NCEA Review and Maintenance Programme – 2027 updates

Review and maintenance work has been undertaken for NZC NCEA for 2027. This pdf document contains the updated assessment materials for **Earth and Space Science Level 3**. In January 2027, Levels 2 and 3 assessment materials will be updated on TKI. For external assessment specifications, refer to the NZQA website.

Subject: Earth and Space Science
Level 3

Product	What's changed?
AS3.6a 91415 Internal Assessment Activity	• Changes in the wording of the task to better support understanding of the Achievement Standard.
AS3.6b 91415 Internal Assessment Activity	• Changes in the wording of the task to better support understanding of the Achievement Standard.

Contents

Product	Page
AS3.6a 91415 Internal Assessment Activity	2
AS3.6b 91415 Internal Assessment Activity	9

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Internal Assessment Resource

Earth and Space Science Level 3

This resource supports assessment against:

Achievement Standard 91415 version 2

Investigate an aspect of astronomy

Resource title: Could Aliens Really Exist?

4 credits

This resource:

- Clarifies the requirements of the standard
- Supports good assessment practice
- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

Date version published by Ministry of Education	January 2027 To support internal assessment from 2027
Authenticity of evidence	Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material. Using this assessment resource without modification may mean that students' work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform.

Internal Assessment Resource

Achievement Standard Earth and Space Science 91415: Investigate an aspect of astronomy

Resource reference: Earth and Space Science 3.6A v2

Resource title: Could Aliens Really Exist?

Credits: 4

Teacher guidelines

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Earth and Space Science 91415. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students against it.

Context/setting

This activity requires students to investigate whether life could exist on other planets or moons in our solar system. They will consider the **conditions on other planets or moons that may mean that life could exist**, and the possible forms that such life would take to survive in these conditions.

This context sets out the astronomical aspect for this assessment.

Conditions

This activity will take place over 4–6 weeks of in-class and out-of-class time.

The student can work collaboratively with other students to research but will be assessed individually.

The assessment will be a written report or poster presentation. Relevant images, data, and diagrams can be used to illustrate points.

Group and class discussion to increase understanding of the task is recommended.

Resource requirements

You may provide resources such as video clips, key scientific articles, and lists of suitable websites. A list of key websites is provided in Student Resource A of the student instructions.

Additional information

None.

Internal Assessment Resource

Achievement Standard Earth and Space Science 91415: Investigate an aspect of astronomy

Resource reference: Earth and Space Science 3.6A v2

Resource title: Could Aliens Really Exist?

Credits: 4

Achievement	Achievement with Merit	Achievement with Excellence
Investigate an aspect of astronomy.	Investigate in-depth an aspect of astronomy.	Investigate comprehensively an aspect of astronomy.

Student instructions

Introduction

This assessment activity requires you to investigate whether life could exist on other planets or moons in our solar system.

You will research the topic and present findings that:

- explain whether life could exist on other planets or moons in our solar system
- explain the key science relevant to whether life could exist on other planets or moons in our solar system
- integrate the explanations.

You can write a report or produce a poster.

> Teacher note: You could edit this selection to guide your students to the presentation method you prefer. If you do so, this will also need to be edited below.

Images, data, and diagrams can be used to illustrate points. Rough notes and processed resources must also be handed in.

You may work collaboratively to research the topic, but the report must be your own work.

You will have 4–6 weeks of in-class and out-of-class time to complete the activity.

You will be assessed on your explanation of the astronomical aspect you have considered and the quality of the links that you have made between your explanations of whether life could exist on other planets and moons in our solar system and the key science relevant to this. It is very important that the final assessment is in your own words. This will show that you have understood the work and have not just copied information from the sources.

Task

Conduct research

Gather, select, and process a wide range of information on the topic.

Collect information from a range of resources, such as class notes, the Internet, photographs, videos, DVDs, reference books, and interviews. Student Resource A contains information that will be useful when conducting your research.

Select and process the information you need. Show you have done this by writing notes in a logbook and/or by annotating your photocopied or printed-out material (for instance by underlining or highlighting). Your logbook and any annotated material must be handed in with your report.

This part may be conducted in collaboration with other students or on your own. You must show evidence of your role in any collaboration, for instance by writing a summary of a group discussion in your logbook.

Keep all your notes and copies of resources showing processing. If you have used generative AI to help with research or structure, your prompts and the responses to these must be recorded. These notes and/or prompts and responses may be on paper or digital, but they must be handed in with the final report.

All sources of information, images, diagrams (not generated by you), and data must be acknowledged. This should be in the form of a bibliography that includes full web addresses for Internet sources, full referencing of information from books and journals, and details of any interviews you have conducted (such as time and date).

> Teacher note: You may wish to extend your students by encouraging them to apply footnoting or a style of referencing such as APA within the text. This would involve accurately citing:
> - diagrams, tables of data, and images
> - information from sources that is directly quoted
> - 'borrowed' ideas written in their own words
> - use of generative AI.

Write the report

This part must be done on your own.

Present the information you have selected and processed to communicate your investigation to an audience of Year 13 students.

You can write a report, show a PowerPoint presentation, or produce a poster. Use diagrams, images and data where relevant. (Note: If a PowerPoint presentation is used, then notes associated with the PowerPoint are essential.)

All sources of information used in your report must be recorded in a traceable format. This means that someone else could go straight to where you accessed the information from.

In your report:

- explain whether life could exist on other planets or moons in our solar system
- explain the science relevant to this topic
- integrate the explanations to show your understanding.

Student Resource A: Research

Areas where you could focus your research include:

- the conditions on selected planets and moons that life could utilise or adapt to
- the range of extreme physical and chemical conditions under which life exists on Earth
- the basic requirements life needs to survive and reproduce, for example, liquid water, a compound that can be used to release energy from food, and a carbon source
- examples of life that are found in extreme conditions, that is, extremophiles
- examples of planets and moons having conditions that could support life, or that life can adapt to, in the form of bacterial or Archaea extremophiles.

Some useful websites include:

http://en.wikipedia.org/wiki/Extremophile

https://astrobiology.com/2024/07/30/extremophiles-in-a-changing-world/

http://www.theguardians.com/Microbiology/gm_mbm04.htm

https://astrobiology.nasa.gov/news/the-message-of-really-really-extreme-life/

http://www.ucmp.berkeley.edu/archaea/archaea.html

http://science.howstuffworks.com/environmental/life/cellular-microscopic/extremophile2.htm

https://sites.dartmouth.edu/dujs/2010/03/24/limits-to-life-on-earth-beyond-extremophiles/.

Assessment schedule: Earth and Space Science 91415 Could Aliens Really Exist?

Evidence/Judgements for Achievement	Evidence/Judgements for Achievement with Merit	Evidence/Judgements for Achievement with Excellence
The student has investigated an aspect of astronomy. The student has: • selected and processed a wide range of information on the astronomical aspect and the science related to the aspect *Evidence from the logbook and processed resources.* • used the processed information to explain the astronomical aspect (conditions on other planets or moons that may mean that life could exist) *Mars' surface is very dry but there is evidence of subsurface water. Mars' atmosphere has a high saturation of carbon dioxide, a carbon source. The soil is rich in sulphur and iron that could be used as energy sources. These features are common to life on Earth.* • explained the key science relevant to the **astronomical aspect** *The range of extreme physical and chemical conditions under which life exists on Earth are:* – *a wide range of temperature from between the freezing point to over the boiling point of water* – *pH extremes such as pH 9 and above and pH3 and below* – *high radiation by living in radioactive deposits* – *very dry conditions* – *deep in the ground and ocean; so subjected to high pressure* – *high levels of dissolved heavy metals.* *The basic requirements life needs to survive and reproduce are liquid water, a carbon source, and an electron donor and acceptor or physical or chemical gradient. Life has been found in extreme conditions*	The student has investigated in-depth an aspect of astronomy. The student has: • selected and processed a wide range of information on the astronomical aspect and the science related to the aspect *Evidence from the logbook and processed resources.* • explained the science relevant to the astronomical aspect and linked this to the key science of life in extreme conditions *Extremophiles have been found on Earth in extremely dry places such as the Atacama desert, the driest place on Earth. Such bacteria or Achaea could possibly use sulphur or iron compounds, rather than oxygen, to release energy from food. Mars has a very small magnetic field and so is bombarded with solar radiation. However, there are bacteria highly resistant to radiation because their DNA has many repeated parts and so radiation damage can be easily fixed.* *The examples above relate to only part of what is required, and are just indicative.*	The student has investigated comprehensively an aspect of astronomy. The student has: • selected and processed a wide range of information on the astronomical aspect and the science related to the aspect *Evidence from the logbook and processed resources.* • made integrated links between the explanation of the astronomical aspect and the explanation of the key science of life in extreme conditions to show comprehensive understanding Conditions on other planets and the conditions for life need to be linked together. For example: *Mars' surface is very dry. Extremophiles have been found on Earth in extremely dry places such as the Atacama desert, the driest place on Earth and so it is possible that such organisms could survive on Mars. Liquid water doesn't easily exist on the surface because of low atmospheric pressure, but bacteria and Archaea can live deep underground where there may be water. The soil is rich in sulphur and iron that could be used instead of oxygen to release energy from food. Such bacteria or Archaea could possibly also use sulphur or iron compounds as electron donors. Mars has a very small magnetic field and so is bombarded with solar radiation. However, there are bacteria that are highly resistant to radiation. Radiation still damages their DNA but much of their single chromosome has repetitions that are easily copied to mend the DNA.* *The examples above relate to only part of what is required, and are just indicative.*

in just about every place that humans have looked, mainly in the form of bacteria and Archaea, collectively called extremophiles. *The examples above relate to only part of what is required, and are just indicative.*		

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Internal Assessment Resource
Earth and Space Science Level 3

This resource supports assessment against:

Achievement Standard 91415 version 2

Investigate an aspect of astronomy

Resource title: Space Exploration

4 credits

This resource:

- Clarifies the requirements of the standard
- Supports good assessment practice
- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

Date version published by Ministry of Education	January 2027 To support internal assessment from 2027
Authenticity of evidence	Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material. Using this assessment resource without modification may mean that students' work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform.

Internal Assessment Resource

Achievement Standard Earth and Space Science 91415: Investigate an aspect of astronomy

Resource reference: Earth and Space Science 3.6B v2

Resource title: Space Exploration

Credits: 4

Teacher guidelines

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Earth and Space Science 91415. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students against it.

Context/setting

This activity requires students to investigate an aspect of space exploration. You may select an aspect or allow students to choose their own.

Examples of aspects of space exploration include:

- finding dwarf planets
- looking for exoplanets
- exploring conditions on other planets and moons
- investigating whether humans could cope in space for long periods of time
- discovering black holes.

This context sets out the astronomical aspect for this assessment.

Conditions

This activity will take place over 4–6 weeks of in-class and out-of-class time.

The student can work collaboratively with other students to research but will be assessed individually.

Students can produce a written report, a PowerPoint presentation, or a poster. Relevant images, data and diagrams can be used to illustrate points.

Resource requirements

You may provide resources such as video clips, DVDs, key scientific articles, relevant classroom teaching and lists of suitable websites. Students may also interview scientists and other experts.

Additional information

None.

Internal Assessment Resource

Achievement Standard Earth and Space Science 91415: Investigate an aspect of astronomy

Resource reference: Earth and Space Science 3.6B v2

Resource title: Space Exploration

Credits: 4

Achievement	Achievement with Merit	Achievement with Excellence
Investigate an aspect of astronomy.	Investigate in-depth an aspect of astronomy.	Investigate comprehensively an aspect of astronomy.

Student instructions

Introduction

This assessment activity requires you to investigate an aspect of space exploration. You may choose an example given to you or select one of your own in negotiation with your teacher.

You will research the topic and present findings that:

- explain the aspect of space exploration you have chosen
- explain the key science relevant to this aspect of space exploration
- integrate your explanations.

You can produce a report, a PowerPoint presentation, or a poster. (Note: If a PowerPoint presentation is produced, then notes associated with the PowerPoint are essential.)

Images, data, and diagrams can be used to illustrate points. Rough notes and processed resources must also be handed in.

> Teacher note: You could edit this selection to guide your students to the presentation method you prefer. If you do so, this will also need to be edited below.

You may work collaboratively to research the aspect of space exploration. The report (or PowerPoint presentation or poster) must be your own work.

You will have 4–6 weeks of in-class and out-of-class time to complete the activity.

You will be assessed on your explanation of the aspect of space exploration you have chosen and the quality of the links that you have made between this and the key science relevant to it. It is important that the final assessment is in your own words. This will show that you have understood the work and have not just copied information from the sources.

Task

Conduct research

Gather, select, and process a wide range of information on the topic.

Collect information from a range of resources such as class notes, the Internet, photographs, videos, DVDs, reference books, and interviews. You may collect and share information collaboratively.

Select and process the information you need. Show how you have done this by writing notes in a logbook and/or by annotating your photocopied or printed-out material (for instance by highlighting, underlining and making notes and putting useful information into your own words).

This part may be conducted in collaboration with other students or on your own. You must show evidence of your role in any collaboration, for instance by writing a summary of a group discussion in your logbook.

Keep all your notes and copies of resources showing processing. If you have used generative AI to help with research or structure, your prompts and the responses to must be recorded. These notes and/or prompts may be on paper or digital, but they must be handed in with the final report.

All sources of information, images, diagrams (not generated by you) and data must be acknowledged. This should be in the form of a bibliography that includes full web addresses for Internet sources, full referencing of information from books and journals, and details of any interviews you have conducted (such as time and date).

> Teacher note: You may wish to extend your students by encouraging them to apply footnoting or a style of referencing such as APA within the text. This would involve accurately citing:
> - diagrams, tables of data, and images
> - information from sources that is directly quoted
> - 'borrowed' ideas written in their own words
> - use of generative AI.

Write the report

This part must be done on your own.

Present the information you have selected and processed to communicate your investigation to an audience of Year 13 students.

You can write a report, create a PowerPoint presentation, or produce a poster. Use diagrams, images, and data where relevant.

All sources of information used must be recorded in a traceable format. This means that someone else could go straight to where you accessed the information from.

In your report:

- explain the aspect of space exploration you have chosen
- explain the science relevant to the aspect
- integrate the explanations to show your understanding.

Assessment schedule: Earth and Space Science 91415 Space Exploration

Evidence/Judgements for Achievement	Evidence/Judgements for Achievement with Merit	Evidence/Judgements for Achievement with Excellence
The student has investigated an aspect of astronomy which is key to space exploration. The student has selected and processed a wide range of information on the astronomical aspect and the science related to the aspect. *Evidence for this will come from the logbook and processed resources that students will hand in.* The student has explained the astronomical aspect of space exploration. For example: *Dwarf planets orbit around the sun and have sufficient mass to develop hydrostatic equilibrium, i.e., they are round. They have not become large enough, however, to clear their orbit, so they usually end up sharing their orbit with similar-sized objects. They are found in the Asteroid belt, around and between the gas giants as Trojans and Centaurs, in the Kuiper Belt and suspected in the Oort Cloud.* The student has explained the key science relevant to the **astronomical aspect**. For example: *Ceres and Pluto were discovered in 1801 and 1930 respectively. However, the dwarf planets that are beyond Neptune have been harder to find. Distances are great and the objects very small. Also, their orbits are often highly elliptical and not on the same plane as the planets. Their surfaces vary in how much light they reflect. An object with a dark surface is much harder to find with a telescope than one with a bright surface.* *The examples above relate to only part of what is required, and are just indicative.*	The student has investigated in-depth an aspect of astronomy. The student has selected and processed a wide range of information on the astronomical aspect and the science related to the aspect. *Evidence for this will come from the logbook and processed resources that students will hand in.* The student has explained the science relevant to the astronomical aspect and linked this to the key science affecting (or affected by) this. For example: *The dwarf planets that are beyond Neptune in the Kuiper Belt and the Oort Cloud are much harder to find. Distances are great and the objects very small. Also, their orbits are often highly elliptical and not on the same plane as the planets so there is a vast amount of sky to explore to find them. Wobbles in other objects' orbits may indicate a new object. Also, their surfaces vary in how much light they reflect. An object with a dark surface reflects very little light and is much harder to find with a telescope than one with a bright surface. So a large dark object may be relatively close but appears to be further away, or a highly reflective object may appear closer.* *The examples above relate to only part of what is required, and are just indicative.*	The student has investigated comprehensively an aspect of astronomy. The student has selected and processed a wide range of information on the astronomical aspect and the science related to the aspect. *Evidence for this will come from the logbook and processed resources that students will hand in.* The student has made integrated links between the explanation of the astronomical aspect of space exploration and the explanation of the key science relevant to show comprehensive understanding. For example: *Ceres was the first dwarf planet found because, being part of the asteroid belt, it was orbiting on the same plane as all the planets. Pluto was only discovered when irregularities in Neptune's orbit were found. Without this it would have been difficult because Pluto's orbit is not on the same plane as the planets. The other dwarf planets found are all in the Kuiper Belt or in the inner edge of the Oort Cloud. Distance and highly unusual orbits make searching the sky very difficult. Also, not enough objects have been found and studied to make looking for irregularities in orbits a good way to find new objects. Also, their surfaces vary in how much light they reflect. An object with a dark surface reflects very little light and is much harder to find with a telescope than one with a bright surface. So a large dark object may be relatively close but appears to be further away, or a highly reflective object (one with a high albedo) may appear closer. However, the surface of the dwarf planet can be studied by studying the albedo of a dwarf planet, and also the diameter can be measured. This was how it was found that Eris was larger than Pluto.* *The examples above relate to only part of what is required, and are just indicative.*

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.