2015 NCEA Assessment Report

Technology Level 1 91048, 91049, 91050, 91053, 91070, 91074

Report on standards

1. Assessment Report for 91048: Demonstrate understanding of how technological modelling supports decision-making

Achieved	Candidates who were assessed as Achieved commonly: • used their own words • identified a technological outcome that had been developed as a result of technological modelling • identified some aspects of technological modelling (functional and/or prototyping) that they had independently undertaken during the development and trialling of their outcome • stated the specific evidence they had gathered as a result of modelling • showed links between the selected method of modelling, the specific evidence gathered and the resulting decision that informed the development of the outcome • made some decisions regarding technical feasibility as a result of the modelling • provided evidence from their portfolios to support their decision making.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • wrote in generic terms about modelling that did not relate to a technological outcome • used a case study only and struggled to identify the evidence as a result of modelling • identified the advantages/disadvantages of different modelling methods in general terms without showing any relevance specific modelling • did not identify a technological outcome • provided illegible reports and extracts • tracked the product development process of “what they did” • Wrote about multiple technological outcomes with no logical links • only identified the modelling used • followed set questions or templates that constrained their responses and in some cases were irrelevant to the standard • explained or discussed risks without meeting the other achieved criteria.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • explained why each form of modelling (functional and prototyping) used had been selected in relation to the developing outcome • provided evidence of modelling that was relevant to the developing outcome • explained how the modelling evidence enabled key decisions to be made in relation to the technical feasibility (how to make it happen and how is it happening) of the outcome and/or • explained how the modelling evidence enabled decisions in relation to the social acceptability (should it be happening) in terms of the social and physical environment) of the outcome.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • provided evidence of understanding both functional modelling and prototyping by discussing the purpose of the selected form of modelling at the particular stage in the development of the outcome • discussed how the evidence gained from modelling identified potential risks and how subsequent decisions enabled the risk to be managed • provided discussion using practical and functional reasoning to determine fitness for purpose • discussion throughout the report included consideration of technical feasibility and

	social acceptability • referred to a case study to support their technological modelling.
Standard specific comments	Candidates whose reports addressed all of the criteria were able to achieve with merit or excellence. These candidates identified the modelling, the evidence produced, and the following decisions as a base for discussing how purposive modelling had produced the required evidence to allow consideration of what could and should happen so as to support decisions about risk in developing a technological outcome. Candidates who targeted technical feasibility, social acceptability and risk management without having presented specific evidence resulting from specific modelling leading to specific decisions supporting a specific next step often did not show a convincing understanding of modelling. This weakness in candidate reports often reduced judgements to not achieved or low achieved. Candidates who were awarded an achieved grade provided a wide range of evidence in their reports. Some reports just met the minimum criteria and others provided full reports but were unable to gain a merit grade due to a lack of consideration of either technical feasibility or social acceptability. Reports that reflected upon an individual candidate's experience of technological modelling tended to achieve higher grades than reports based upon generic resources provided to a whole group. The supporting evidence provided by candidates was often decisive for determining a level of understanding and therefore the grade. Candidates who presented illegible scanned work or reports without indicative headings and labelled photographs were disadvantaged. In general there was an improvement in the quality of reports this year. Most candidates presented well-structured reports within the 10 page limit.

2. Assessment Report for 91049: Demonstrate understanding of how materials enable technological products to function

Achieved	Candidates who were assessed as Achieved commonly: • wrote their report based around their own technological experiences in working with specific material/s for a technological outcome. • described the composition and structure of at least one material. • identified the performance properties of their chosen material/s. • described how their chosen material/s were able to be manipulated due to the composition and structure of the material/s, e.g. easy to machine, easy to dye etc. • explained how they manipulated the chosen material/s to allow their technology product to function.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • presented information which did not clearly identify either composition or structure of a material, or did not identify any performance properties of their chosen material. • explained the construction of their project and limited information on the materials they used • presented limited or no evidence describing how composition and structure of their chosen material allowed the material to be manipulated • presented limited or no evidence explaining how the chosen material has been manipulated to allow their product to function • focused on a number of materials, e.g. all the types of flour or sugar instead of one; all the materials in bread etc., but did not present evidence of explaining how the composition and structure determine the performance properties or how the composition and structure determine how the materials can be manipulated.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • presented evidence of interaction between their research of material/s and their use in their own work • presented evidence explaining how the material/s composition and structure

	determines the performance properties • presented evidence explaining how the material/s composition and structure determines the ways the materials can be manipulated • compared the composition, structure and performance properties of different materials and made decisions based around these comparisons.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • based their report upon their experiences with materials used with a product they developed • compared the composition, structure and performance properties of different materials discussing in depth how the composition and structure of the different types of materials enables the product to function in different ways • presented evidence that compared and contrasted materials to predict changes to products as a result of the composition and structure and manipulation of materials • concentrated on one or two materials allowing them to research and write a more in-depth report.
Standard specific comments	Candidates who reported upon materials they had been able to work with in constructing a product appeared to have been advantaged.

3. Assessment Report for 91050: Demonstrate understanding of the role of subsystems in technological systems

Achieved	Candidates who were assessed as Achieved commonly: • selected at least one technological system • identified at least two subsystems within the technological system • described the roles of at least two subsystems within a system • described using accurate technical terms how these subsystems worked together to make the overall system function.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • misunderstood what a subsystem is referring to components as subsystems e.g. LEDs, resistors and capacitors • submitted lengthy explanations of how their own circuit worked at a component level but did not identify the subsystems within their system • identified subsystems but did not describe the roles of the subsystems • did not relate how the various subsystems they described worked together to achieve the objective of the system • gave inaccurate, vague or general descriptions of subsystems within a systems • often used incorrect terminology about systems • described non-technological systems such as biological, managerial or organisational systems
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • explained how specific control functions were performed between various subsystems in a technological system • had a correct understanding of feedback and explained how control information was taken from an output subsystem back to an input subsystem to control, adjust or regulate the behaviour of the system • explained at least two advantages and two disadvantages of at least one subsystem within the technological system.

Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • discussed both advantages and disadvantages of at least one subsystem within a particular technological system through comparisons or by evaluating specific decisions made by technologists • discussed all three aspects of design, development, and maintenance decisions made by technologists regarding subsystems and their implications on a particular technological system.
Standard specific comments	Candidates were required to demonstrate their understanding of the role of subsystems in technological systems. Candidates chose from a number of alternatives and wrote reports that communicated their understanding often using diagrams or pictures to assist their explanations. Candidates who based their reports upon existing, rather than their own electronic, systems generally did better because many candidates own practice seldom included the aspects of systems required to meet the standard. Where candidates used their own electronic circuits as the basis for their report, in many cases, their circuits contained no feedback path and so the candidate could gain no higher than an achieved. A significant number of candidates limited their report to only the achieved criteria and did not attempt to explain feedback or control within a technological system. A significant number of candidates failed to gain merit or higher grades as they incorrectly referred to looping constructs within their program code as feedback paths in a system. A number of candidates failed to gain merit or excellence grades as their explanations of feedback, and in some cases control, were incorrect. Feedback in technological systems does not include how the system gives information about its operation to users of the system; feedback is a self-regulating feature of technological systems and occurs without human interaction.

4. Assessment Report for 91053: Demonstrate understanding of design elements

Achieved	Candidates who were assessed as Achieved commonly: • described the relevant design elements within an outcome they had designed • included some personal voice, although evidence was often limited with limited detail • described design elements appropriate to the outcome(s) and how they affected the quality of the outcome(s) • selected simplistic outcomes such as a basic web home page, banner advertisement or magazine cover, which restricted their opportunity to explain the considerations used to decide the design quality of an outcome • used generic/prescribed design elements that were often not the most obvious or important within their specified context • limited their analysis to the aesthetic elements of design and did not fully explore the functional considerations • identified and described design elements within a chosen context which demonstrated an understanding of design elements.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • did not provide an image, screen dump or printout of the outcome they were describing; or, to a lesser extent, provided black and white images when colour was being discussed • described poorly designed outcomes which did not give them enough scope to demonstrate understanding of design elements • provided in-depth description of individual design elements but only identified them

	within their specified context • described the design element and how the outcome demonstrated the design element, but did not explain how it improved the outcome's quality • used bullet points to identify, rather than describe, the use of design elements • reproduced information in a cut-and-paste form and did not relate the design elements to their specified context.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • identified, described and explained the application of design elements within the chosen context, which demonstrated an in-depth understanding • supported discussion with imagery and/or screen snips of their developing ideas (often with arrows and text boxes highlighting aspects of concepts or outcomes) • often compared and contrasted existing products with their own outcomes which enabled in-depth discussion on the quality of the design(s) and underpinning design elements • explained the 'how' and 'why' of the design elements considered in relation to the design quality within the chosen context.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • demonstrated independent research, design, and on-going and reflective analysis within their practice • compared, contrasted and evaluated the application of design elements in different Technological Outcomes and explored what underpinned the application of these design elements • showed accurate and comprehensive understanding of design elements and how and why they contributed to the quality of outcome/s in their specified context • discussed how and why design elements contributed to their own outcome • stated how the use of one design element impacted on the effectiveness of other design elements and explored options and compromises.
Standard specific comments	Candidates increasingly integrated evidence from Technological Practice into the report which has resulted in a greater diversity of evidence, a wider range of essay structures and increased personal voice within the student-generated evidence. Candidates who restricted their evidence to a limited, and often prescribed, range of design elements were often unable to advance beyond Achievement. Candidates working within a prescribed range often produced evidence for the same design element. Other candidates working with the same material selected and reflected upon relevant design elements within each image and provided the broad and in-depth understanding of design elements required for Merit. Candidates who gained Achievement carefully managed the number of design elements and Technological Outcomes utilised within a submission. By commenting on a large number of different Technological Outcomes, candidates often could not demonstrate comprehensive understanding. A common successful report structure involved analysing existing products and using this information to inform practice. The application of design elements as part of the development of a technological outcome promoted personal voice and encouraged discussion and higher order thinking promoting Achievement at higher levels. Some candidates gained excellence without the reference to their own Technological Practice, but many candidates who appeared to have attempted this often did not discuss how design decisions had been influenced by the application of design elements. The majority of candidates appear to have responded to the changes in the

	specifications by targeting the assessment criteria to a greater extent. In addition, they commonly reduced the historically prevalent, often cut-and-paste, preamble Candidates who produced 3-4 pages of 'background noise' prior to commencing the narrative of their specified context often did not successfully produce the required evidence for the standard.

5. Assessment Report for 91070: Demonstrate understanding of basic concepts of information management

Achieved	Candidates who were assessed as Achieved commonly: • identified and described at least 2–3 features of an operating system • chose at least two applications they had used during the year and described at least 2–3 features of each application • wrote about one application only but the description of features was comprehensive and some with purposes or justification • explained the general purpose of an application (e.g. "Photoshop is used to create and edit digital images") but not the purposes of key features • covered 2–3 elements required for file management with basic understanding, such as file naming conventions, folder structuring, file compression, and/or managing data threats • showed basic understanding of at least 2–3 ethical issues, such as copyright, privacy, file security and/or appropriateness of material in context • demonstrated understanding in their own words and referred to their own practice but the description lacked depth or purpose (the "why" element) • showed minimum understanding on one of the four standard criteria (key features of operating systems, key features of common applications, file management and ethical issues in relation to information management) but the overall report included strong evidence of understanding in the other three sections • used screenshots to support the description and to provide evidence of their own practice and genuine understanding of the content.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • provided work that was clearly copied and pasted • showed little evidence of their own understanding or practice (lack of "I" statements) • substituted written work and relied entirely on screenshots (no annotation) to demonstrate their knowledge • wrote about their practice during the year (which internals they had done and what was involved in each internal), not relating the content to the requirements of this standard • missed one or more of the four standard criteria and other areas were too weak to compensate • listed key features of operating systems or applications without further description or the description was very brief (eg one short sentence) • provided general and brief description of a list of application software without any key features or use in their own practice • provided insufficient evidence for file management. They usually stated the purpose of file management briefly ("…to keep my work organised") but did not go into details of how they structured folders for school work or what guidelines were followed when naming files. Screenshots were too small to be useful. Annotation of screenshots was either missing or showed minimum understanding ("this is my digital folder") • described ethical issues such as the copyright law or the privacy act using information solely from external sources, without reference to their own practice.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • explained the purposes of an operating system in terms of how the operating system helps them with everyday use of the computer, such as utilising the peripherals (inputs and outputs), managing system resources to maximise the performance of

	applications, managing files and security, etc • were able to relate key features of applications to work they had produced during the year and explained why those features were used in their own work • showed in-depth understanding of application features. For example, the Spellcheck tool in Word checks spelling using a built-in dictionary. Words that are not in the dictionary are considered to be spelt wrong. New words can be added to the dictionary to improve its efficiency. Proofreading is necessary because the tool does not pick up words used in the wrong context • provided legible screenshots of their folder structure at school and explained the use of each main folder (what goes in that folder), and the importance of storing files in the right places • made their own decisions on how to name their files and folders, which enabled them to write about why they had chosen their naming conventions • described file compression techniques (zipping for quick and easy transfer of data, and/or converting file types such as from .psd to .jpg for faster uploads on website) and explained where and why compression was implemented in their work • described a variety of ways that their data could be threatened and steps they had taken to mitigate or minimise the threats, either at home or at school. Threats chosen for discussion were relevant to their personal experiences rather than from textbooks. It was evident that they knew how to put theory they had been taught into their own everyday practice • compared a range of storage devices and wrote about how they used these devices for different purposes (such as USB for portability, cloud storage for easy access to school work, external hard drive for backup) • described at least 2–3 ethical issues with reference to their own practice. They were able to give specific examples of what they did or did not do. Where only two issues were covered, the description included sufficient details to show deeper understanding of each issue • did not attempt the three Excellence criteria (interaction between applications and operating systems, justification of application software choices, as well as comparing and contrasting file types) • may have covered aspects of Excellence criteria but lacked the depth required or close reference to their own work. For example, many candidates chose the process of printing a document to illustrate the relationship between applications and operating systems, but the discussion was superficial or insufficient to judge student understanding. Some candidates listed a range of common file types but the discussion was in isolation from each other (eg “I used .xlsx to save Excel files, .ai to save Illustrator files which are vector graphics”) • demonstrated in-depth understanding by providing examples from their own work and using statements like “I did this because …” or “this is helpful because …”
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • showed comprehensive understanding of all four aspects of the achievement criteria. For example, when discussing features of application software, they chose distinguishing features which relate closely to the purpose of the application software (such as styles in Word, selection tools in Photoshop) or compared features with alternatives • addressed all three criteria for the Excellence grade • explained the interaction between applications and operating systems through personalised examples which showed clear understanding of what was happening in the process • had experience with using different application software for creating similar tasks and therefore gave genuine justification of why they chose a particular application over another for a particular task • based their justification of application software choice on the needs of a particular task and features available in the software, rather than their personal preference or accessibility of the software, such as “I am familiar with …” or “… is already installed on the school computers” • compared the purposes of different file types and justified the use of a particular file type for a particular task. This could be done by saving a file as different file types and looking at the consequences different file types had and which type was most suitable for the task

	• referred to their own practice throughout the report and annotated screenshots from their own work to demonstrate understanding.
Standard specific comments	Reports that were well laid out and formatted with headings and clearly defined sections assisted markers to find the required evidence. Many candidates started the report with irrelevant descriptions of internal assessments completed during the year. These descriptions often did not relate to any element of the standard. Candidates who focused upon the criteria achieved at a higher level. Many candidates either did not reference or referenced incorrectly. They added inline references when they were clearly talking about their own work. Many used references without putting quotation marks around the referenced text. It was difficult for the marker to decide where a reference started or ended. Screenshots should be legible and annotated. Screenshots that were too small to read were useless. Screenshots with no annotation or reference in the report were not helpful. Candidates who presented screenshots closely related to the content in of report achieved at a higher level than candidates who used screenshots instead of written content. Candidates continue to struggle with understanding of operating systems and how they interact with application software. Candidates often disadvantaged themselves when they: • described or compared a large number of operating systems • described or compared each upgrade of the same system (e.g. Windows 7, 8 or 10) described and compared different types of operating systems (e.g. single or multi-task, single or multi-user systems). • justified their choice of operating system for school work. At the Achieved level, candidates were successful when they described the key features of one operating system they are familiar with, for example, Windows 8. At Merit level, candidates also explained the general purposes of operating systems and purposes of key features. Candidates who discussed a large number of the applications they used in their work often disadvantaged themselves. Candidates who referred to two or three applications and discussed features in depth often did much better. Candidates who simply listed the features/tools used in an application were disadvantaged; candidates who produced a developed description of a feature (3–4 sentences) did better. Discussing features in relation to the candidate's own work often showed better understanding than writing about the features in general terms. The reports of candidates who took screenshots of the toolbars in each application and described the function of icons on the toolbar were often not convincing because the features were described without any context that showed understanding. Candidates who were able to engage in a discussion relating to the difference between web-based apps (including tablet and phone use) and PC based easily accessed the Excellence criteria. The file management section was generally done better than other sections. Most candidates could describe their file management procedures, file compression techniques and how they managed common data threats, as well as the purpose of each. Some candidates could not distinguish between files and folders. File naming conventions were often not discussed in detail. Candidates who succeeded at the Excellence grade often compared different file types for similar outcomes, such as comparing jpg, gif, png, and psd for image files. These reports often compared and or contrasted file types in relation to the specifications of an outcome, for example the dimension, quality, or intended use of the image. These reports also often related to an internal project (web design or print media). Unsuccessful reports often contained a long list of different file types and described each type briefly and individually. Candidates showed a number of misunderstandings in the ethics section. Some candidates did not understand that the copyright symbol only serves as a reminder. It is not required for copyright. Therefore, they should not assume that images without the copyright symbol are free to use. Some candidates discussed the privacy issue in relation to their personal information only, usually in the context of social media, such as changing the privacy settings on

	Facebook or not posting their own personal information online. These candidates often failed to discuss how to handle private information, especially the information of others in a digital outcome. One of the ethical issues listed in the explanatory notes of the standard is file security. Many candidates confused it with managing data threats in the file management section. Candidates received better grades when they reported upon securing files containing sensitive and/or personal information, the consequences and legal/moral implications if such data were hacked or leaked, rather than keeping the files clean from viruses. Reports that related to personal practice (how the candidate acted ethically when managing digital information) often achieved higher grades than generic reports. General comments on ethical issues were not helpful. Candidates often demonstrated a lack of understanding when discussing the importance of adhering to copyright and acknowledging sources while their reports contained unreferenced and unacknowledged copyright materials. As a matter of privacy candidates should be encouraged not to use their name or the name of their school in their reports.

6. Assessment Report for 91074: Demonstrate understanding of basic concepts from computer science

Achieved	Candidates who were assessed as Achieved commonly: • used their own words • used personal pronouns • described sorting, searching, programming and experiments that they had done in class • wrote paragraphs to explain images • reported on where the data for tables and graphs had come from.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • did not attempt all three concepts • filled in templates with short answers • used technical words such as “abstraction” without explaining them • wrote under supplied numbering systems or headings without explaining what they were talking about • attempted to compare and contrast without describing the underlying concepts eg comparing two search algorithms without articulating the cost of a task, comparing two devices without describing the role of a user interface.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • developed explanations within an easily recognisable explanation framework • covered all three concepts in some depth, or two convincingly with one lighter • explained their own experiences with algorithms, programming languages and user interfaces.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • talked about similarities and differences in their comparisons • drew conclusions from their comparisons • justified their opinions.
Standard specific comments	There were a wide range of reports within the achieved grade. Reports that gained Merit or Excellence were concentrated within a narrower qualitative range. Reports could be uneven in their treatment of the three concepts. Some understanding of each concept was required. In general, the user interface concept was done best, with the programming languages concept being weakest. Candidates who were attempting to write from their own experiences were often disadvantaged by prescriptive templates and scaffolding. Candidates were generally more successful when they: • described an experiment they had done rather than re-worded theoretical material • explained the origin of data in tables and graphs • annotated and explained screenshots.

Candidates, who punctuated, capitalised, used a spell checker effectively, and developed headings and sub-headings tended to communicate effectively. Many candidates inserted hyperlinks in their reports, seemingly unaware that these would be of no value to the marker.

Candidates who acknowledged at the point of insertion graphics and text sourced from the Internet or teachers were advantaged. Candidates who relied upon colour based information but printed in black and white were disadvantaged. Very few candidates disadvantaged themselves by exceeding the 10 page limit. Candidates who printed double sided were sometimes disadvantaged by the poor quality print output. Generally candidates who met all requirements of specifications had better outcomes than candidates who did not meet all of the requirements.

Common confusions that disadvantaged candidate.

1. The differences between a programming language and a program.
2. The distinctions between algorithms and programs.
3. The distinctions between a collection of algorithms and a programme.
4. Low level languages are not the same as converting text into binary.
5. Assembler is a valid example of translating computer languages, it is not a valid way of translating a high level language into a machine language.
6. HTML and CSS are not programming languages they are mark-up languages.
7. MIPS can be useful for showing understanding of low level languages, but is not useful as a way of translating high level languages.
8. Translation from low level languages to high level languages does not address the Excellence part of the programming languages concept. Neither does translating between high level languages.
9. Features of devices rather than factors of usability.

Reports were more convincing when they described a sorting or searching task they had actually undertaken. Candidates who discussed algorithms for tasks other than searching or sorting struggled to determine a meaningful cost. When working out the cost of an algorithm on a small sample size, number of comparisons was a better measure than time taken to complete the algorithm. The number of steps in an algorithm does not necessarily affect its efficiency as a sorting or searching algorithm.

Candidates who attempted to describe, explain compare and contrast different generations of languages often failed to address the key differences between high and low level languages. GameMaker was often a useful environment to demonstrate the difference between interpreting and compiling as a means of translation from a high level language to a low level language, especially because it allowed candidates to do both processes for themselves.

Candidates were required to explain and discuss interfaces to a computer or electronic system. For excellence, the interfaces compared needed to be for related interfaces. It was often not helpful for candidates to evaluate the usability of an interface they had developed as the evaluation was often not objective.