology • renewable and non-renewable sources of energy • conversion and transmission of energy • **kinetic** and **potential** energy • effect of mass and inertia on speed and distance • role of aerodynamics • effects of **forces** on devices
	Robotics *Students are expected to know the following:* • uses of robotics in local contexts • **types of sensors** • user and autonomous control systems • uses and applications of end effectors • movement- and sensor-based responses • program flow • interpretation and use of schematics for **assembling** circuits • identification and applications of **components** • various **platforms** for robotics programming

Learning Standards (continued)

Curricular Competencies	Content
	Textiles *Students are expected to know the following:* • sources of **textile materials** • hand and machine construction techniques for producing and/or repairing textile items • basic components of patterns and instructions • colour as an element of design • personal factors that influence textile choices, including culture and self-expression, and the impact of those choices on individual and cultural identity
	Woodwork *Students are expected to know the following:* • historical and current contexts of woodworking • identification, characteristics, and properties of a variety of woods, both manufactured and natural • elements of plans and drawings • woodworking **techniques** • **traditional** and **non-traditional** joinery using **hand tools** and **power equipment** • options for **reuse** of wood and wood products

Learning Standards (continued)

Curricular Competencies	Content
Testing • Identify **sources of feedback** • Develop an **appropriate test** of the prototype • Conduct the test, collect and compile data, evaluate data, and decide on changes • Iterate the prototype or abandon the design idea *Making* • Identify and use appropriate tools, **technologies**, materials, and processes for production • Make a step-by-step plan for production and carry it out, making changes as needed • Use materials in ways that minimize waste *Sharing* • Decide on how and with whom to **share** their **product** and processes • Demonstrate their product to potential users, providing a rationale for the selected solution, modifications, and procedures, using appropriate terminology • Critically evaluate the success of their product, and explain how their design ideas contribute to the individual, family, community, and/or environment • Critically reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space • Identify new design issues **Applied Skills** • Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments • Identify the skills and skill levels needed, individually or as a group, in relation to specific projects, and develop and refine them as needed	**Electronics and Robotics** *Students are expected to know the following:* • uses of electronics and robotics • **components** of an electric circuit • ways in which various **electrical components** affect the path of electricity • **Ohm's law** • **platforms** for PCB (printed circuit board) production • basic robot behaviours using **input/output devices**, movement- and sensor-based responses, and microcontrollers • **mechanical devices** for the transfer of mechanical energy • mechanical advantage and power efficiency, including friction, force, and torque • robotics **coding** • various **platforms** for robotics programming **Entrepreneurship and Marketing** *Students are expected to know the following:* • risks and benefits of entrepreneurship • the role of social entrepreneurship in First Nations communities • ways of decreasing production costs through training and technological advancement • flow of goods and services from producers to consumers • **identification** of a good or service that ensures brand recognition • marketing strategies using the 4 Ps: product, price, promotion, and placement • market segmentation by **demographic, geographic, psychographic**, and **purchasing pattern** • evolving consumer needs and wants • role of online technologies in expanding access to goods and services • **sources of financing** for a new venture or start-up business • **measurement** of financial success and failure

Learning Standards (continued)

Curricular Competencies	Content
Applied Technologies • Choose, adapt, and if necessary learn about appropriate tools and technologies to use for tasks • Evaluate the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use • Evaluate how the land, natural resources, and culture influence the development and use of tools and technologies	**Food Studies** *Students are expected to know the following:* • **pathogenic microbes** associated with food-borne illnesses • components of food preparation, including use and adaptations of ingredients, techniques, and equipment • health, economic, and environmental **factors** that influence availability and choice of food in personal, local, and global contexts • **ethical issues** related to food systems • First Peoples traditional food use, including ingredients, harvesting/gathering, storage, preparation, and preservation
	Information and Communications Technologies *Students are expected to know the following:* • **text-based coding** • binary representation of various data types, including text, sound, pictures, video • **drag-and-drop mobile development** • programming **modular components** • development and collaboration in a **cloud-based environment** • design and function of networking hardware and topology, including wired and wireless network router types, switches, hubs, **wireless transfer systems**, and client-server relationships • functions of operating systems, including mobile, open source, and proprietary systems • current and future **impacts** of evolving web standards and cloud-based technologies • **design for the web** • strategies for curating and managing personal digital content, including management, personalization, organization, maintenance, contribution, creation, and publishing of digital content • **relationships** between technology and social change • strategies to manage and maintain **personal learning networks**, including **content consumption and creation** • **keyboarding techniques**

Learning Standards (continued)

Curricular Competencies	Content
	Media Arts *Students are expected to know the following:* • **digital and non-digital** media technologies, their distinguishing characteristics and uses • techniques for organizing ideas to structure information and story through media **conventions** • **media production skills** • **standards-compliant technology** • **ethical, moral, and legal considerations and regulatory issues** • technical and symbolic elements that can be used in storytelling • specific features and purposes of media artworks from the present and the past to explore viewpoints, including those of First Peoples • specific purposes of media use in the social advocacy of First Peoples in Canada • influences of digital media in society
	Metalwork *Students are expected to know the following:* • **basic metallurgy** • range of **uses** of metalwork • **welding** • fabrication **techniques and processes** using **hand tools** and **stationary equipment** • foundry processes, including creating patterns and moulds, and **casting** • recycling and repurposing of materials

Learning Standards (continued)

Curricular Competencies	Content
	Power Technology *Students are expected to know the following:* • energy transmission and applications • efficiency, including energy loss in the form of thermal energy • **thermodynamics** • types of fuels and methods of converting fuels to mechanical energy • alternative energy sources • **small engine systems** • **mechanical measurement devices** • power technology **hand tools** • effects of **forces** on devices • manuals as information sources
	Textiles *Students are expected to know the following:* • natural and manufactured fibres, including their origins, characteristics, uses, and care • strategies for using and **modifying** simple patterns • **elements of design** used in the design of a textile item • **social factors** that influence textile choices and the impact of those choices on local communities • role of textiles in First Peoples cultures
	Woodwork *Students are expected to know the following:* • importance of woodwork in historical and cultural contexts, locally and throughout Canada • identification, characteristics, properties, and uses of wood from various tree species • techniques for adjusting plans and drawings • woodworking **techniques** and **traditional** and **non-traditional** joinery using a variety of tools and equipment, including **stationary power equipment** • the relationship between First Peoples culturally modified trees and the sustainable use of wood • **issues** in the sustainable use of wood