Critical Thinking Curriculum for IDAT

STAGE	SKILL	CODE	OUTCOMES
3-6	**Assumption**	CT1.1	Student can determine if a statement is an assumption or fact based on evidence presented.
	Inferences	CT1.2	Student can assess whether knowledge if sufficient and reliable.
	Interpretation	CT1.3	Student can conclude meaning of processed information
	Deduction	CT1.4	Student can follow one or more factual statements through to a logical conclusion
	Evaluation of Argument	CT1.5	Student can determine value of arguments based upon quality, point of view and evidence presented.
	Critical Analysis	CT2.1	Student can analyse sources and content presented to know value, point of view or quality.
	Critical Reflection	CT2.2	Student can determine personal bias and use logical and abstract information to explain own opinion.
	Critical Expression	CT2.3	Student has mastery of language to present own thoughts and ideas effectively for age/stage of study.

Logic Outcomes

Stage	Code	Outcome
1	L1.1	connect and order number names, numerals and groups of objects using numbers up to two digits
	L1.2	describe and continue patterns
	L1.3	identify quantities such as more, less and the same in everyday comparisons
	L1.4	sequence familiar actions and events using the everyday language of time
2	L1.1	model, represent, order and use numbers up to four digits
	L1.2	visualise, sort, identify and describe symmetry, shapes and angles in the environment
	L1.3	verbal reasoning. Can read and deduce how facts are ascertained
3	L1.1	identify and describe routes and locations, using grid reference systems and directional language such as north or north east
	L1.2	model, represent, order and use numbers up to five digits

	L1.3	solve problems and check calculations using efficient mental and written strategies
	L1.4	create simple financial plans, budgets and cost predictions – AND convert between 12- and 24-hour systems to solve time problems, interpret and use timetables from print and digital sources
4	L1.1	solve complex problems by estimating and calculating using efficient mental, written and digital strategies
	L1.2	compare, order and use positive and negative numbers to solve everyday problems
	L1.3	visualise and describe the proportions of percentages, ratios and rates
	L1.4	Evaluate language and words to find patterns and meaning
5	L1.1	visualise, describe and analyse the way shapes and objects are combined and positioned in the environment for different purposes
	L1.2	evaluate financial plans to support specific financial goals
	L1.3	use 12- and 24-hour systems within a multiple timezone to solve time problems, use large and small timescales in complex contexts and place historical and scientific events on an extended timescale
	L1.4	Logic questions, using nonsense words that prove truths based on statements
6	L1.1	Logic questions using up to five variables elements

	L1.2	Using word order and logic to deduce meaning of nonsense words
	L1.3	Using probability and problem solving to work out logical word problems

Science Outcomes

Outcome		Topics/Context suggestions
3.1	**Explains how food and fibre are produced sustainably in managed environments for health and nutrition.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of sustainable food supplies, farming practices and a nutritional diet. These will be general knowledge questions to show that students understand the importance of local food sources, responsible farming & transportation practices to reduce carbon emissions, and the importance of a diet that minimizes unhealthy additives and chemicals.		- Greenhouse gas emissions and your carbon footprint - Organic farming practices - Processed vs. fresh food
3.2	**Explains the effect of heat on the properties and behaviour of materials.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of the effect of temperature on matter. These will be general knowledge questions to show that students understand conservation of mass, temperatures effect on particle motion and density, and their role in determining a substance's state of matter.		- Law of conservation of matter - States of matter - Particle motion relative to temperature

3.3	Explains how energy is transformed from one form to another.	
Candidates will answer multiple-choice questions to demonstrate their understanding of the various forms of energy. These will be general knowledge questions to show that students understand common forms of energy such as solar, heat, light, magnetic, and electric.		- Thermal energy transfer - Forms of energy - Efficiency of energy transfer (energy loss)
Candidates will answer multiple-choice questions to demonstrate their understanding of how energy is transferred through position and motion. These will be general knowledge questions to show that students understand the energy of motion through potential and kinetic energy.		- Potential energy relative to position - Kinetic energy and motion - Transfer of potential to kinetic energy
4.1	**Investigates a variety of chemical changes.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of atoms and how they interact with other elements. These will be general knowledge questions to show that students understand atomic composition of simple molecules and how to read the periodic table.		- Parts/structure of an atom - Information found in the periodic table - Atomic number and atomic mass
Candidates will answer multiple-choice questions to demonstrate their understanding of chemical change. These will be general knowledge questions to show that students understand atomic bonding and the differences in physical and chemical change of a substance.		- Examples of a physical change - Evidence of a chemical change - Conservation of matter
4.2	**Explores the interactions of living things with each other and the environment.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of the interactions of living things and their relationships to each other. These will be general knowledge questions to show that students understand		- Energy cycle (producer, consumer, decomposer) - Energy pyramid - Classification by food source (herbivore, omnivore, carnivore)

types of interactions like competitive, predatory, and mutually beneficial relationships as well as the role of producers, consumers, and decomposers.	
Candidates will answer multiple-choice questions to demonstrate their understanding of how living things interact with their environment. These will be general knowledge questions to show that students understand various types of ecosystems and habitats and the abiotic factors that influence them, such as rainfall and temperature.	- Abiotic environmental factors - Types of ecosystems - Human impact on ecosystems (climate change)
4.3	**Identifies features of the Earth.**
Candidates will answer multiple-choice questions to demonstrate an understanding of Earth's geological features. These will be general knowledge questions to show that students understand the composition of the planet, various landforms, and the processes that create them (i.e. plate tectonics, volcanoes, weathering).	- Weathering/erosion - Plate Tectonics - Volcanoes - Earth's structure
5.1	**Explains how advances in scientific understanding of processes that occur within and on the Earth influence the choices people make about resource use and management.**
Candidates will answer multiple-choice questions to demonstrate their understanding of Earth's major cycles. These will be general knowledge questions to show that students understand the stages and driving forces of the water cycle, carbon cycle, and where they occur on Earth.	- Water cycle - Earth's spheres (i.e. geo-, hydro-, atmo-, bio-) - Carbon cycle
Candidates will answer multiple-choice questions to demonstrate their understanding of responsible resource use and management. These will be general knowledge questions to show that students understand human's role in altering natural processes and what actions can be taken to mitigate negative consequences.	- Renewable vs. non-renewable energy - Environmental conservation efforts - Greenhouse gas emissions and climate change - Sustainable living

5.2	**Relates the structure and function of living things to their classification, survival and reproduction.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of the classification of living things. These will be general knowledge questions to show that students understand how the evolution of life from shared ancestry has led to our current system for how life is classified.		- Evidence of evolution - Taxonomy - Evolution of the Linnean classification system
Candidates will answer multiple-choice questions to demonstrate their understanding of how the characteristics of various life forms have allowed for their survival. These will be general knowledge questions to show that students understand the factors that may limit a population in an environment and the role mutation plays in adaptation.		- Genetic mutation and evolution - Organism's fitness/survival (adaptation) - Population dynamics (i.e. carrying capacity, limiting resources)
5.3	**Applies models, theories, and laws to explain situations involving energy, force, and motion.**	

Candidates will answer multiple-choice questions to demonstrate their understanding of the changes and transfer of energy. These will be general knowledge questions to show that students understand that system components can include thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.		- Types of energy and their factors
		  ○ Potential Energy = mgh
		  ○ Kinetic Energy = 1/2 m v^2
		- Efficiency of energy transfer systems
		- Laws of thermodynamics

Candidates will answer multiple-choice questions to demonstrate their understanding of forces and interactions. These will be general knowledge questions to show that students understand the theories of force and motion through Newton's laws of motion and Coulomb's Law to predict forces between objects.		- Coulomb's law of magnetism - Newton's laws of motion - Newton's Momentum Conservation Principle
6.1	**Develop knowledge and understanding of the structure and function of organisms and develop knowledge and understanding of heredity and genetic technologies.**	

Candidates will answer multiple-choice questions to demonstrate their understanding of cellular structure and function of organisms. These will be general knowledge questions to show that students understand the various components and stages of cellular reproduction, including the central dogma of molecular biology.	- Central dogma of molecular biology - Components of genetic transfer - Translation vs. Transcription
Candidates will answer multiple-choice questions to demonstrate their understanding of the structures and systems of organisms. These will be general knowledge questions to show that students understand the hierarchical organization of interacting systems that provide specific functions within multicellular organisms, including types of organic molecules.	- Role of basic human systems (Circulatory, respiratory, digestive, nervous, muscular, endocrine) - Types of organic molecules (carbohydrates, lipids, proteins and nucleic acids) - Cellular respiration
6.2	**Develop knowledge and understanding of the fundamentals of chemistry and develop knowledge and understanding of equilibrium and acid reactions.**
Candidates will answer multiple-choice questions to demonstrate their understanding of the fundamentals of chemistry and chemical reaction systems. These will be general knowledge questions to show that students understand major types of chemical reactions, their reactants and products, and what reactions will occur based on the outermost electron states of atoms.	- Types of bonds (ionic vs. covalent) - Stoichiometry - Types of reactions (i.e. displacement, synthesis, decomposition, combustion)
Candidates will answer multiple-choice questions to demonstrate their understanding of acids and bases. These will be general knowledge questions to show that students understand the components and characteristics of the acid-base (neutralization) reaction.	- Strong vs. weak acids and bases - Reactants acid-base reactions - Products of acid-base reactions
6.3	**Develop knowledge and understanding of advanced mechanics and electromagnetism.**
Candidates will answer multiple-choice questions to demonstrate their understanding of the electromagnetic spectrum. These will be general knowledge	- Parts of wave - Energy of a wave

questions to show that students understand the parts of a wave and how they influence the energy of that wave.	- Electromagnetic spectrum
Candidates will answer multiple-choice questions to demonstrate their understanding of quantum mechanics and special relativity. These will be general knowledge questions to show that students understand key concepts such as the nature of light, photoelectric effect, and subatomic physics principles.	- Subatomic particles - Behaviour of photons (i.e. photoelectric Effect) - Wave-particle duality

Technology Outcomes

Outcome		Topics/Context suggestions
3.1	**To understand characteristics and properties of a range of materials, systems, components, tools, and equipment and evaluate the impact of their use.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of how technology tools are used to visually communicate data and information. These will be general knowledge questions to show that students understand basic data tables and simple graphs like bar, line, and pie.		- Types of graphs (line, bar, pie) - Reading data tables - Labelling graphs
Candidates will answer multiple-choice questions to demonstrate their understanding of different features of user interfaces that allow people to access information regardless of culture or language. These will be general knowledge questions to show that students understand consistent icon and symbol design and placement to reduce frustration for users.		- Examples of user interface - Common icon use (i.e. exit, zoom, download, volume, power off, reload)

3.2	**To understand the value of sources and reliability of information on the internet. To be able to protect privacy in computer usage.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of the reliability of information they find online. These will be general knowledge questions to show that students understand characteristics of reliable information sources, including types of domain names.		- Types of domains - How to check reliable sources - Common sources that you should or shouldn't cite
Candidates will answer multiple-choice questions to demonstrate their understanding of common best practices for online safety and privacy, and the creation of their digital footprint. These will be general knowledge questions to show that students understand how to access multiple personal accounts and explain possible risks such as password re-use, phishing, and malware.		- Parts of a digital footprint - Characteristics of a secure password - Online security concerns (i.e. phishing, malware)
4.1	**To identify the legal obligations regarding the ownership and use of digital products and apply some referencing conventions.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of ownership and use of digital products. These will be general knowledge questions to show that students understand referencing conventions and basic citation.		- Importance of references - Plagiarism - When to reference a website
Candidates will answer multiple-choice questions to demonstrate their understanding of use of information found online. These will be general knowledge questions to show that students understand basic citation via the use of quotation marks.		- When to use citations - How to cite a source using quotes
4.2	**To use ICT effectively to record ideas, represent thinking and plan solutions.**	
Candidates will answer multiple-choice questions to demonstrate their understanding of word processors and their use in recording and communicating ideas. These will be general knowledge questions to show that students understand		- Common examples of word processors - Word processor shared tool bar features - Formatting tools (i.e. font size, paragraph alignment, bullets)

basic functions of a word processor, including recognizing common icons, familiarization with the tool bar, and some basic formatting functions.	
Candidates will answer multiple-choice questions to demonstrate their understanding of various file types and their purpose. These will be general knowledge questions to show that students understand common files they will work with, such as .pdf, .jpeg, .doc, and mp3.	- Names of different file types - What different file types are used for
5.1	**To identify and value the rights to identity, privacy and emotional safety for themselves and others when using ICT and apply generally accepted social protocols when using ICT to collaborate with local and global communities**
Candidates will answer multiple-choice questions to demonstrate their understanding of the rights to identity, privacy and safety when using technology. These will be general knowledge questions to show that students understand tools to protect your privacy and information, including the use of firewalls, vpns, and access control.	- What is a VPN - What is a firewall - Examples of access control
Candidates will answer multiple-choice questions to demonstrate their understanding of tools to collaborate with local and global communities. These will be general knowledge questions to show that students understand emerging digital tools and advanced features to create and communicate interactive content for a diverse audience, such as accessibility tools and features like read aloud, zoom, closed captions, and alt text.	- Assistive technology - Examples of software accessibility features - Equal access and accessibility requirements online
5.2	**To use appropriate ICT to collaboratively generate ideas and develop plans.**
Candidates will answer multiple-choice questions to demonstrate their understanding of modern tools for collaboration. These will be general knowledge questions to show that students understand cloud technology and its benefits, as well as common cloud services.	- What is cloud computing - Examples of common cloud services - Uses of the cloud

Candidates will answer multiple-choice questions to demonstrate their understanding of modern tools for collaboration. These will be general knowledge questions to show that students understand general best practices and functions of video conferencing solutions (like Microsoft Teams and Zoom).	- Common examples of video conferencing solutions - Features of video conferencing software (i.e. share screen, mute, chat) - Best practices when using video conferencing
6.1	**To explain how technology products and services are used to find modern solutions with consideration of preferred futures and the impact of emerging technologies on design decisions, as well as the understanding of the interrelationship of design, technology, society, and the environment.**
Candidates will answer multiple-choice questions to demonstrate their understanding of the role of technology in the interrelationship of society, industry and the environment. These will be general knowledge questions to show that students understand emerging technologies and the impact they have on modern life, such as automation, artificial intelligence, and microchips.	- Microchip uses - Artificial intelligence - Automation of manufacturing
Candidates will answer multiple-choice questions to demonstrate their understanding of how products and services have changed to address environmental and cultural concerns. These will be general knowledge questions to show that students understand the environmental impact of increased technology use, as well as the process to find modern solutions (design criteria).	- Environmental impact of technology - Using technology to solve real-world problems - Design criteria for finding solutions
6.2	**To understand the characteristics and uses of traditional and emerging computing devices, systems, and networks and their evolution in creating access to complex digital solutions, multimodal creative outputs, and data transformations for a range of audiences and purposes.**
Candidates will answer multiple-choice questions to demonstrate their understanding of how technology has been modified as a solution to meet the increased computing and network demands of emerging technologies. These will be general knowledge questions to show that students understand the evolution of networks and computing power and the factors that impact their speed.	- Types of transmission media (guided vs. unguided) - Examples of guided transmission (i.e. fiber optics, ethernet) - Factors that affect computer speed - Units of memory size

Candidates will answer multiple-choice questions to demonstrate their understanding of the primary software and hardware components of common digital systems and their function. These will be general knowledge questions to show that students understand hardware components (e.g. memory, CPU, motherboard, hard drive), as well as basics of the software that runs them.	- Identification of hardware components and their purpose - Common software and programs - Basic coding (algorithm, binary)