

No part of the candidate's evidence in this exemplar material may be presented in an external assessment for the purpose of gaining an NZQA qualification or award.

SUPERVISOR'S USE ONLY

1

91922



Draw a cross through the box (X) if you have NOT written in this booklet

+



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science 2024

91922 Describe features of science that have contributed to the development of a science idea in a local context

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Describe features of science that have contributed to the development of a science idea in a local context.	Explain features of science that have contributed to the development of a science idea in a local context.	Examine features of science that have contributed to the development of a science idea in a local context.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Pull out Resource Booklet 91922R from the centre of this booklet.

Choose ONE science idea from the Resource Booklet to answer ALL parts of the task in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–7 in the correct order and that none of these pages is blank.

Do not write in the margins (// // //). This area will be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Excellence

TOTAL 07

Page 1

Make sure you have the paper Resource Booklet 91922R.

INSTRUCTIONS

This task is made up of three parts. You must answer ALL three parts.

Choose ONE science idea from the resource booklet to complete this assessment.

How are the oceans affected by increasing carbon dioxide in the atmosphere? ▼

Use information in the resource booklet for your chosen science idea to answer ALL parts of the task.

PART ONE

For part one, focus on **these two** features of science:

- the development of science ideas in response to new evidence or varied perspectives, such as Māori and Pacific knowledge systems
- linking new evidence to existing models, theories, and ideas.

Using the information from your chosen science idea, discuss the following:

(a) How does EACH feature of science mentioned above contribute to the development of the science idea?

(i)

B I U ☰ ▼ ☷ ▼ ↶ ↷ ②

The development of science ideas in response to new evidence or varied perspectives, such as Maori and Pacific knowledge systems contribute to the development of the science idea because Charles David Keeling was concerned that burning fossil fuels produced carbon dioxide (CO₂). Keeling decided to make daily measurements of CO₂ at the Mauna Loa Observatory. The text explains, "He measured the CO₂ concentration in parts per million (ppm)". These measurements continued, and new evidence showed that the CO₂ concentration (ppm) was only getting higher as shown clearly on the graph. Dr Kim Currie saw this and she was inspired to build on his findings. She wanted to understand: How does the uptake of CO₂ from the atmosphere vary around New Zealand's coast? This affects the Maori people of New Zealand because New Zealand had high levels of CO₂ in the atmosphere and Maori people wanted to keep their waters clean. With this new discovery, they had hope that they can clean our waters.

(ii)

B I U ☰ ▼ ☷ ▼ ↶ ↷ ②

Dr Kim Currie helped contribute to the science idea because of her interest in Charles David Keeling's existing data and theories. The text explains, "In 1992, Kim Currie was studying at Otago University in Dunedin and learned about Charles Keeling's measurements. She was inspired to build on his findings but took a different perspective." She wanted to study and expand Keeling's data, she decided that measuring the amount of CO₂ in the ocean would help her to understand this relationship. Because of Dr Kim Currie's interest in Keeling's data, she was able to link her own experiments to show the change in ocean pH levels over time.

(b) Why are these features of science important to the development of the science idea?

B I U     

These features of science are important to the development of the science idea because if Currie didn't find Keeling's findings and data, she wouldn't have struck her curiosity and she would have never done her own experiments and found her own data to share and explain how when pH values decrease it means something is getting less alkaline and more acidic. The text quotes, "Currie discovered a pattern that showed more CO₂ is being absorbed from the atmosphere into the ocean. This is lowering the pH of the ocean, which means it is becoming more acidic." Because of Keeling she would have never been able to discover what she did and share it and compare with scientists all over the world. The other feature is important because if Charles David Keeling wasn't concerned that burning fossil fuels produced CO₂, Currie would have never been able to use that evidence to help do her own experiments on the levels of pH in the ocean overtime.

(c) How do the two features of science work **together** to support the development of the science idea?

B I U     

These features work together to support the development of the science idea because they both link back to Currie's curiosity in Keeling's findings. If Keeling never thought there was an issue with burning fossil fuels creating CO₂, Currie would not have been inspired to undergo her own experiments to expand on his study. The text quotes, "Kim Currie was studying at Otago University in Dunedin and learned about Charles Keeling's measurements. She was inspired to build on his findings but took a different perspective." Keeling's new evidence gave inspiration and Currie used the evidence and linked it with his theories.

PART TWO

For part two, focus on **these two** features of science:

- interpreting patterns and interactions
- the influence of the development and use of technology on science.

Using the information from your chosen science idea, discuss the following:

(a) How does the interpretation of patterns and interactions add to the science idea?

B I U

The interpretation of patterns and interactions add to the science idea because of Currie's experiment. "Dr Currie decided to take pH measurements off the coast of Dunedin at different points." the Data was collected as a time series and overtime, Dr Currie produced a time series that showed a pattern. The pH of the ocean seemed to be getting lower. She wanted to know if the other scientists were finding similar results. Dr Currie met with scientists from all over the world and compared how she did her measurements. They were able to compare their results, and they had all found the same pattern. If Currie didn't interact with other scientists she wouldn't have been able to properly conclude that the ocean is becoming more acidic.

(b) How does the development and use of technology add to the science idea?

B I U

The development and use of technology adds to the science idea because Dr Currie had to design and make new measuring equipment. This equipment would be able to measure the parts per million on CO₂ in the ocean very accurately. The text quotes, "Dr Currie had to design and make new measuring equipment. This equipment would be able to measure the parts per million on CO₂ in the ocean very accurately." This was important because she needed equipment that would be the most accurate to calculate the best results for her conclusion. The technology was also important when Currie wanted to compare results with other scientists, because Currie needed to make sure the other scientist were making the measurements in the same way as Currie. So they could get the best results, and add to the science idea.

(c) Why are these two features of science important to the development of the science idea?

B I U

These two features of science are important to the development of the science idea because Currie had to design the technology and equipment herself if she wanted to get the most accurate results. Having the most accurate results in one of the most important things in an experiment, so we can get the best results. Comparing your results with other scientist is also very important, as it is easier to work together and share results rather on concluding on Currie's own.

(d) How does one feature of science **support** the other in the development of the science idea?

B I U

The influence of the development and the use of technology helped support Currie's time series that showed a pattern. If she didn't have the right technology she wouldn't be able to support her point in the time series graph pattern. Because she had the right technology she was able to meet with other scientists to conclude their discoveries.

PART THREE

For part three, focus on **these two** features of science:

- the influence of the development and use of technology on science
- using specific language, symbols, and conventions.

Using the information from your chosen science idea, discuss the following:

(a) How do the use of technology and specific language, symbols, and conventions contribute to the science idea?

B *I* U

The use of the symbols "CO₂ and pH" played a big part in the science idea because it helps explain the parts of the experiments in a more specific way rather than using other incorrect language. They also used language such as, "atmosphere and measuring", using this language it helped contribute to the science idea because using that language helps other scientists understand and communicate with each other through similar experiments.

(b) Why was each feature of science significant to the development of the science idea?

B *I* U

These features of science are significant to the development of the science idea because the use of technology and specific language, symbols, and conventions all work together to create a discovery about CO₂ levels in the atmosphere and how they affect the ocean. Without this language it would be difficult to understand and do the experiments properly.

(c) How do these two features of science work **together** to develop the science idea?

B *I* U

These two features of science work together to develop the science idea because technology and the symbols and language both link to when Currie wants to meet and compare results to see if they are similar. "However, to do this she needed to make sure that the other scientists' measurements were made in the same way and meant the same thing that hers did." Using both language and technology she was successfully able to compare results with the other scientists and confirm her results. "Currie met with scientists from all over the world and compared how she did her measurements."

Excellence

Subject: Science

Standard: 91922

Total score: 07

Grade score	Marker commentary
E7	This response explained the significance of both features of science and discussed how they interacted in the development of the science idea. The response explained, with examples, the significance of the development and use of technology. Additionally, the response explained the significance of specific language, symbols, and conventions with examples, but did not link this to technology. The candidate has not recognised the significance of interpreting patterns or interactions in the science idea.