**Science Teaching, Learning and Assessment Guide Nov 2021**

<https://ncea.education.govt.nz/science/science>

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# What is Science about?

*Subject terms can be found in the glossary*

Science uses the **nature of science** strand from the New Zealand Curriculum to teach ākonga what science is and how scientists work. Science involves generating and testing ideas and gathering evidence in order to develop knowledge, understand it, and explain it. Scientists do this by making observations, carrying out investigations and modelling, and communicating and debating with others. In this way, science, as a discipline, is practiced by every culture: it drove the journeys of the wayfinders who explored and populated the Pacific, and informed understanding of the interwoven nature of the taiao.

Students should also be able to recognise the creativity, curiosity, collaboration and other attributes of scientists. Strongly founded in evidence, scientific knowledge can change over time with new technology finding more information and with new perspectives altering how the evidence is interpreted. It is important that ākonga understand that science knowledge, and the processes by which it is derived, both evolve. Science is not a static discipline.

Scientific progress comes from logical, systematic work and creative insight, and rests on a foundation of respect for evidence. This ties in naturally with te ao Māori, which is a worldview with a broad range of scientific concepts and investigative frameworks that inform and provide a deeper understanding of the world of science. A signature contribution to our ways of thinking in Aotearoa New Zealand are the mātauranga and indigenous knowledges that enrich our views in science. In order to study Science, ākonga must first understand the importance of mātauranga Māori and indigenous Pacific knowledges to scientific endeavour. All learners can learn from indigenous knowledge systems at a time when new approaches are needed to deal with the challenges faced by all.

# Big Ideas and Significant Learning

This section outlines the meaning of, and the connection between the Big Ideas and Significant Learning, which together form the Learning Matrix. It then explains each Science Big Idea.

The Science Learning Area curriculum, including its Whakataukī, informs this subject's Significant Learning – learning that is critical for students to know, understand, and do in relation to a subject by the end of each Curriculum Level. This covers knowledge, skills, competencies, and attitudes. It also includes level-appropriate contexts students should encounter in their education. The Learning Area's Whakataukī is: *Mā te whakaaro nui e hanga te whare; mā te mātauranga e whakaū*(Big Ideas create the house; knowledge maintains it.)

The subject's Big Ideas and Significant Learning are collated into a Learning Matrix for Curriculum Level 6. Teachers can use the Learning Matrix as a tool to construct learning programmes that cover all the ‘not to be missed’ learning in a subject.

There is no prescribed order to the Learning Matrix within each Level. A programme of learning might begin with a context that is relevant to the local area of the school or an idea that students are particularly interested in. This context or topic must relate to at least 1 Big Idea and may also link to other Big Ideas.

There are four Big Ideas in Science. The nature of this subject as a discipline means aspects of Significant Learning often cross over multiple Big Ideas, and vice versa.

Each of the three NCEA Level 1 subjects in the science learning area (Science, Chemistry and Biology, and Physics, Earth and Space Science) have been developed as a different body of learning and assessment. Science at this level is concerned with the Nature of Science, and the Big Ideas for this subject explore ways of working in science and how various bodies of science knowledge are generated, communicated, and used. Therefore, Science Significant Learning can be explored within the body of knowledge that exists within either of the other two other Level 1 subjects. The Guidance for Course Design document demonstrates how this can be done. In addition, the Mātauranga Framework document provides guidance on delivering a programme that allows ākonga Maori to learn and succeed in Science as Māori.

**Big Idea :Science offers ways for ākonga to engage with issues and opportunities at personal, community, or global level**

Ākonga are empowered when they learn to explore different perspectives, develop and express their own reasoned opinions, and make decisions to take action. Ākonga will use the practices and knowledge drawn from mātauranga Māori and other knowledge systems to inform their perspectives, opinions, and actions.

Ākonga will engage with real world issues (including problems, needs, and opportunities) at a personal, community, or global level. They will bring their own world view, experiences, and knowledge while building new capabilities such as disciplinary meaning making, perspective taking, and critical inquiry to develop evidence-based opinions.

Finally, ākonga understand that wānanga and talanoa can be used to discuss existing knowledge and in so doing, allow new knowledge to emerge.

**Big Idea: Science uses a wide variety of investigative approaches to gain understanding about the taiao**

Investigations are used to generate and evaluate knowledge to answer questions. A variety of investigation methods exist that involve making observations, gathering evidence, and collecting and interpreting data. Different investigation approaches are appropriate for answering different questions.

By engaging in investigations themselves, ākonga are more likely to think critically about information, data, and claims from the investigations of others. A life-long learner is able to investigate, evaluate, and collect data to enhance their participation in society.

**Big Idea : Understandings developed through science are contestable and refined over time**

People working in science in Aotearoa New Zealand learn from and build on knowledge that has been generated by those who came before them, especially from Māori and Pacific indigenous knowledge sources. By understanding how science knowledge has developed, extended, and changed over time, ākonga can appreciate how science operates and can use appropriate tools in their own science practice.

**Big Idea : Science offers a way for ākonga to interpret representations, critique evidence, and communicate knowledge**

Young people are bombarded with a huge volume of information from the internet and other sources. The tools to discern valid evidence and to distinguish science from pseudoscience are vital in this information-rich world. Ākonga are also communicators of science. Different audiences will require them to communicate their own findings and understandings in different styles. Clear, logical, well-reasoned arguments based on solid evidence are the cornerstone of science practice. Finally, ākonga will learn to use māramatanga alongside this evidence to help them judge science from pseudoscience.

# Key Competencies in Science

Learning in Science provides meaningful contexts for developing Key Competencies from the New Zealand Curriculum. These Key Competencies are woven through, and embedded in, the Big Ideas and Significant Learning. Students will engage with critical thinking and analysis, explore different perspectives on scientific issues, and develop their understanding of the role of science in society.

[Key Competencies](http://nzcurriculum.tki.org.nz/Key-competencies): This section of *New Zealand Curriculum online* offers specific guidance to school leaders and teachers on integrating the Key Competencies into the daily activities of the school and its Teaching and Learning Programmes.

**Thinking**

Students of Science will:

* understand that there is no one scientific method
* develop a greater understanding of the nature of science
* recognise how science and mātauranga Māori can help solve world problems
* understand how models and theories have developed through time and are influenced by culture and politics
* grasp increasingly complex science concepts & apply them to an ever-growing range of contexts
* understand that science knowledge is developed through investigation
* select, plan & carry out a range of appropriate investigations (including evaluating method & data)
* analyse information in its various forms and know how to check the sources of information
* identify the assumptions that underlie claims made by journalists, scientists, and themselves, and to check these against the evidence
* learn to distinguish science from pseudoscience.

**Using language, symbols, and texts**

Students of Science will:

* develop knowledge of the vocabulary, numeric and symbol systems, and conventions of science such as graphs, significant figures, formulae, units, and diagrams.
* use appropriate ways to communicate their own science ideas and understanding of evidence.

**Relating to others**

Students of Science will:

* learn to define the problem or issue to be investigated and establish what knowledge they already bring and what new knowledge they may need to gain
* learn how to determine the different perspectives by which people view a science issue
* use scientific understandings to make decisions and respond in social and cultural contexts.

**Managing self**

Students of Science will:

* engage in scientific conversations about their science experiences, the quality of their evidence and the evidence of others
* be open-minded and able to distinguish between their own and others' positions and findings.

**Participating and contributing**

Students of Science will:

* use the science conclusions to generate and evaluate a range of possible responses (including consideration of cultural, social, environmental, ethical, economic and political implications)
* understand that science is a collaborative activity and practise talanoa or mahi tahi in their own science activities
* engage in wānanga or talanoa to consult a body of knowledge and the work and ideas of others,
* where appropriate, debate evidence and justify points of view using a scientific perspective.

**Science Learning Matrix**

<https://ncea.education.govt.nz/science/science?view=learning>

## **Sample Course outlines**

## <https://ncea.education.govt.nz/science/science?view=teaching>

Sample course outlines are being produced to help teachers and schools understand the new NCEA Learning and Assessment Matrices. We will have three examples of how a year-long Science course could be constructed using the new Learning and Assessment Matrices. They are indicative only and do not mandate any particular choice of text or approach.

More detailed sample Teaching and Learning Programmes will be developed during piloting.

The document 'Science knowledge ideas for Level 6 Science' suggests contexts for Teaching and Learning Programmes.

It is imperative to provide educationally powerful connections for ākonga Māori, who have the right to engage in learning that recognises their language, culture, and identity. The Mātauranga Framework document provides guidance on delivering a programme that allows ākonga Maori to learn and succeed in Science as Māori.Other learners, including Pacific learners, are also entitled to have their language, culture and identity recognised in their learning.

# Assessment Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| **Science 1.1 (91920)**[Develop a science-informed response to a local socio-scientific issue](https://ncea.education.govt.nz/science/science/1/1)Internal 5 Credits  | Science 1.2 (91921)[Use a range of scientific investigative approaches in a taiao context](https://ncea.education.govt.nz/science/science/1/2?view=standard)Internal 5 Credits | **Science 1.3 (91922)** [Describe features of science involved in the development of a scientific idea in a New Zealand Aotearoa or Pacific context](https://ncea.education.govt.nz/science/science/1/3?view=standard)91921 External 5 Credits  |  Science 1.4 (91923)[Demonstrate understanding of science claims in communicated information using māramatanga](https://ncea.education.govt.nz/science/science/1/4?view=standard)External5 Credits |

**Subject Glossary**

Both EnglishandTe Reo Māori<https://ncea.education.govt.nz/glossary/science>

# Science 1.1 (AS 91920)

**Title:** Develop a science-informed response to a local socio-scientific issue

## Credits: 5 Level: NCEA Level 1 Assessment mode: Internal

## Status: Draft for pilot Date published: 1 Dec 2020 Date version reviewed: 15 Dec 2020

##

## Purpose :

Students will explore a local socio-scientific issue and develop a science-informed response.

## Achievement criteria:

|  |  |  |
| --- | --- | --- |
| Achievement | Achievement with Merit | Achievement w Excellence |
| Develop a science-informed response to a local socio-scientific issue | Examine a science-informed response to a local socio-scientific issue | Evaluate a science-informed response to a local socio-scientific issue |

Explanatory Note 1:

*Develop a science-informed response to a local socio-scientific issue* involves:

* describing the science ideas involved in the issue
* identifying perspectives relevant to the issue
* describing how kaitiakitanga relates to the issue and informs the science-informed response
* outlining a science-informed response to the issue.

*Examine a science-informed response to a local socio-scientific issue* involves:

* explaining the science ideas relevant to the issue
* outlining perspectives relevant to the issue
* explaining how the science-informed response to the issue considers kaitiakitanga.

*Evaluate a science-informed response to a local socio-scientific issue* involves:

* giving reasons for the science-informed response to the issue in relation to kaitiakitanga, the relevant perspectives, and the science ideas involved.

Explanatory Note 2:

For this Standard, a *local socio-scientific* *issue* is an issue about which people hold varying opinions and perspectives: 'local' refers to the issue being of interest or importance to the student.

Explanatory Note 3:

*Kaitiakitanga* is the concept of guardianship, stewardship for living things and resources. In this Standard, a *kaitiakitanga approach* is one that demonstrates guardianship or stewardship for self, others, whānau, and the environment.

Explanatory Note 4:

Kaitiakitanga is part of a *science-informed response* and could include:

* taking a position on an issue
* devising an action to address an issue
* taking action to address an issue.

Shared Explanatory Note 1:

This Achievement Standard is derived from the Science Learning Area at Level 6 of *The New Zealand Curriculum:*Learning Media, Ministry of Education, 2007.

# Science 1.2 (AS 91921)

**Title:** Use a range of scientific investigative approaches in a taiao context

## Credits: 5 Level: NCEA Level 1 Assessment mode: Internal

## Status: Draft for pilot Date published: 1 Dec 2020 Date version reviewed: 15 Dec 2020

## Purpose :

Students will use a range of scientific investigative approaches to answer questions about the taiao

## Achievement criteria:

|  |  |  |
| --- | --- | --- |
| Achievement | Achievement with Merit | Achievement w Excellence |
| Use a range of scientific investigative approaches in a taiao context | Explain a range of scientific investigative approaches in a taiao context | Evaluate a range of scientific investigative approaches in a taiao context |

Explanatory Note 1:

Use a range of scientific investigative approaches in a taiao context involves:

* carrying out investigative approaches that each answer a question about the taiao
* collecting data or findings
* reporting findings for each investigation.

Explain a range of scientific investigative approaches in a taiao context involves:

* giving reasons why each investigative approach was or was not appropriate to answer a question about the taiao
* stating how well the findings of each investigative approach contributes to the question about the taiao.

Evaluate a range of scientific investigative approaches in a taiao context involves:

* discussing a similarity between two of the investigative approaches used
* discussing a difference between two of the investigative approaches used
* validating findings from the investigative approaches through wānanga
* reporting on new understanding of the taiao developed through the use of investigative approaches.

Explanatory Note 2

Examples of a range of scientific investigative approaches include:

* pattern seeking
* exploring and observing
* modelling
* classifying and identifying
* fair testing.

Explanatory Note 3

Wānanga means a conference, meeting, or to discuss. In this Standard, wānanga means collaboration with others in a group setting or forum, or consulting a body of knowledge with peers.

Explanatory Note 4

Taiao refers to all aspects of the environment, including land, water, climate, and living things. In this Standard, taiao refers to the specific context the activity is based in, for example, the human body or an ecosystem.

Shared Explanatory Note

This Achievement Standard is derived from the Science Learning Area at Level 6 of The New Zealand Curriculum: Learning Media, Ministry of Education, 2007

# Science 1.3 (AS 91922)

**Title:** Describe features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context

## Credits: 5 Level: NCEA Level 1 Assessment mode: Internal

## Status: Draft for pilot Date published: 1 Dec 2020 Date version reviewed: **N/A**

## Purpose :

Students will demonstrate understanding of how the features of science contribute to the development of a scientific idea, within an Aotearoa New Zealand or Pacific context.

## Achievement criteria:

|  |  |  |
| --- | --- | --- |
| Achievement | Achievement with Merit | Achievement w Excellence |
| Describe features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context | Explain features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context | Examine features of science involved in the development of a scientific idea in an Aotearoa New Zealand or Pacific context |

Explanatory Note 1:

*Describe science claims in communicated information using māramatanga* involves*:*

* identifying science claims in communicated information
* identifying the use of science language or conventions in the communicated information
* outlining how māramatanga is used to validate scientific claims in communicated information.

*Interpret science claims in communicated information using māramatanga* involves*:*

* explaining how science language or conventions are used in the communicated information
* using māramatanga to draw conclusions about the science claims
* making judgements about the credibility of the source of the communicated information.

*Evaluate science claims in communicated information using māramatanga* involves*:*

* discussing the use of science language and conventions in the communicated information
* using māramatanga to discuss a conclusion about the science claims.

Explanatory Note 2:

*Māramatanga* means enlightenment or insight. In this Standard, *māramatanga* means the insight or understanding that a student draws on to support their conclusions about the science claims made in the communicated information.

Explanatory Note 3:

*Communicated information* is information from any channel, source, or media such as conversations with people, radio shows, published research, and online content.

Shared Explanatory Note:

This Achievement Standard is derived from the Science Learning Area at Level 6 of *The New Zealand Curriculum:*Learning Media, Ministry of Education, 2007.

# Science 1.4 (AS 91923)

**Title:** Demonstrate understanding of science claims in communicated information using māramatanga

## Credits: 5 Level: NCEA Level 1 Assessment mode: Internal

## Status: Draft for pilot Date published: 1 Dec 2020 Date version reviewed: **N/A**

## Purpose :

Students will interpret and critique information in order to examine scientific claims.

## Achievement criteria:

|  |  |  |
| --- | --- | --- |
| Achievement | Achievement with Merit | Achievement w Excellence |
| Describe science claims in communicated information using māramatanga | Interpret science claims in communicated information using māramatanga | Evaluate science claims in communicated information using māramatanga |

Explanatory Note 1:

Describe science claims in communicated information using māramatanga involves:

* identifying science claims in communicated information
* identifying the use of science language or conventions in the communicated information
* outlining how māramatanga is used to validate scientific claims in communicated information.

Interpret science claims in communicated information using māramatanga involves:

* explaining how science language or conventions are used in the communicated information
* using māramatanga to draw conclusions about the science claims
* making judgements about the credibility of the source of the communicated information.

Evaluate science claims in communicated information using māramatanga involves:

* discussing the use of science language and conventions in the communicated information
* using māramatanga to discuss a conclusion about the science claims.

Explanatory Note 2:

Māramatanga means enlightenment or insight. In this Standard, māramatanga means the insight or understanding that a student draws on to support their conclusions about the science claims made in the communicated information.

Explanatory Note 3:

Communicated information is information from any channel, source, or media such as conversations with people, radio shows, published research, and online content.

Shared Explanatory Note:

This Achievement Standard is derived from the Science Learning Area at Level 6 of The New Zealand Curriculum: Learning Media, Ministry of Education, 2007.

# Unpacking Standards

Unpacking Standard 1.1

*Mātauranga Māori constitutes concepts and principles that are richly detailed, complex, and fundamental to Māoridom. It is important to remember that the practice of these are wider and more varied than their use within the proposed NCEA Achievement Standards and supporting documentation.*

*We also recognise that the cultures, languages, and identities of the Pacific Islands are diverse, varied, and unique. Therefore the Pacific concepts, contexts, and principles that have been incorporated within NCEA Achievement Standards may have wide-ranging understandings and applications across and within the diversity of Pacific communities. It is not our intention to define what these concepts mean but rather offer some ways that they could be understood and applied within different subjects that kaiako and students alike can explore.*

For this Standard ākonga will demonstrate their understanding of the relevance of science in the world, and their skills in argumentation and critical thinking. They will explore a local socio-scientific issue and propose a science-informed response.

'Socio-scientific' means that science ideas form a key part of the phenomenon and are needed to fully understand it. A socio-scientific issue can be controversial, where different people hold varying positions, opinions and perspectives. A socio-scientific issue could involve a locality significant to ākonga (eg where their home marae is) or be something personally relevant (eg sugar in food). This Standard requires ākonga to engage in kaitiakitanga, delving deeply into a 'local' issue. ‘Local’ implies direct relevance to the learner.

Ākonga need to take into account the perspectives of those affected by the issue, some of whom may have a vested interest. In Aotearoa New Zealand it is also important to canvas the views of local iwi who have kaitiaki responsibilities over local whenua, awa, and moana. After consideration of the underpinning science, ākonga will also identify a possible response supported by science evidence.

It is also important that contexts for study must be selected with respect for whānau and ākonga cohort position. Teachers need to be mindful that ākonga personal, religious, or cultural views will inevitably influence their response to an issue. These should not prevent them from achieving, provided they have demonstrated clear understanding of the science ideas involved in an issue. Guidance may be needed in the choice of contexts/issues to enable students to engage fully with all aspects of the task.

This Standard only assesses the design of the response.

## Unpacking Standard 1.2

Mātauranga Māori constitutes concepts and principles that are richly detailed, complex, and fundamental to Māoridom. It is important to remember that the practice of these are wider and more varied than their use within the proposed NCEA Achievement Standards and supporting documentation.

We also recognise that the cultures, languages, and identities of the Pacific Islands are diverse, varied, and unique. Therefore the Pacific concepts, contexts, and principles that have been incorporated within NCEA Achievement Standards may have wide-ranging understandings and applications across and within the diversity of Pacific communities. It is not our intention to define what these concepts mean but rather offer some ways that they could be understood and applied within different subjects that kaiako and students alike can explore.

Understanding the world around us requires a variety of approaches – there is no one right way. By engaging in investigations themselves, learners are more likely to think critically about information, data, and claims that they encounter in daily life.

In this Standard ākonga will answer three questions using three approaches to investigate one context in the taiao, and come to individual conclusions. A collective response or conclusion will be made through wānanga, consulting with others, discussing with classmates, or consulting a wider body of knowledge as they collect overarching findings that relate to their taiao investigation .

Ākonga will show an understanding of how to conduct three different types of investigations within a single context and which approaches are appropriate for which purposes. They will process data, draw conclusions, and compare the different approaches used. Investigative approaches may include, but are not limited to, the following:

* pattern seeking
* exploring and observing
* modelling
* classifying and identifying
* fair testing.

The emphasis is on how to investigate as opposed to the new knowledge ākonga may gain through their investigations. Ākonga will also understand that investigations involve several of the same features.

As part of the assessment for this Standard, an investigation may need to use a model to collect observations or data. Ākonga may change factors, testing the effect of different variables and generating some results. For example, ākonga may use computer programs or models to explore what will happen over time as a new gene is introduced into a population of small animals.

Interrogation of databases forms the foundation of many investigations. Ākonga can use primary or secondary data – either way, they are developing methods and gathering and analysing data to form conclusions.

Validating overall understanding of taiao through wānanga means, in this context, that a collaborative approach has been used in problem solving. Thus, ākonga should work in groups and teachers could record evidence that each ākonga has met all the criteria of the Standard when engaging in wānanga. In addition, consulting a body of knowledge also constitutes wānanga. Ākonga will recognise that these are essential components of science investigation.

At Level 6 of the New Zealand Curriculum, teachers give direction by providing a purpose and general instructions for the investigative method.

##

## Unpacking Standard 1.3

Mātauranga Māori constitutes concepts and principles that are richly detailed, complex, and fundamental to Māoridom. It is important to remember that the practice of these are wider and more varied than their use within the proposed NCEA Achievement Standards and supporting documentation.

We also recognise that the cultures, languages, and identities of the Pacific Islands are diverse, varied, and unique. Therefore the Pacific concepts, contexts, and principles that have been incorporated within NCEA Achievement Standards may have wide-ranging understandings and applications across and within the diversity of Pacific communities. It is not our intention to define what these concepts mean but rather offer some ways that they could be understood and applied within different subjects that kaiako and students alike can explore.

For this Standard, ākonga will demonstrate understanding of how knowledge in science develops over time. They will appreciate science as:

* a dynamic process
* a useful tool in understanding our world
* a process that is influenced by mātauranga Māori & by the socio-cultural environment of the time.

In this Standard the features of science are based on learning through observation, experience, investigation, and testing. Knowledge respects historical observations as communicated through mātauranga Māori, and informs future decision making. However nothing in science is static, and the evolution of science relies on the interconnectedness of knowledges and approaches. Science conclusions are informed by collaboration and curiosity.

Features of science could include aspects such as:

* interpreting patterns and interactions within te taiao
* linking new evidence to existing models, theories and ideas
* showing awareness of Māori and indigenous Pacific knowledges systems and their contributions to scientific knowledge and development
* the influence of social and cultural factors on science
* the influence of the development and use of technology on science
* responding to needs and opportunities
* rigorously reviewing claims
* using specific language, symbols, and conventions
* being tentative by nature; the only certainty in science is when a claim is disproved
* the attributes of the people who carry out the science such as curiosity, collaboration, competitiveness, creativity and critical thinking.

Ākonga will explore stories of science seated in their world of knowledge in Aotearoa New Zealand and the Pacific. Some of these may describe instances when science got it wrong or when others have misused science knowledge.

Prior to the assessment session candidates will assemble a report that explores the development of a science idea or process based in an Aotearoa New Zealand or Pacific context. This will be used to create a one page summary resource sheet to refer to when answering unseen questions about the case study selected, in an exam setting.

External Assessment Specifications will be published by NZQA and will specify details about how and at what stage of the year this Standard will be assessed.

**2021 Mini-pilot Assessment Material**

Science is being piloted by a small number of schools in 2021. You can find out about the [2021 mini-pilot here](https://ncea.education.govt.nz/trial-and-pilots-initiative). The resources below are those used in the 2021 mini-pilot for this standard.

[SC 1.3 Assessment specification](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-09/Assessment%20Specification%202021%20RAS%20Pilot%20Subjects%20%E2%80%93%20Science%201.3.pdf?VersionId=n487EwlCwxUFiTcPU4P7XDW.mIMXoHx9) [SC 1.3 CAA Assessment resource](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-09/91922-res-2021.pdf?VersionId=BLvr8pA6RWV29WLMD1gfUgdwGp77cCYL) [SC 1.3 CAA Assessment paper](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-09/91922-exm-2021.pdf?VersionId=nZ6JbzAwxkiCJki98ci4N3XSNJG0X.4o)

## Unpacking Standard 1.4

Mātauranga Māori constitutes concepts and principles that are richly detailed, complex, and fundamental to Māoridom. It is important to remember that the practice of these are wider and more varied than their use within the proposed NCEA Achievement Standards and supporting documentation.

We also recognise that the cultures, languages, and identities of the Pacific Islands are diverse, varied, and unique. Therefore the Pacific concepts, contexts, and principles that have been incorporated within NCEA Achievement Standards may have wide-ranging understandings and applications across and within the diversity of Pacific communities. It is not our intention to define what these concepts mean but rather offer some ways that they could be understood and applied within different subjects that kaiako and students alike can explore.

Misinformation abounds in social media and elsewhere. This Standard requires ākonga to interpret and critique information and examine scientific claims. This will involve considering the reliability of sources.

Science communication presents data and information, using a specific science vocabulary and conventions. So too does pseudoscience, but it uses them to misrepresent science and scientific viewpoints. Ākonga will engage in māramatanga to discern such flaws as:

* misinterpreted results
* conflicts of interest
* confusion between correlation and causation
* problems with small or unrepresentative samples
* or a lack of controls, blind testing or peer review.

Finally, it is important to note that contexts for ākonga study to prepare for this Standard must be selected with respect for whanau and ākonga cohort position. This is to avoid a dilemma when family response differs from mainstream science viewpoints: ākonga wellbeing and safety in study is paramount.

External Assessment Specifications will be published by NZQA and will specify details about how and at what stage of the year this Standard will be assessed.

**2021 Mini-pilot Assessment Material**

Science is being piloted by a small number of schools in 2021. You can find out about the [2021 mini-pilot here](https://ncea.education.govt.nz/trial-and-pilots-initiative). The resources below are those used in the 2021 mini-pilot for this standard.

[SC 1.4 Assessment Specification](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-09/Assessment%20Specification%202021%20RAS%20Pilot%20Subjects%20%E2%80%93%20Science%201.4.pdf?VersionId=d94NzO5HRT.HLfbgnF5I5EgI.vuKAkOk)

# Conditions of Assessment (for internals)

**Sci 1.1**

Ākonga could either be given the socio-scientific issue they are required to address or they could select it for themselves. If the latter applies, the issue selected should be approved by the teacher.

This Standard assumes ākonga have engaged in a sequence of kaitiakitanga-based learning opportunities to develop their understanding of various socio-scientific issues. Ākonga should be exposed to multiple issues during the year.

With this type of assessment, checkpoints are recommended as ākonga explore the issue and develop their response. Checkpoints support ākonga to stay on track and get the feedback they need. Feedback is usually oral and checks for gaps and balance but does not involve detailed pre-marking. Checkpoints also provide a means of determining authenticity and collecting naturally occurring evidence.

**Sci 1.2**

Assessment evidence will be collected from a minimum of three investigative approaches, then a summary will be completed to compare the different investigative approaches used.

Ākonga may be given an appropriate template, a suitable aim or question, and a skeletal method for the investigations.

It may be appropriate for ākonga to develop their methods and gather data in groups, but each learner should be actively involved and the teacher needs to collect evidence that each one has met all aspects of the standard. Development and recognition of the value of wānanga and talanoa are important in this learning and assessment.

Range of investigative approaches for this standard means at least three different approaches from:

* pattern seeking
* exploring and observing
* modelling
* classifying and identifying
* fair testing.

The teacher can determine the time taken by the assessment as this is dependent on the investigations chosen

##

# Assessment Specifications (for externals)

## Sci 1.3

### Assessment Format

During the assessment, candidates will respond to questions that require them to analyse features of science that contribute to the development of scientific ideas or processes.
In the exam, candidates are permitted to bring and use a self-produced resource consisting of one A4 page. This may be a case study report or a summary of a report. Candidates may refer to their resource page during the assessment to assist them by providing supporting evidence for their responses.
There will be five questions. Candidates are required to respond to THREE of the five questions.
Candidates may use their self-produced resource sheet to support their response.
Responses may include visual and written representations of information (e.g., annotated timelines, diagrams, bullet points, etc.) to show connections between ideas.
Candidates should write no more than 750–800 words in total.

### Conditions of Assessment

The summary resource sheet must not exceed one A4 page.
The summary resource sheet must be student-generated.
Teacher involvement in the preparation of candidates’ one-page resource sheets prior to the assessment is limited to providing feedback to candidates about which previously studied cases or topics may be most appropriate for the assessment.
Candidates must complete their assessment individually under examination supervisor supervision, in accordance with the NCEA Assessment and Examination Rules and Procedures.

## Sci 1.4

### Assessment Format

Candidates will be required to submit a portfolio consisting of THREE responses that assess the validity of science claims. These responses may be produced and collected over time, at different points of the year, as appropriate to the programme of teaching and learning.
The science claims may relate to the same scientific context/issue OR different ones. The claims and contexts/issues may be EITHER student-selected OR teacher-selected.
Responses may include visual and written representations of information (e.g. annotated timelines, diagrams, bullet points etc.) to show connections between ideas.
Each response should not exceed 300 words.

### Conditions of Assessment

Teachers will give candidates the opportunity to respond to a previously ‘un-taught’ science claim as the culmination of a teaching and learning sequence that may involve examining other, different claims and how to respond to them, which is a ‘hands on’ process.
When candidates are provided the opportunity to produce a response for assessment by NZQA, teachers may not provide any scaffolding, instruction, guidance, or feedback on candidates’ responses, using a ‘hands off’ approach. If the candidate needs feedback on a response to assess the validity of a science claim, then they are not ready for assessment and the piece becomes a formative piece and cannot be submitted in the final portfolio.

It is expected that authenticity of candidates’ work will be ensured according to NZQA’s current Assessment and Examination Rules and Procedures.
Teachers can ensure authenticity of candidates’ work by:

* ensuring each candidate’s work is their own
* not providing guidance outside what is permissible, if any, as specified in the Assessment Specifications.

# Assessment Activities

## Sc 1.1 Activity A: Pushing Boundaries in Sport

<https://ncea.education.govt.nz/science/science/1/1/activity-a-0>

There are many science ideas behind how humans are pushing the boundaries in sport. By exploring both the science and people’s different views, students develop a response.

## **What to do**

Sport has become more competitive in Aotearoa New Zealand and the Pacific. There are new sports being played, and more focus on nutrition and training to increase performance. You will explore an aspect of this socio-scientific issue in a local context:

* **Identify the issue:** what is an aspect of sport science that people hold varying opinions and perspectives on? Your teacher will support you to select an appropriate aspect that is of interest to you.
* **Discuss** the key science ideas that relate to the selected aspect of sport science.
* **Discuss** two perspectives held by groups or individuals who have a interest in the selected aspect of sport science.
* **Decide** on a response to the issue that is informed by the identified science ideas. This could be a particular position you take on the issue, or an action that you devise (or actually take!) to address the issue.
* As part of your response, **identify** a kaitiakitanga approach to the issue, that demonstrates guardianship for yourself, others, or the environment, and **explain** how your response considers kaitiakitanga.
* **Evaluate** your response in relation to kaitiakitanga, the relevant perspectives, and the science ideas involved.

## **How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3 - 5 mins), which may be a video or voice recording, or presented in front of the teacher or class, and might incorporate karakia, mihi, whaikōrero, waiata, pūrākau or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) that will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English or NZ Sign Language.

## **Timeframe**

Your teacher will provide details of the time you have, any checkpoints, and the submission date/time.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## **Getting started**

Explore sports science in Aotearoa New Zealand. Before you identify the aspect of sports science that you want to focus on for your issue you will need to:

* find information on relevant science
	+ what life processes are related to sports?
	+ what physics ideas are related to sports?
	+ how are safety and performance equipment and clothing developed?
* spend time investigating the different perspectives that groups and individuals hold on sports science
	+ talk to people who are involved with this issue, eg sports coaches, physiotherapists, dieticians
* think about kaitiakitanga in the context of sports
	+ parity in access to sports gear or supplementary nutrition
	+ how sports and nutrition can care for your health, or be detrimental for your health (consider the model of Te Whare Tapa Whā)
	+ implication of enforcing rules around specific clothing, equipment
	+ consider the implication of drugs in sports and the impact they have on athletes.

Your teacher may provide resources as a starting point.

## **Student resources** [Drug Free Sport New Zealand](https://drugfreesport.org.nz/)

## Sc 1.1 Activity B: Te pūngao puia

## <https://ncea.education.govt.nz/science/science/1/1/activity-b-0>

Māori have used pūngao puia for centuries. Students explore the issue of using a specific pūngao puia resource while considering varying perspectives and developing a response.

## **What to do**

Te pūngao puia is geothermal energy that is generated within the Earth and used by people for a variety of purposes. You will explore this socio-scientific issue as it relates to you, your hapori, or your rohe.

* **Identify the issue:** what is an aspect of te pūngao puia that people hold varying opinions and perspectives on? Your teacher will support you to select an appropriate aspect that is of interest to you.
* **Discuss** the key science ideas that relate to the selected aspect of te pūngao puia.
* **Discuss** two perspectives held by groups or individuals who have a interest in the selected aspect of te pūngao puia.
* **Decide** on a response to the issue that is informed by the identified science ideas. This could be a particular position you take on the issue, or an action that you devise (or actually take!) to address the issue.
* As part of your response, **identify** a kaitiakitanga approach to the issue, that demonstrates guardianship for yourself, others, or the environment, and **explain** how your response considers kaitiakitanga.
* **Evaluate** your response in relation to kaitiakitanga, the relevant perspectives, and the science ideas involved.

## **How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3 - 5 mins), which may be a video or voice recording, or presented in front of the teacher or class, and might incorporate karakia, mihi, whaikōrero, waiata, pūrākau or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) that will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English, or NZ Sign Language.

## **Timeframe**

Your teacher will provide details of the time you have, any checkpoints, and the submission date/time.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## **Getting started**

Explore te pūngao puia in Aotearoa New Zealand. Before you identify the aspect of te pūngao puia that you want to focus on for your issue you will need to:

* find information on relevant science
* spend time investigating the different perspectives that groups and individuals hold on te pūngao puia
* think about kaitiakitanga in the context of te pūngao puia
	+ will this resource continue to provide for all those who use it?
	+ how can we protect this resource?
	+ how can we better respond to different perspectives / stakeholders?

Use the provided Students Resources as a starting point.

## **Student resources**

Contacts within your local iwi or mana whenua.

[Pūngao puia – ngā motika wai māori / Ō Ahupūngao: Te Hiko / Nau mai ki Kei te mōhio anō koe? - Kei te mōhio koe (tki.org.nz)](https://keitemohiokoe.tki.org.nz/O-Ahupungao-Te-Hiko/Pungao-puia-nga-motika-wai-maori)

[Geothermal power — Science Learning Hub](https://www.sciencelearn.org.nz/resources/1573-geothermal-power)

[Restoring Rotorua’s natural geothermal taonga — Science Learning Hub](https://www.sciencelearn.org.nz/resources/1386-restoring-rotorua-s-natural-geothermal-taonga)

[Rotorua geothermal field: protecting a taonga — Science Learning Hub](https://www.sciencelearn.org.nz/videos/2051-rotorua-geothermal-field-protecting-a-taonga)

[Renewable energy sources — Science Learning Hub](https://www.sciencelearn.org.nz/resources/1571-renewable-energy-sources)

[Non-renewable energy sources — Science Learning Hub](https://www.sciencelearn.org.nz/resources/1570-non-renewable-energy-sources)

[Iwi and council back geothermal deal | RNZ News](https://www.rnz.co.nz/news/te-manu-korihi/282406/iwi-and-council-back-geothermal-deal)

[New Zealand Geothermal Association | Uses of Geothermal Resources - New Zealand Geothermal Association (nzgeothermal.org.nz)](https://nzgeothermal.org.nz/geothermal-energy/geo_uses/)

[Contact and iwi work with African tribe to find energy solutions | Stuff.co.nz](https://www.stuff.co.nz/business/innovation/101835482/contact-and-iwi-work-with-african-tribe-to-find-energy-solutions)

[Geothermal energy – Te Ara Encyclopedia of New Zealand](https://teara.govt.nz/en/geothermal-energy)

[Geothermal energy generation | Ministry of Business, Innovation & Employment (mbie.govt.nz)](https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-generation-and-markets/geothermal-energy-generation/)

[Māori and geothermal resources | Waikato Regional Council](https://www.waikatoregion.govt.nz/community/your-community/iwi/a-maori-perspective-te-ao-maori/maori-and-geothermal-resources/)

[Geo40 partner with Maori on world-leading energy project | Scoop News](https://www.scoop.co.nz/stories/BU1807/S00476/geo40-partner-with-maori-on-world-leading-energy-project.htm)

[Geothermal energy critical if NZ is to reach carbon-zero by 2050 | Stuff.co.nz](https://www.stuff.co.nz/science/115918054/geothermal-energy-critical-if-nz-is-to-reach-carbonzero-by-2050)

[Geothermal Generation | Geothermal Plants | Mercury | Mercury](https://www.mercury.co.nz/why-mercury/renewable-energy/geothermal-generation)

[New Zealand Geothermal Association | Geothermal Energy - New Zealand Geothermal Association (nzgeothermal.org.nz)](https://nzgeothermal.org.nz/geothermal-energy/)

## Sc 1.1 Activity C: Healthy Waterways

## <https://ncea.education.govt.nz/science/science/1/1/activity-c>

Every community has a local waterway. In this activity students explore the health of their awa. They consider a range of perspectives and develop a response.

**What to do**

You will explore the socio-scientific issue of waterway health as it relates to a waterway in your rohe. The waterway may be a river, lake, estuary or similar.

* **Identify the issue:** what is an aspect of waterway health that people hold varying opinions and perspectives on? Your teacher will support you to select an appropriate aspect that is of interest to you.
* **Discuss** the key science ideas that relate to the selected aspect of waterway health.
* **Discuss** two perspectives held by groups or individuals who have a interest in the selected aspect of waterway health.
* **Decide** on a response to the issue that is informed by the identified science ideas. This could be a particular position you take on the issue, or an action that you devise (or actually take!) to address the issue.
* As part of your response, **identify** a kaitiakitanga approach to the issue, that demonstrates guardianship for yourself, others, or the environment, and **explain** how your response considers kaitiakitanga.
* **Evaluate** your response in relation to kaitiakitanga, the relevant perspectives, and the science ideas involved.

**How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3-5 mins), which may be a video or voice recording, or presented in front of the teacher or class, & might incorporate karakia, mihi, whaikōrero, waiata, pūrākau or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) that will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English, or NZ Sign Language.

**Timeframe**

Your teacher will provide details of the time you have, any checkpoints, and the submission date/time.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Getting started**

Explore waterway health in the context of a local waterway. Before you identify the aspect that you want to focus on for your issue you will need to:

* find information on relevant science related to waterway health
	+ what factors influence waterway health?
	+ what are the indicators of the health of a waterway? Eg oxygen content, phosphates, nitrates, turbity
	+ how does waterway health affect the plants, animals and microorganism that live in it?
* spend time investigating the different perspectives that groups and individuals hold on the health of your local waterway
	+ consider how people use the waterway
	+ consider how waterway health affects different groups of people in your rohe
	+ talk to people from groups involved in the issue (eg kaumātua from the local iwi, Department of Conservation, and recreational fishers, boaters or hunters).
* think about kaitiakitanga in the context of the local waterway
	+ how can we protect this resource?

Use the provided Students Resources as a starting point.

**Student resources**

[Fresh water | Ministry for the Environment](https://environment.govt.nz/publications/statement-of-intent-2008-2011/operating-intentions/fresh-water/)

[Stream health assessment kits for schools | Greater Wellington Regional Council (gw.govt.nz)](https://www.gw.govt.nz/stream-health-assessment-kits-for-schools/)

Examples of responses include:

* taking part in a riparian (streamside) planting activity
* persuading people to change their behaviour when interacting with the water body
* a proposal to the local Council about possible changes to improve water health in our roto (lake).

Sc 1.2 Activity A: Te Whare Tapa Whā

<https://ncea.education.govt.nz/science/science/1/2/activity-a-0>

Students carry out and report on different types of scientific investigations with Te Whare Tapa Whā as a central investigation concept then they compare the range of approaches used to collect data.

**What to do**

Te Whare Tapa Whā is a health model that consider the four dimensions of hauora: taha hinengaro, taha tinana, taha whānau and taha wairua.

You will work as a group to plan and carry out three investigations that look at some of the aspects of hauora (health and wellbeing) through the model of Te Whare Tapa Whā.

* **Identify** aspects of Te Whare Tapa Whā that you would like to explore. Use the Student Resources as inspiration.
* **Choose** three scientific investigative approaches from the list:
	+ pattern seeking
	+ exploring and observing
	+ modelling
	+ classifying and identifying
	+ fair testing.
* **Identify** a research question relating to Te Whare Tapa Whā for each investigative approach. Your teacher will provide guidance and support you to refine or create a method for each investigation.
* **Carry out** the three investigations. Collect data and report on findings for each investigative approach, then discuss how well each approach answered the research question.
* **Comment** on a similarity between any two of the investigative approaches, as well as a difference between any two of the approaches.
* **Discuss** your findings with kaumātua, local kaitiaki, your kaiako, or classmates, to validate your conclusion and science findings through wānanga. What can you find out about their findings? Are they similar to your own?

**How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3 - 5 mins), which may be a video or voice recording, or presented in front of the teacher or class, and might incorporate karakia, mihi, whaikōrero, waiata, pūrākau or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) which will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English, or New Zealand Sign Language.

**Timeframe**

Your teacher will provide details of the time you have, the checkpoints, and the submission date/time.

All investigations will be completed over a period of \_\_\_\_\_\_\_ weeks.

Checkpoints will occur for your teacher to check your progress on:

* identifying your research questions
* completing the investigations
* developing your conclusions.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Getting started**

Find out about the different science investigation approaches on [Science Learning Hub](https://www.sciencelearn.org.nz/resources/3038-investigating-in-science).

Explore the concepts of Te Whare Tapa Whā and hauora, and think about how different investigation approaches could be used to help you collect findings or data related to these concepts. Use the provided student resources as inspiration. Your teacher will help you decide on the three investigation approaches to focus on for this activity.

**Student resources**

**Taha hinengaro** - the mental and emotional aspect of hauora, including the capacity to communicate thoughts and feelings, to think critically and coherently.

* Can we use the Stroop Test to test how well we respond to mental challenges before and after lunch?
* Is there a relationship between the amount of sleep we get and the amount of exercise we do?

**Taha tinana** - the physical aspects of hauora, including the capacity for physical growth, development, and skilled movement.

* What does coffee do to heart rate?
* How does the amount of exercise affect your breathing rate?
* Can taller people jump higher?
* How is bone density related to diet and health? (From secondary data - bone scans.)
* What model can we use to measure the protective effect of toothpaste?

**Taha whānau** - the social aspects of hauora, including relationships with friends, family, community, and other people.

* What aspects of rongoā are accessible in our rohe?
* What items in a kitchen/garden could be poisonous?
* Is there a link between your outstretched arm & your height?  Carry out a survey of your whānau.

**Taha wairua** -the spiritual aspect of hauora, including personal belief structures, the quest for personal meaning, personal identity, and the values that determine the way people live.

* How long do you and your classmates spend on your phone? What factors influence this?
* Try different relaxation strategies and record their effect on self-reported wellbeing.

**Wānanga**

Wānanga means collaboration with others (in a group setting or forum, or by consulting a body of knowledge) & recording the discussion and findings to validate the conclusions. Wānanga is an important skill for science as it expands the data you have access to and increases your understanding of your topic.

This may involve:

* discussing the investigations and the conclusions with others, including kaumātua, local kaitiaki, the kaiako, or classmates
* comparing your results to other bodies of knowledge, like a database of information or data from previous experiments.

**Examples of prompting questions for wānanga:**

* What features of the chosen investigative approaches meant they were the best approaches to answer your research questions?
* What were the limitations of one approach, compared with another?
* What were the advantages of one approach, compared with another?
* What were significant similarities and/or differences between results within the class?
* How well did each investigation answer your research questions and inform your understanding of the context?

[Student worksheet](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-11/SC%201.2%20Student%20Worksheet.docx?VersionId=UXjw0A_MPLf3vM_AXBeTzUJBm_m1DOWy)

## Sc 1.2 Activity B: Sea level on the rise

<https://ncea.education.govt.nz/science/science/1/2/activity-b-0>

Three different types of scientific investigations are used to explore questions about rising sea levels in Aotearoa New Zealand and the Pacific. Students then compare the range of approaches used.

## **What to do**

Climate change is causing temperatures to rise, resulting in changes in ocean temperatures, and causing ice to melt. Aotearoa New Zealand and the Pacific Islands are surrounded by the sea and will be greatly impacted by any rise in sea level this might cause.

You will work as a group to plan and carry out three investigations that look at the cause of sea level rising.

* **Choose** three scientific investigative approaches from the list:
	+ pattern seeking
	+ exploring and observing
	+ modelling
	+ classifying and identifying
	+ fair testing.
* **Identify** a research question relating to sea level rising for each investigative approach. Your teacher will provide guidance and support you to refine or create a method for each investigation.
* **Carry out** the three investigations. Collect data and report on findings for each investigation approach, then discuss how well each approach answered the research question to contribute to your understanding of the cause of rising sea levels.
* **Comment** on a similarity between any two of the investigative approaches, as well as a difference between any two of the approaches.
* **Discuss** your findings with kaumātua, local kaitiaki, your kaiako, or classmates, to validate your conclusions through wānanga. What can you discover about their findings? Are they similar to your own?

## **How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3 - 5 mins), which may be a video or voice recording, or presented in front of the teacher or class, and might incorporate karakia, mihi, whaikōrero, waiata, pūrākau or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) that will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English, or New Zealand Sign Language.

## **Timeframe**

Your teacher will provide details of the time you have, the checkpoints, and the submission date/time.

All investigations will be completed over a period of \_\_\_\_\_\_\_ weeks.

Checkpoints will occur for your teacher to check your progress on:

* identifying your research questions
* completing the investigations
* developing your conclusions.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

##

## **Getting started**

Find out about the different science investigation approaches on [Science Learning Hub](https://www.sciencelearn.org.nz/resources/3038-investigating-in-science). Think about how each investigative approach could contribute different knowledge to your overall understanding of what causes sea level rise. Use the provided students resources as inspiration. Your teacher will help you decide on the three investigation approaches to focus on for this activity.

Find out about some of the factors that contribute to climate change and sea level rising.

## **Student resources**

**Resources for investigations:**

* Using simple models to demonstrate the differing impacts of melting land ice and sea ice on sea level rise ([Investigating sea level rise — Science Learning Hub](https://www.sciencelearn.org.nz/resources/2278-investigating-sea-level-rise))
* Investigate, using models, the impact of melting polar ice on sea levels ([Seashore Science: How Melting Polar Ice Affects Ocean Levels - Scientific American](https://www.scientificamerican.com/article/bring-science-home-sealevel-rise/))
* What makes ice melt the fastest? ([What Makes Ice Melt Fastest? - Scientific American](https://www.scientificamerican.com/article/what-makes-ice-melt-fastest/))
* Investigate the effect that contact with water has on melting ice. ([Melting glacial ice — Science Learning Hub](https://www.sciencelearn.org.nz/resources/2279-melting-glacial-ice))
* Investigate the relationship between temperature and the volume of water. ([Sea Level: On The Rise! - Climate Change Lesson Plan](https://archive.epa.gov/climatechange/kids/documents/sea-level-rise.pdf))
* Explore and observe the effects of sea level rise on coastal communities. (Could use data from [Sea Level | Vital Signs – Climate Change: Vital Signs of the Planet (nasa.gov)](https://climate.nasa.gov/vital-signs/sea-level/), or photos of the same area over time)
* Investigate sea-level data to create models and compare short-term trends to long-term trends. (Uses secondary data - [https://www.jpl.nasa.gov/edu/teach/activity/graphing-sea-level-trends//](https://www.jpl.nasa.gov/edu/teach/activity/graphing-sea-level-trends/))
* World360: ([360Cities.net World Map | 360Cities](https://www.360cities.net/map))
* Pattern Seeking - sea level rise over the years ([Coastal sea-level rise (shinyapps.io)](https://statisticsnz.shinyapps.io/coastal_sea_level_rise_oct19/))

Wānangameans collaboration with others (in a group setting or forum, or by consulting a body of knowledge) and recording the discussion and findings to validate the conclusions. Wānanga is an important skill for science as it expands the data you have access to and increases your understanding of your topic.

This may involve:

* discussing the investigations and the conclusions with others, including kaumatua, local kaitiaki, the kaiako or classmates
* comparing your results to other bodies of knowledge, like a database of information or data from previous experiments.

**Examples of prompting questions for wānanga:**

* What features of the chosen investigative approaches meant they were the best approaches to answer your research questions?
* What were the limitations of one approach, compared with another?
* What were the advantages of one approach, compared with another?
* What were significant similarities and/or differences between results within the class?
* How well did each investigation answer your research questions and inform your understanding of the context?

[Student worksheet](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-11/SC%201.2b%20Student%20Worksheet%20.docx)

##

## Sc 1.2 Activity C: Mahinga Mātaitai

<https://ncea.education.govt.nz/science/science/1/2/activity-c-0>

Mahinga mātaitai (customary seafood gathering site or shellfish beds) are the context for a range of different scientific investigations. Students compare the range of investigative approaches.

## **What to do**

Mahinga mātaitai are customary seafood gathering sites.  Rūnanga from hapū (those with responsibility for the site) will monitor the size and distribution of species present in their rohe to ensure there is a sustainable supply.

You will work in a group to plan and carry out three investigations that look at mahinga mātaitai.

* **Choose** three scientific investigative approaches from the list. Pattern seeking, exploring and observing, and classifying and identifying are recommended for this task:
	+ pattern seeking
	+ exploring and observing
	+ modelling
	+ classifying and identifying
	+ fair testing.
* **Identify** a research question about mahinga mātaitai for each investigative approach. Your teacher will provide guidance and support you to refine or create a method for each investigation.
* **Carry out** the three investigations. Collect data and report on findings for each investigation approach, then discuss how well each approach answered the research question.
* **Comment** on a similarity between any two of the investigative approaches, as well as a difference between any two of the approaches.
* **Validate your conclusions** through wānanga. This involves a comparison of your results to other bodies of knowledge, for example:
	+ engaging collaboratively with a body of knowledge such as [Marine Meter Squared](https://www.mm2.net.nz/resources/marine-metre-squared), or wānanga with all the people who have studied in this rohe before you
	+ discussing your work with kaumātua, kaitiaki, kaiako, or classmates.

## **How to present your learning**

Your findings could be presented in a variety of ways such as:

* an **oral presentation** (3 - 5 mins), which may be a video or voice recording, or presented in front of the teacher or class, and might incorporate karakia, mihi, whaikōrero, waiata, pūrākau, or mōteatea
* a digital or paper **poster, infographic,** or **slideshow** (4 - 6 slides) that will include detailed annotations alongside diagrams or pictures
* a **video** or **animation** (3 - 5 mins)
* a **written article**, **report,** or **blog** (700 - 800 words), which may also include diagrams or pictures.

You must be actively involved in any group component to this assessment and you will need to identify your contribution.

Your evidence for all parts of this assessment can be in te reo Māori, English, or New Zealand Sign Language.

## **Timeframe**

Your teacher will provide details of the time you have, the checkpoints, and the submission date/time.

All investigations will be completed over a period of \_\_\_\_\_\_\_ weeks.

Checkpoints will occur for your teacher to check your progress on:

* identifying your research questions
* completing the investigations
* developing your conclusions.

Final submission date will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## Getting started

Find out about the different science investigation approaches on [Science Learning Hub](https://www.sciencelearn.org.nz/resources/3038-investigating-in-science). Your teacher will help you decide on the three investigation approaches to focus on for this activity.

Explore the [Marine Metre Squared](https://www.mm2.net.nz/resources/marine-metre-squared/) website to find out about how to survey, classify, and observe marine plants and animals living on estuary shores or seashores.

## **Student resources**

Wānanga means collaboration with others (in a group setting or forum, or by consulting a body of knowledge with peers) and recording the discussion and findings to validate the conclusions. Wānanga is an important skill for science as it expands the data you have access to and increases your understanding of your topic.

This may involve:

* discussing the investigations and the conclusions with others, including kaumātua, local kaitiaki, the kaiako, or classmates
* comparing your results to other bodies of knowledge, like a database of information or data from previous experiments.

**Examples of prompting questions for wānanga:**

* What features of the chosen investigative approaches meant they were the best approaches to answer your research questions?
* What were the limitations of one approach, compared with another?
* What were the advantages of one approach, compared with another?
* What were significant similarities and/or differences between results within the class?
* How well did each investigation answer your research questions and inform your understanding of the context?

[Student worksheet](https://ncea-live-3-storagestack-53q-assetstorages3bucket-2o21xte0r81u.s3.amazonaws.com/s3fs-public/2021-11/SC%201.2b%20Student%20Worksheet_2.docx?VersionId=zqGpKCqh4cszDqq2vi5XZs70NrmWdJ88)