Science education encourages students to have inquiring minds and to make sense of the actions and interactions of the biological and physical features of their environment.

The science curriculum is organised into four major areas of learning which are intended to help students make sense of the living world, the physical world, the material world, and planet Earth and beyond. Since science is both a process of enquiry and a body of knowledge, the curriculum also requires that students are helped to develop scientific ideas, skills and attitudes, and “acquire an understanding of the nature of science and its relationship to technology”.

This chapter reports the results of eighteen science tasks administered to individual Māori students in both general education settings and Māori immersion settings. Results for fifteen additional tasks administered to individual Māori students in both types of settings are not reported here because less than 70 percent of the students in Māori immersion settings completed these tasks (for reasons explained in Chapter 2).

Of the eighteen tasks included here, six were administered in one-to-one interview format and eleven were attempted in a stations format (where students worked independently on a series of paper and pencil tasks, many of which included the use of hands-on materials or visual information). The last task was administered in paper-and-pencil format during a team and independent session.

National monitoring results are reported task by task so that results can be understood in relation to what the students were asked to do. To allow comparisons of performance between the 1999 and 2003 assessments, however, seven of the eighteen tasks have been designated link tasks. Student performance data on these tasks are presented in this report, but the tasks are described only in general terms because they will be used again in 2003.

Two of the eighteen tasks reported here had significant problems with the translation for the Māori language version. These problems are clearly identified in the commentaries for the tasks. This left sixteen tasks on which the performance of Māori students in general education and Māori students in Māori immersion settings could be compared. The two categories of students performed equally well on twelve tasks, with students in immersion programmes scoring statistically significantly higher on one task and Māori students in general education scoring statistically significantly higher on three tasks. These comparisons must be viewed with considerable caution, for the reasons discussed in Chapter 2.
**Pātiki — Flounder**

**Approach:** One to one

**Focus:** Observe a flounder and identify its features with adaptive significance to its habitat on the sandy bottom of the ocean.

**Resources:** Video of flounder in its habitat.

**Questions/instructions:**

We’re going to watch a video that shows shots of a flounder living on the sandy bottom of the sea. The flounder has some features that help it live in this environment. Watch the video carefully. After the video I want you to tell me about the features that help the flounder live in its environment.

Ka mātakitaki atata tāua mō te noho a te pātiki i ngā onepū o te takere o te moana. Kei te pātiki ētahi āhuatanga e āhei ai tana noho i tēnei taito. Āta mātakitakahia te ripene atata. Ka mutu ana, kōrerotia mai ngā āhuatanga e āhei ai te pātiki ki te noho i tēnei taito.

Play video.

---

**Commentary:**

The performance of some MI (Māori Immersion) students was affected by their limited Māori language skills. They might have been helped if the introductory paragraph had used the idea of hiding (huna). MI (Māori Immersion) students scored statistically significantly lower than GEd (General Education) students.
Chapter 3: Science

He Urutaunga Kararehe - Te Ngata — Animal Adaptation - Snail

**Approach:** Station

**Focus:** Observe and describe the structural features of a snail that are considered to be adaptive features with survival value.

**Resources:** Picture of snail.

**Questions/instructions:**

Look carefully at the picture. Write about the parts of the snail that help it to survive.

An example has been done for you.

<table>
<thead>
<tr>
<th>Snail</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell protects soft parts inside from predators</td>
<td>30 15</td>
</tr>
<tr>
<td>Shell keeps body moist</td>
<td>1 0</td>
</tr>
<tr>
<td>Body can withdraw totally into shell</td>
<td>25 26</td>
</tr>
<tr>
<td>Body uses slime to allow snail to slide easily and safely</td>
<td>48 22</td>
</tr>
<tr>
<td>Slime closes entrance to shell for temperature control</td>
<td>2 7</td>
</tr>
<tr>
<td>Eyes used to see (light and dark)</td>
<td>64 37</td>
</tr>
<tr>
<td>Tentacles used to touch, smell and taste</td>
<td>40 28</td>
</tr>
<tr>
<td>Mouth used to eat</td>
<td>12 20</td>
</tr>
</tbody>
</table>

Number of valid responses: 4–511 4
2–3 61 50
0–1 28 46

**Commentary:**

The performance of some MI (Māori Immersion) students was affected by their limited Māori language skills. Also, the phrase “kei reira tōna oranga” was ambiguous. Because of the latter fault, a statistical comparison of GEd (General Education) and MI (Māori Immersion) student performances was not appropriate.
Kai Moana

Approach: Station
Focus: Demonstrate knowledge of the identification and specific coastal habitat of 10 seafoods (kai moana).
Resources: Picture of coastal scene, sticker with names of seafoods.

Questions/instructions:
Kai moana means seafood. Different seafoods are found in different places. You have a seaside map and 10 pictures of sea foods.

1. Stick each picture on the map to show where it would usually be found.

2. Write the number for each seafood beside its name. The first one is done for you.

Here are 10 pictures of kai moana and a list of their names.
Anei etahi pikitia te kau o ngā kaimoana me tētahi rā rangi o ngā ingoa.

English | Māori | % responses
---|---|---
Paua | Paua | clings to rocks in deep sea 55 69
Kina | Kina | identified picture 8 96 100
Oyster | Tio | rocky areas, low tide pools near shore 51 75
Crayfish | Köura | upper tidal rocky area 43 65
Crab | Pāpaka | deep water, near rocks 60 62
Snapper | Tāmure | exposed beaches, low tide areas 65 86
Mussel | Kuku | deep sea 67 76
Eel | Tuna | rocky areas, deep water beds 41 63
Cockle/pipi | Tuangi | fresh water, streams, rivers 70 81
Flounder | Pātiki | shallow tidal flats, estuaries 35 61

Commentary:
Quite often, the MI (Māori Immersion) students showed greater knowledge of where the seafood could be found, but less knowledge of the name of the seafood. The difference between MI (Māori Immersion) and GEd (General Education) students in overall performance was not statistically significant.
### Chapter 3: Science

**He Manu — Birds**

**Approach:** Station

**Focus:** Recognise from prior knowledge a selection of birds, define the term “native bird,” and identify those that fit in this category.

**Resources:** Pictures numbered 1–8.

### Questions/instructions:

1. Look at the bird pictures. Match the birds in the pictures with their names on the chart. Write the number of the bird beside its name.

   Titiro ki ngā whakaahua o ngā manu.
   Whakaritea ngā whakaahua manu kia hāngai ki ō rātou ingoa. Tuhia te tau o te whakaahua manu ki te taha o tōna ingoa.

<table>
<thead>
<tr>
<th>Bird names</th>
<th>number</th>
<th>✓ native birds</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>fantail</td>
<td>4</td>
<td>✓</td>
<td>95 GEd, 78 MI</td>
</tr>
<tr>
<td>thrush</td>
<td>6</td>
<td>✓</td>
<td>36 GEd, 12 MI</td>
</tr>
<tr>
<td>shag</td>
<td>2</td>
<td>✓</td>
<td>53 GEd, 55 MI</td>
</tr>
<tr>
<td>sparrow</td>
<td>3</td>
<td>✓</td>
<td>53 GEd, 14 MI</td>
</tr>
<tr>
<td>waxeye</td>
<td>8</td>
<td>✓</td>
<td>42 GEd, 27 MI</td>
</tr>
<tr>
<td>pukeko</td>
<td>5</td>
<td>✓</td>
<td>82 GEd, 92 MI</td>
</tr>
<tr>
<td>woodpigeon</td>
<td>1</td>
<td>✓</td>
<td>55 GEd, 86 MI</td>
</tr>
<tr>
<td>kingfisher</td>
<td>7</td>
<td>✓</td>
<td>65 GEd, 37 MI</td>
</tr>
</tbody>
</table>

2. Some of these birds are native to New Zealand. What do we mean by “native” birds?

   Ko ētahi o ēnei manu he manu māori o Aotearoa. He aha te tikanga o te “manu māori”?

   | not introduced to NZ | 2 GEd, 19 MI |
   | found only in NZ     | 14 GEd, 28 MI |

3. Tick the birds that you think are native to New Zealand. Put your ticks in the “native birds” column. Results not recorded here.

### Commentary:

 Compared to GEd (General Education) students, MI (Māori Immersion) students performed better in naming some distinctive native birds, but worse on introduced species. Overall, MI (Māori Immersion) students scored statistically significantly lower than GEd (General Education) students.
Te Whakamakere Moni — Dropping Coins

Approach: Station
Focus: Students demonstrate their intuition or prior learning about the effects of gravity on objects of differing mass, then carry out a practical investigation and interpret the outcome.
Resources: 50c coin, 10c coin.

Questions/instructions:
In this activity you will be finding out about how things fall.

1. THINK FIRST — do not try it yet.
   You have a 10 cent coin and a 50 cent coin.
   Which picture do you think shows a way to hold the coins before you drop them so they will hit the floor at the same time?
   Circle the picture which you think shows the best way.

2. NOW TRY IT.
   Hold your arms in each of the different ways and drop the coins. Write down which coin hit the floor first.
   KEI A KOE INĀIANEI
   Torona ō ringa kia rerekē pērā i ērā o ia pikitia, ā, ka whakamakere ai i ngā moni. Tuhia te moni i tau tuatahi ai ki te papa.

3. Which is the best way to hold your arms so the coins hit the floor at the same time?
   Circle the picture which you think shows the best way.
   Ko tēhea te toro tino pai mō ō ringa, kia kotahi ai te tau a ngā moni ki te papa?
   Porohitatia te pikitia e tika ana ki a koe.

4. What could you do to check your results in question 2?
   Me aha koe e whakaritea ai o ortinga i te pātai tuarua?

Commentary:
MI (Māori Immersion) students scored statistically significantly lower than GEd (General Education) students.
He Waea Pirikoko — Mystery Wires

**Approach:** Station

**Focus:** Use a continuity tester (linked battery and bulb) to test and decide which of 6 wires are connected.

**Resources:** Continuity tester (linked battery and bulb with alligator clips), cardboard with 6 wires sticking out.

(blue and grey wires connected internally, red, cream and yellow wires all connected internally)

---

### Questions/Instructions:

In this activity you will be finding out how the wires are connected inside the cardboard.

1. Check that everything on the board is working by touching the 2 loose alligator clips together.
   The bulb will go if everything is working. If the bulb does not go, tell the teacher now.

   Whakamātauria mena kei te ora ngā mea katoa o te papa pūaha [bulb board], mā te whakapā i ngā rawhi kakati [alligator clips] e rua. Mena e ora ana, ka kā mai te pūaha. Ki te kore e kā mai te pūaha, me kōrerohia atu ki te kaiako ināiane.

Inside the cardboard some of the wires are joined to other wires. Each wire might be joined to 1 other, 2 others, or no others.

Use the board with the battery and bulb to find out which wires are connected.

Whakamahia te papa o te pūhiko me te pūaha, kia kitea ai ko ehea waea e tūhono ana.

---

### Commentary:

The small differences in performances between the GEd (General Education) and MI (Māori Immersion) students were not statistically significant.

<table>
<thead>
<tr>
<th>Connections</th>
<th>GEd Responses</th>
<th>MI Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green wire not connected to any other</td>
<td>84</td>
<td>74</td>
</tr>
<tr>
<td>Blue and grey wires connected to each other only</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>Red, yellow and cream wires all connected to each other and no others</td>
<td>71</td>
<td>57</td>
</tr>
</tbody>
</table>
**Wai Mīharo — Wonderful Water**

**Approach:** Independent  
**Focus:** Explain buoyancy and flotation in three situations.  
**Resources:** None

**Questions/instructions:**

Look at the pictures then answer the questions.

Tirohia ngā pikitia, kātahi ka whakautu i ngā pātai.

1. Imagine that you have a ball of plasticine. You put it in water and it sinks. Then you shape it into a boat. Now it floats. Why did the ball of plasticine sink but the boat float?

   Tenā me pohewa noa he poi kerepēhi [ball of plasticine] tāu. Ka kuhuna e koe ki rōto i te wai, ka totohu. Kia hangaia e koe hei waka, kātahi ka mānu. He aha te poi kerepēhi i totohu ai, i mānu kē ai ko te waka?

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>boat shape displaces enough water to hold weight of plasticine</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>more spread out so it floats/water holds it up there</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>because there is air inside it</td>
<td>29</td>
<td>11</td>
</tr>
</tbody>
</table>

2. Why do things feel lighter when you pick them up under water?

   He aha i māmā ake ai he mea ka hikina ana mai i raro i te wai?

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>some of the weight is supported by the water displaced</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>because water is less dense than air</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>there is less or no gravity under water</td>
<td>21</td>
<td>13</td>
</tr>
</tbody>
</table>

3. Someone holds the ball at the bottom.  
   Why does it jump out of the water when they let it go?

   Ka pupuritia e tētahi te poi ki raro. Kia tukua, nā te aha i peke ake ait e poi?

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under the water: ball weighs less than the water displaced air in the ball makes it rise</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Above the water: ball moves upward because of inertia ball is going fast when it reaches the surface</td>
<td>43</td>
<td>36</td>
</tr>
</tbody>
</table>

**Commentary:**

This was a difficult task beyond the reach of most year 8 students. There was not a statistically significant difference between GEd (General Education) and MI (Māori Immersion) students.
Chapter 3: Science

Te Wai Tōmiti — Disappearing Water

**Approach:** Station

**Focus:** Explanation of evaporation and understanding of the water cycle.

**Resources:** Video showing evaporation with hand fanning and use of a hair dryer.

**Questions/instructions:**
In this activity you are going to watch a video clip showing people cleaning a blackboard, then answer some questions about what you saw happening in the video. Watch the video and then answer these questions. You may replay the video if you need to.

I tēnei mahi e mātakitaki ana koutou i tētahi ripene atata poto o ngā tāngata e ūkui ana i te papatuhituhi, kātahi ka whakautu i ngā pātai o ngā mahi i kite koutou. Mātakitaki i te atata, ā, ka whakautu i ēnei pātai. Me whakaatu anō te ripene atata mehe mea koutou e hiahia ana.

Two squares were marked on the blackboard. One was dried using fanning (left) one was dried using a hair dryer (right).

1. Why did fanning the wet blackboard help it to dry?
   He aha i maroke ai te papatuhituhi i te tāwhiritanga?
   - fanning moves moist air away from the blackboard to allow more to evaporate 0 0
   - mentions wind and/or water vapour and/or evaporation 9 12
   - mentions wind or air movement only 63 79

2. The hairdrier uses heat as well as fanning. Why did the heat dry the blackboard faster?
   He mahana, he tāwhiri ngā whakamahinga o te whakamaroke makawe. He aha i tere ake ai te maroke o te papatuhituhi i te mahana?
   - mentions increased warmth helping evaporation 50 34

3. Where does the water go as the blackboard dries?
   Ka tōmiti te wai ki hea i te wā e maroke haere ana te papatuhituhi?
   - evaporation or equivalent (eg. “into the air”) 50 40

4. Now think about a puddle on the footpath. Where does the water go when the puddle dries out?
   Nā, whakaaro ki tētahi hōpua pua i te ara hikoi. Ka ngaro te wai ki hea ina tōmiti ai te hōpua pua?
   - both in to the air and the ground 9 2
   - into the air/sky 46 40
   - into the ground 30 30

5. The water that falls as rain in one place may come from another place that is far away. Explain how this happens.
   You can draw a diagram with labels to help explain your answer.
   Tērā pea ko te ua o tētahi wāhi i puta kē mai i tētahi wāhi pāmamao. Whakamārama te aha i pēnā aī? Tāngia he hoa hoa, me ōna tapa, hei whakamārama i tō whakautu.

   **Includes all three aspects:**
   - water evaporation from source
   - cloud movement
   - rain falling elsewhere 10 14

**Commentary:**
Overall, the performances of GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.
**Ngā Matire — Rods**

**Approach:** One to one

**Focus:** Predict and investigate the heat conductivity of different materials, and explain practical applications.

**Resources:** 5 rods, picture of saucepan, , timer, mug, paper towel, water (boiling), electric jug.

**Questions/instructions:**

In this activity you are going to find out and tell me about how quickly different materials let heat through them.

Show student the rods as you name them.

1. Here are 5 rods. They are made of wood, perspex, copper, steel and aluminium.

I am going to put them into this cup then pour in boiling water. Then I will get you to touch the end of each rod to find out how much heat they are letting through.

2. But before we start, can you tell me which rod you think will let the heat move through most quickly?

**Prediction for first:**

<table>
<thead>
<tr>
<th>Material</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>copper</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>aluminium</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>steel</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>perspex</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>wood</td>
<td>21</td>
<td>13</td>
</tr>
</tbody>
</table>

3. Why do you think that rod will let the heat through most quickly? (not marked)

4. Now let’s do the experiment.

I am going to pour boiling water into the mug, and I want you to test each rod.

When you test the rods, touch them like this:

Demonstrate how the rods should be touched — before the boiling water is added. Demonstrate use of timer.

I will get you to check them every 30 seconds, for two minutes.

With the rods already in the mug, pour boiling water into the mug, and get ready to time the 30 sec intervals.

Repeat the following instruction 4 times (every 30 seconds).

5. Feel each rod now, and tell me what you notice.

After 2 minutes of feel tests:

I tēnei mahi ka whakamātau koe i te tere o te kawe wera a ētahi rauemi, ā, ka whakamārama mai ai ki a au.

Whakaaturia ngā matire ki te ākonga i a koe e whakaingoa haere ana.

1. Anei ētahi matire e rima: kua hangaia ki te rākau, te kiriaku puata [perspex], te konukura [copper], te tīra[steel], me te konumohe [aluminium].

E kuhua ana e au ki roto i te maka, ka riringi ki te wai wera. Māu e whāwhā ngā tōpito o ia matire kia mātau ai pēhea te nui o te wera kei te kawea.

2. Engari, i mua i te tīmatatanga, ka taea e koe te ki mai ko tēhea te matire tino tere ki te kawe i te wera?

3. He aha koe i whakaaro ai koianā te matire tino tere ki te kawe i te wera? (not marked)

4. Me whakamātau ināianei.

E ringihia ana e au he wai wera ki roto i te maka, ā, māu e ārohi ia matire.

Ka ārohi koe i ngā matire, me pēnei te pā.

*I mua i te ringihanga ki te wai wera, whakaaturia me pēhea te pā atu ki ngā matire. Whakaaturia te whakamahinga o te mata wāti.*

Mō te 2 meneti, me ārohi e koe ia 30 hēkena.

Kua kuhua nei ngā matire ki roto i te maka, ringihia ki te wai wera, ka whakarite ai i ngā wā e toru tekau hēkena.

Hokia anō ngā tohutou e whai ake nei mō ngā wā e 4 (ia 30 hēkena).

5. Whāwhātia ia matire ināianei, ā, ka ki mai he aha tāu i rongo ai.

Ka taha te 2 meneti o ngā ārohi whāwhā:
Chapter 3: Science

6. Now lift each rod out of the water and place them on the table in order, from the one that let the heat through most quickly, to the one that let it through least quickly. Be careful to lift them out with a paper towel so that you don’t burn your fingers.

<table>
<thead>
<tr>
<th>Observations:</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>copper first</td>
<td>78 85</td>
</tr>
<tr>
<td>aluminium second</td>
<td>69 83</td>
</tr>
<tr>
<td>steel third</td>
<td>76 91</td>
</tr>
<tr>
<td>perspex fourth</td>
<td>76 64</td>
</tr>
<tr>
<td>wood fifth</td>
<td>76 64</td>
</tr>
</tbody>
</table>

7. Materials that let the heat travel through easily are called good conductors. Which rods were good conductors of heat?

- copper 96 91
- aluminium 94 69
- steel 55 32

8. When toffee is made, the ingredients are made very hot, a lot hotter than water. If we had spoons made out of each of these materials, which spoon would be the best for stirring the very hot toffee mixture?

- wood and/or perspex 4 2
- wood 56 83
- perspex 10 6
- copper 15 4

9. Why would you use that material?

- not good conductor of heat 60 80

Show student the picture of a saucepan.

The saucepan in this picture is made of stainless steel. It has a copper bottom, and a plastic handle.

10. Why do you think it has a copper bottom?

- conducts heat well 81 89

11. Why do you think it has a plastic handle?

- conducts heat poorly 94 93

Commentary:

Overall, the results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.
Kiri Huawhenua — Vege Peelings

**Approach:** One to one

**Focus:** Evaluate and justify different approaches to organic waste disposal.

**Resources:** Video showing four ways to dispose of vegetable peelings, 4 photos.

**Questions/instructions:**

In this activity I want you to think about different ways of getting rid of vegetable waste. We’ll start by watching a video.

I tēnei mahi me whakaaro ake koe ki ngā āhuatanga rerekē hei tuku para huawhenua. Tirohia te ripene atata.

**Show video.**

The video showed four different ways of getting rid of some vegetable peelings — put them in a rubbish bag, throw them on a compost heap, put them in a waste disposal unit or feeding them to the animals.

E whā nga āhuatanga rerekē hei maka para huawhenua i whakatūria e te ripene atata — kuhua ki roto i te pēke para, whiuia ki runga pū wairākau [compost heap], kuhua ki roto i te mihini kanioro [waste disposal unit], whāngaitia rānei ki ngā kararehe.

**Show pictures.**

### 1. Which of these ways do you think is a very good way to get rid of the vegetable peelings?

Ki ōu whakaaro ko ēhe a ēnei āhuatanga he tino pai mō te maka kiri huawhenua?

<table>
<thead>
<tr>
<th>Method</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>rubbish bag</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>compost heap</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>waste disposal</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>feeding to animals</td>
<td>46</td>
<td>56</td>
</tr>
</tbody>
</table>

### 2. What happens to the vegetable peelings when you get rid of them in that way?

Ka aha ngā kiri huawhenua ki te whiuia pērātia?

### 3. Why is that a very good way to get rid of the peelings?

He aha i tino pai ai tēnei āhuatanga mō te whiu kiri?

<table>
<thead>
<tr>
<th>Consideration</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>good understanding of process</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>some useful idea/s</td>
<td>40</td>
<td>62</td>
</tr>
</tbody>
</table>

### 4. Which of these ways do you think is not a very good way for getting rid of vegetable peelings?

Ko ēhe a ēnei āhuatanga ēhara i te mahi tino pai mō te whiu kiri huawhenua?

<table>
<thead>
<tr>
<th>Method</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>rubbish bag</td>
<td>40</td>
<td>47</td>
</tr>
<tr>
<td>compost heap</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>waste disposal</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>feeding to animals</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

### 5. Why is that not a very good way for getting rid of vegetable peelings?

He aha i kore ai i tino pai tērā āhuatanga mō te maka kiri huawhenua?

### 6. What happens to the vegetable peelings when you get rid of them in that way?

Ka aha ngā kiri huawhenua ki te makaina pērātia?

*Considerations of immediate and long-term consequences, hygiene, pollution, conservation, convenience, cost*:

<table>
<thead>
<tr>
<th>Consideration</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>good awareness of waste issues</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>some awareness</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

**Commentary:**

Overall, the results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.
Approach: Station
Focus: Identify the sequence of phases of the moon.
Resources: Computer, mouse, headphones, mousepad.

Questions/instructions:
This activity is done on the computer.
The computer should show the home page. If it doesn’t tell the teacher.
Click on the button that says “Moon”.
The computer will tell you what to do.

Placement of 7 phases
All correct:
for southern hemisphere 15 16
for northern hemisphere 8 2
One pair inverted:
for southern hemisphere 2 10
for northern hemisphere 4 2
Other 71 71

Commentary:
The results achieved by GEd (General Education) and MI (Māori Immersion) were not statistically significantly different.
**Link Tasks — Science**

**LINK TASK 2**

*Approach:* One to one  
*Focus:* Explanation of plant features  
*Resource:* 3 pictures, other objects

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total score: 10–14</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8–9</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>6–7</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>4–5</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>2–3</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>0–1</td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

**Commentary:**
The results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.

**LINK TASK 3**

*Approach:* Station  
*Focus:* Insect features  
*Resource:* Laptop computer, Hypercard® programme

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total score: 19–20</strong></td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>17–18</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>15–16</td>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>13–14</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>11–12</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>0–9</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

**Commentary:**
The results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.

**LINK TASK 4**

*Approach:* Station  
*Focus:* Animal adaptation  
*Resource:* Picture

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total score: 4–5</strong></td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>39</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

**Commentary:**
The results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.

**LINK TASK 16**

*Approach:* One to one  
*Focus:* Motion  
*Resource:* Not revealed

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanation:</strong></td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>

**Commentary:**
MI (Māori Immersion) students scored statistically significantly higher than GEd (General Education) students.
**LINK TASK 20**

**Approach:** Station  
**Focus:** Chemical tests  
**Resource:** Not revealed

<table>
<thead>
<tr>
<th>Component</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>72</td>
<td>81</td>
</tr>
<tr>
<td>4</td>
<td>91</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>58</td>
<td>73</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>52</td>
<td>42</td>
</tr>
</tbody>
</table>

**Commentary:**
The results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.

**LINK TASK 22**

**Approach:** One to one  
**Focus:** Phenomena on earth  
**Resource:** Video

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Information</td>
<td>49</td>
<td>40</td>
</tr>
<tr>
<td>Explanation</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

**Commentary:**
The results achieved by GEd (General Education) and MI (Māori Immersion) students were not statistically significantly different.

**LINK TASK 26**

**Approach:** Station  
**Focus:** Phenomena on earth  
**Resource:** Picture

<table>
<thead>
<tr>
<th>% responses</th>
<th>GEd</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td>9–22</td>
<td>0</td>
</tr>
<tr>
<td>6–8</td>
<td>44</td>
<td>34</td>
</tr>
<tr>
<td>3–5</td>
<td>55</td>
<td>58</td>
</tr>
<tr>
<td>0–2</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

**Commentary:**
The language in the Māori language version of this task was more difficult than the English. Accordingly, no statistical comparison of the results for GEd (General Education) and MI (Māori Immersion) students is appropriate.