

**Subject:** Technology

**Level:** 3

**Standards:** 91612, 91613, 91614, 91617

## Part B: Report on standards

### 91612: Demonstrate understanding of how technological modelling supports technological development and implementation

#### Observations

Candidates are expected to identify their context early to provide coherence in their report. If case studies are used, these need to be relatable to the modelling in the report otherwise they confuse rather than reinforce the candidate's submission.

Competing and contestable factors must be the focus of the modelling to enable defensible decisions to be made. Discussion of competing factors should show evidence of how and why they are competing and how they impacted candidates' projects. Generally, the functional modelling section was far stronger than prototyping. It is important to explain and justify decisions in prototyping properly.

A number of submissions (mainly digital biased) tended to prototype individual components rather than a complete prototype outcome. This was accepted but prototyping needs to include in-situ of the prototype.

Candidates should adhere to the report specifications of 10 pages, size 12 font and 25mm borders. Where small font /stretched borders and/or additional pages have been used, then the equity and validity of the entirety of the report are questionable at level 3 and marking will stop at the specified page length. Templating at level 3 should be minimal so that the submitted report is an accurate representation of the candidate's knowledge and as such candidates using templates are not able to demonstrate comprehensive understanding in their report.

Use of images of portfolio work should be used sparingly. Some candidates tried to place many images of modelling which were too small to read. Images must also be relevant to the report.

#### Grade awarding

Candidates who were awarded **Achievement** commonly:

- differentiated between functional modelling and prototyping
- explained competing and contestable factors
- explained how their modelling influenced their decision making during the making and implementation of an outcome.

Candidates whose work was assessed as **Not Achieved** commonly:

- did not explain or explained superficially how modelling informed their decision making for an outcome

- described some modelling undertaken but either did not mention or mentioned minimal evidence of competing and contestable factors
- included sketches, diagrams, photos, or screenshots of modelling but did not refer to these to help explain modelling choices
- described technological modelling without identifying how it was used to address competing and / or contestable factors in relation to their outcome
- explained how modelling can manage and mitigate risk in technological development without explaining, or often even mentioning contestable and competing factors.

Candidates who were awarded **Achievement with Merit** commonly:

- provided detail about how relevant competing and contestable factors were addressed by technological modelling
- explained the changes that took place during the development stage of their technological outcome due to the results from functional modelling
- reflected on what was changed in their development due to prototyping.

Candidates who were awarded **Achievement with Excellence** commonly:

- discussed comprehensively and reflectively how technological modelling can be used to defend and validate decisions made during their own technological development at certain stages
- displayed with clarity how key factors were resolved through evidence gained from modelling processes and a clear understanding of the difference between competing and contestable factors
- presented reports that were well-organised and structured.

## 91613: Demonstrate understanding of material development

### Observations

Candidates who produced a clear structure were better enabled to provide evidence of their learning – for example candidates who based their headings on the assessment criteria. Writing a report based on workshop experiences alone was not enough to meet this Achievement Standard. These tended to be an outline of the finishes applied to the product to enhance appearance, e.g. paint on a wooden stool could be applied to “make it look better”.

### Grade awarding

Candidates who were awarded **Achievement** commonly:

- described a relevant material and how it is produced along with its properties
- related a material to a range of products or product in terms of how the material affects the performance of said products
- described how the material affected the disposal and maintenance of a product or products.
- structured the report in a way that showed a clear understanding of either a product they knew about or an experience with a product related to a candidate's personal practice
- described how a material could improve or enhance the performance of a product(s) in relation to the properties of the material.

Candidates who were awarded **Not Achieved** commonly:

- focused on only the material or a product without providing a connection between the two
- compared a material with another material (e.g. Carbon Fibre with Aluminium) - this is not part of this assessment
- did not describe the processes on how a material was developed, for example just described different versions of sugar and not the processes in sugar refinement
- related the report to an internal construction standard only and not addressing the performance criteria for this standard
- focused on the history of a product or material only
- gave no references to provide evidence of research
- focused on manufacturing processes or tools and equipment rather than the material itself. For example, a report was submitted focusing purely on different router tool bits
- focused on the environment aspects of a material being produced rather than the implications of the disposal of a product / material.

Candidates who were awarded **Achievement with Merit** commonly:

- produced a well-structured report with headings that related to the context and criteria of this standard
- explained in detail and with obvious references how a material enhanced the performance of one specific product – for example how spandex interlinks with other materials to improve the performance of a swimsuit
- linked to the scientific aspects of materials and how that integrates with a product in terms of its enhanced performance
- analysed and explained specific material enhancements with reference to the assessment criteria – design, development, maintenance and disposal
- described how the properties of a material integrated with the function of a product
- used their own language from a piece of research to show an in depth understanding.

Candidates who were awarded **Achievement with Excellence** commonly:

- synthesised their own research and constructed a well-structured report using their own language based on the research
  - provided references throughout the report when discussing or explaining a product and / or material
  - used scientific and technological terms when explaining in detail how a material is developed from its raw state or combined with another component / material to enhance a product
  - discussed how a material enhanced a further process on a product, e.g. digital printing on a spandex enhanced clothing item
  - clearly and scientifically explained how enhancements and developments of a material have had a direct impact on enhancing the performance of a product
  - covered in detail and explained how the material influenced all aspects of the product through its design process leading to the disposal
  - discussed their own opinion on further enhancement of a product based on material development whilst relating this to referenced research.
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# 2022 NCEA Assessment Report



Mana Tohu Mātauranga o Aotearoa  
New Zealand Qualifications Authority

## 91614 Demonstrate understanding of operational parameters in complex and highly complex systems.

Candidates who were awarded **Achieved** commonly:

- identified and explained one or more concepts that lead to the establishment of operational parameters (e.g., concept of optimum ambient temperature for humans)
- provided an example of a highly complex system and identified the operational parameters within this system as a measurable range of values (e.g. 10°C minimum - 25°C maximum temperature in an air conditioning system)
- explained the implications that these concepts had on the design as well as the development of the system provided an accurate explanation of how the operational parameters allow the system to function
- provided an accurate explanation of how the operational parameters enable maintenance in the system – maintenance is clearly linked to operational parameters
- identified a highly complex system that is self-regulating and / or intelligent as well as the operational parameters associated with this highly complex system
- explained social factors that influenced the establishment of the operational parameters in a highly complex system
- explained technical factors that influenced the establishment of the operational parameters in a highly complex system.

Candidates who were assessed as **Not Achieved** commonly:

- lacked an understanding of what operational parameters are.
- wrote in general about features of systems without referring to specific values
- chose simple technological systems as opposed to complex and highly complex systems.
- produced information that was technically inaccurate
- did not identify operational parameters associated with a complex system
- wrote in general about concepts used in the design and development of technological systems, without linking these to operational parameters
- wrote about maintenance in a technological system without linking these to operational parameters.

Candidates who were assessed as **Achieved with Merit** commonly:

- explained in detail with examples of how a highly complex system operates to maintain its parameters (e.g., air fuel ratio in fuel injection systems operates between 12:1 to 17:1)
- discussed, taking into account different ideas, why social and technical factors influenced the establishment of operational parameters in a highly complex system.

Candidates who were assessed as **Achieved with Excellence** commonly:

- discussed, by comparing and contrasting different ideas, of how operational parameters influenced the design, development and maintenance of systems (both complex AND highly complex systems)

## 91617: Undertake a critique of a technological outcome's design

### Observations

Excellence candidates often justified their selection of certain criteria over others and why these were relevant to the product, context, and target market, providing an in-depth and balanced critique. Candidates should ensure that the criteria selected are a good fit for the outcome being critiqued. Often contemporary judgment criteria were discussed but not used, instead other judgment criteria were used in place of the contemporary judgment criteria, limiting the candidate's ability to reach the higher grades.

Candidates who accessed the higher grades provided images / plans / drawings to support statements within the report and did not assume the reader has knowledge of technological outcome.

Candidates would do perform an edit, proof-read, or read their work aloud to ensure their report is coherent. Unfortunately, there are still submissions where candidates utilise the same case studies – in these cases candidates must ensure their work is their own and submissions should not be substantially similar.

Candidates who used the Achievement Standard to critique a technological outcome with a view to inform their own practice at a future date, proved problematic due to an incorrect focus on deficit critiquing, making suggestions to change or improvements to be made.

Candidates commonly misinterpreted “accessibility” as widespread retail availability, and “influence” as social media influencers. At this level it would be expected that technology candidates will meet the assessment specification in terms of document formatting, regarding font size and page limits.

### Grade awarding

Candidates who were awarded **Achievement** commonly:

- explained the concept of good design
- provided specific examples to illustrate their points
- provided images of the outcome they critiqued
- explained the concept of good design
- selected criteria which were appropriate for and relevant to the outcome they were critiquing
- selected an outcome with which they were familiar but not necessarily something which they had developed themselves
- critiqued in an objective and balanced way using appropriate design judgement criteria they had selected
- used a template and headings to structure their report.

Candidates who were awarded **Not Achieved** commonly:

- did not select a single technological outcome to critique.
- selected complex outcomes which had too large a scope (e.g. AI), or consisted of multiple components (e.g. cake mixes, cars, ) or were too generalised or were a product category (e.g. shoes, remote controls), or focused on future state technologies and outcomes which had yet to be developed
- placed too much emphasis on incremental product development over time without making a relevant connection to their technological outcome
- discussed the role of design movements, eras or specific designers which were unrelated to their technological outcome
- selected criteria which were inappropriate for their technological outcome
- did not complete the critique in enough depth or detail
- produced descriptive reports which were limited to specifications, aesthetics or functions of their chosen outcome

- misinterpreted appraisal to be broadly describing and explaining the function / product specs listing and/or appearance of a technological outcome rather than judging it against recognised judgement criteria (refer to EN3)
- omitted to include evidence that related to one or more of the assessment criteria for Achievement which reflected lack of understanding
- critiqued using the design elements within an outcome rather than using recognised design judgement criteria.

Candidates who were awarded **Achievement with Merit** commonly:

- discussed why contemporary judgement criteria are important
- selected judgement criteria which were relevant to the technological outcome
- proportioned evidence within the report to ensure that the critique formed the main crux of the report.

Candidates who were awarded **Achievement with Excellence** commonly:

- explored and discussed the impact of utilising specific judgment criteria
- understood and explained why criteria are subjective
- clearly articulated the reasons for the selection of their chosen criteria
- personalised the judgement criteria which they used and justified their selection
- presented a balanced critique with strong personal voice.