

Aratohu kaiako Kaiako guide

PAT Pāngarau | PAT Mathematics

This guide is intended to
assist kaiako in the use of
PAPER ASSESSMENTS



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The PAT Pāngarau | PAT Mathematics assessments are available as paper-based versions, and online through NZCER Assist (<https://www.nzcerassist.org.nz/login>). The previous version of the PAT Mathematics assessments (paper-based and online) will not be supported from 2024.

For questions or advice

E-mail assessmentservices@nzcer.org.nz or call Assessment Services on (04) 802 1630

For support with school-wide data

E-mail educationadviser@nzcer.org.nz or call Education Advisers on (04) 802 1386



Kia ora.

Thank you for taking the time to read this kaiako guide. The guide is designed to introduce you to PAT Pāngarau | PAT Mathematics and help you understand how it can be used. It is also designed to help you understand the vision behind the refresh. NZCER's intention in carrying out the refresh has been to develop assessments that can better support the kind of learning and teaching that leads to equitable outcomes for all ākonga. Central to this is a commitment to the individual ākonga who sit the assessments. It is vital that they are able to engage in the assessments and that the results are used to promote their learning, affirm their identities, and uphold their wellbeing.

This guide represents NZCER's first step on the journey towards supporting kaiako to use the refreshed assessments with these commitments in mind. We intend to keep going, and to produce updates to the guide along with other support materials that will promote effective use of the assessments. Please look out for these.

The guide begins with a short explanation of equity and assessment and describes the background to the refresh. It then outlines the purpose of the assessments and provides some guidelines and advice around their use.

We hope that the refreshed assessments are useful for all your ākonga and that they can assist you to promote rich learning and strong kaiako-ākonga relationships.

Nga mihi,

The NZCER PAT Pāngarau | PAT Mathematics development team.

Ngā whakamoemiti

He tino hīkoi roa te whakahou i ngā PAT Pāngarau | PAT Mathematics, me te tini o ōna panonitanga. E whakamoemiti ana te ngākau ki te tokomaha kua hīkoi tahi me mātou.

Tēnei te whakawhetai atu ki ērā i piri mai ki te kaupapa ngā PAT Pāngarau | PAT Mathematics i ngā tau o mua. Kua noho ā koutou mahi hei kahupapa mō ngā mahi o ēnei rā, ā, ka pērā haere tonu hei te urutaunga o ā mātou aromatawai, hei whakaata i te horopaki ahurei o Aotearoa.

Kua tautokona tēnei kaupapa e te Williams Family Trust, ā, ka nui ā mātou mihi mō tēnei mahi mutunga mai o te whāi tikanga.

Tēnei te mihi atu ki ō mātou hoa mahi i Rangahau Mātauranga o Aotearoa | New Zealand Council for Educational Research (NZCER) mō ā rātou mahi nui mō tēnei kaupapa. E mihi ana hoki ki a Adam Errington mō ngā whakaahua i tino mārama ai ngā PAT Pāngarau | PAT Mathematics, i tōia mai ai te huhua o te rangatahi puta noa i Aotearoa ki te kaupapa.

Hei kupu whakamutunga, ka nui te mihi ki ngā ākonga, ki ngā kaiako hoki i whai wāhi ki ngā wāhanga maha o te whakahoutanga. E mihi ana mātou ki a koutou mō koutou i tahuri mai ki te tiri i ō koutou mōhiotanga, wheako anō hoki.

Me kore ake koutou, i tutuki pai ai te kaupapa.

Acknowledgments

Refreshing PAT Pāngarau | PAT Mathematics has been a complex journey of change. We would like to thank the many people who have embarked on this journey with us.

We would like to gratefully acknowledge those who have been involved with the PAT Pāngarau | PAT Mathematics development in the past. We have built on your mahi and will continue to do so as our assessments evolve to reflect the unique context of Aotearoa New Zealand.

This project has been generously supported by the Williams Family Trust, and we extend our heartfelt thanks for committing to such important mahi.

We are grateful to our colleagues at Rangahau Mātauranga o Aotearoa | New Zealand Council for Educational Research (NZCER) who have contributed to this mahi. Thanks to Adam Errington for the illustrations that made the PAT Pāngarau | PAT Mathematics more accessible and appealing to a wider range of rangatahi across Aotearoa New Zealand.

Finally, we would like to express our sincere gratitude to the ākonga and kaiako who participated in various phases of the refresh. We are grateful for your willingness to share your knowledge and experiences.

This project would not have been possible without you all.

Kupu Māori

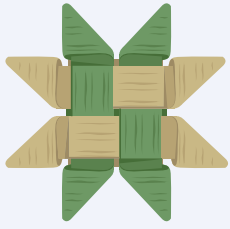
NZCER is committed to acting as an advocate and motivator in the revitalisation of te reo Māori. As part of our PAT refresh, we have welcomed opportunities to include more te reo Māori in our assessment tools.

In the *Aratohu kaiako* | *Kaiako guide* we use the terms ākonga and learner interchangeably to talk about all young people. In the text, kaiako refers to all teachers, and kura refers to all schools. We use the terms ākonga Māori, kaiako Māori, and kura Māori to refer to Maori learners, Māori teachers, and Māori language immersion schools respectively. In the *Aratohu kaiako* | *Kaiako guide* we use the term whānau to refer to all parents, caregivers, and extended family members.

We recommend familiarising yourself with the assessments before using them. If you are unsure of any kupu Māori please use a Māori dictionary such as Te Aka Māori Dictionary <https://maoridictionary.co.nz>

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1. Te ōritetanga me te aromatawai

Equity and assessment

An equitable system recognises that some people are advantaged compared with others and focuses on providing appropriate resourcing and pathways that allow those without the advantages to succeed. The OECD describe an equitable education system as one that is fair and inclusive.¹

When assessment is equitable, no particular group has advantage over another, and achievement cannot be predicted by the cultural, linguistic and socioeconomic backgrounds of learners. In the Aotearoa New Zealand schooling system, a disproportionate number of ākonga Māori, Pacific learners, ākonga from low socio-economic backgrounds, and ākonga with additional needs achieve at significantly lower levels than their peers in mathematics. Assessment practices and differences in opportunities for learning have contributed to these inequitable outcomes.

NZCER strongly encourage kaiako to critically engage with multiple sources of assessment data and provide all ākonga with opportunities to build on their languages, cultures, and identities as strengths; and by doing so reach their full potential as learners of mathematics.

Transforming assessment is complex and requires a journey of change. Through embarking on its current equity-focused refresh, NZCER has made some important improvements to PAT Pāngarau | PAT Mathematics. However, this journey is ongoing and at NZCER we are continuing to explore ways to transform standardised mathematics assessments.

2. Te horopaki o te whakahoutanga Background to the refresh

NZCER is committed to improving equity in education by supporting and catering for those groups of ākonga who have been under-served by the education system. These groups include ākonga Māori, Pacific learners, students from low socioeconomic backgrounds, and students with additional learning needs. In late 2021, NZCER began a significant refresh of the PAT Mathematics assessments. This refresh was intended to make PAT Mathematics more culturally relevant, authentic, and accessible.

The refresh has involved updating the content of the nine core PAT Mathematics assessments (Assessments 1 to 8, and a Foundation Assessment, 1A). All refreshed content has been piloted and then used in a national trial. Results from the trial were used to calibrate the updated material onto the existing PAT Mathematics scale. Use of the scale means that results on the refreshed assessments can be compared with results generated using the older version and with existing national norms.

He aha kua rerekē? | What's different?

Each PAT Pāngarau | PAT Mathematics assessment has been refreshed in one or more of the following ways:

- Contexts have been updated so that a wider range of learners see themselves and their cultural and social worlds reflected in the assessments.
- Home and community settings have been prioritised over kura-based contexts.²
- Where possible, principles and values such as mahi tahi (working together), kaitiakitanga (guardianship), and manaakitanga (kindness, generosity) are represented within items.
- Graphics have been updated so that images are more realistic and relatable. For example, people from a range of cultures are depicted and people with different body sizes and physical abilities are represented.
- Wording has been simplified to ensure that language is not a barrier to accessing the mathematics.

NZCER has also updated the look-and-feel of the online assessments and refreshed the images used in the computer adaptive version of the assessment.



² Although kura is a shared context for ākonga, it is not a neutral space (see, for example, Milne, A. (2016). *Coloring in the White Spaces*. Peter Lang Publishing).

3. Te whāinga o ngā aromatawai Purpose of the assessments

PAT Pāngarau | PAT Mathematics assessments are part of a suite of standardised assessments that were developed by NZCER, specifically for learners in Years 3–10. These assessments are research-based and have been carefully developed for use in Aotearoa New Zealand English-medium contexts. Each assessment can be used at multiple year levels and achievement is reported on a common measurement scale.



PAT Pāngarau | PAT Mathematics assessments are intended to be used as low-stakes assessments. These assessments are designed to support kaiako and tumuaki to:

- understand where ākonga are at in their learning at a specific point in time
- identify what progress ākonga are making
- identify patterns of strengths and areas of need for individuals and groups of learners
- make informed decisions about the kinds of teaching methods, programmes, and materials that are most suitable for their learners
- communicate with whānau and parents about their child's progress, strengths and next steps.

It is important to remember that PAT Pāngarau | PAT Mathematics assessments are just one source of evidence of learning and provide a snapshot at a particular moment in time. To be properly interpreted, the results should be supplemented by other forms of information about the achievement of each learner.

4. Ngā kai o roto i ngā aromatawai

Content of the assessments

Assessment in mathematics and statistics should reflect the concepts, strategies, and habits of mind that are most important for ākonga to learn. PAT Pāngarau | PAT Mathematics assessments target the big mathematical and statistical ideas that ākonga need to know and understand in order to make progress through the New Zealand curriculum and Te Mātaiaho. Items are anchored in the content that underpins the curriculum learning area of mathematics and statistics. Namely:

Mātauranga tau | Number

Taurangi | Algebra

Ine | Measurement

Mokowā | Space

Tauanga | Statistics

Tūponotanga | Probability

There are limits to how mathematics and statistics can be presented using a multiple-choice assessment format. However, the assessment items require thought and conceptual understanding, not just the use of learnt or memorised procedures. While it is difficult to reflect all the practices that are required for doing mathematics—such as explaining, justifying, and communicating ideas—there are many items that involve problem solving, generalising, and reasoning.





5. Te kōwhiri i te aromatawai tika Choosing the right assessment

Each of the refreshed assessments has been designed with a year level in mind. However, each assessment can be used productively at other year levels. This is important because ākonga of the same age can be at very different points in their learning, and all ākonga can demonstrate progress.

When selecting an assessment it is important to consider whether the level of difficulty is appropriate for the ākonga concerned. Assessments that are too easy or too difficult will not provide precise or useful measures. It is for kaiako to use their professional judgement to decide which assessment best suits any particular individual or group to be assessed.

Table 1 shows the year levels which each assessment is designed for. If in doubt, use the assessment recommended (in bold) for the year level of ākonga.

Table 1 Recommended assessments for each year level

Year levels	Recommended assessments*
3	1A
4	1, 2
5	1, 2 , 3
6	2, 3 , 4
7	3, 4 , 5
8	4, 5 , 6
9	5, 6 , 7
10	7, 8**

*Bold print indicates the assessment that was originally created for each year level
** This assessment is intended for the end of Year 10

6. Te whakamahi i ngā aromatawai

Using the assessments

It is recommended that kaiako preview the assessment prior to administering them with ākonga.

Te whakahaere i ngā aromatawai

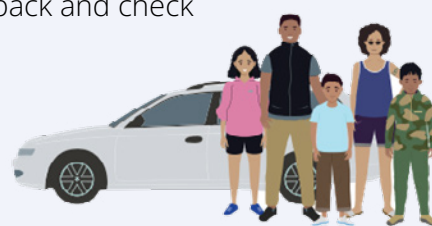
Administering the assessments

1. Give ākonga the appropriate PAT puka | booklet and puka whakatau | answer sheet
2. When everyone is ready, ask ākonga to fill in their details in the spaces provided in the puka whakatau | answer sheet.
3. Read through the instructions, example questions, and each of their alternative answers with ākonga. Check to see that ākonga have all found the correct part of their answer sheets and have shaded the option appropriately.
4. Emphasise to ākonga:
 - This assessment is all about your current understanding and skills in mathematics.
 - Have a go at all the questions, even if the question is hard.
 - Always choose the option you think is the best answer.
 - If you change your mind after selecting an answer, you can go back and change your answer.
 - Any working can be done on scrap paper, but calculators, rulers or other mathematical supports cannot be used.
 - At the end of the assessment, Cross out the shaded circle and fill in the circle for the new answer you have selected. You can go back and check your answers.
 - Karawhiua! Go for it!

Te pānui i ngā aromatawai ki ngā ākonga

Reading the assessments to ākonga

You are welcome to read questions to any ākonga having difficulty during the assessment. However, avoid explaining what the questions mean. If any ākonga have a great deal of difficulty understanding the instructions or questions, the assessment may not be suitable for them. Likewise, if an ākonga appears unusually stressed, do not continue with the assessment (see **Section 5 Choosing the right assessment**).



Te whakamahi tātaitai, rūri (tauine), ētahi atu tautoko pāngarau rānei

Using calculators, rulers, or other mathematical supports

Ākonga are encouraged to use scrap paper for working out. In order to be able to compare results with the normative information, ākonga **cannot** use calculators, rulers, protractors, or other mathematical supports.

Te wā | Timing

Ākonga are expected to work independently and have **45 minutes to complete the questions**. The whole assessment, including administration, will take about **60 minutes** to complete. It is up to kaiako to monitor the timing.

NZCER's piloting and trialling work has indicated that most ākonga finish the assessments within 45 minutes. Some kaiako have told us that they would like their ākonga to have more time to complete the assessment, so that ākonga can maximise the opportunity to show what they know. If PAT Pāngarau | PAT Mathematics assessments are going to be used to compare results with the normative information, it is important that the standardised 45-minute time allowance is followed. However, kaiako and kura may make the decision to extend the time accommodation, depending on the purpose of using the assessments in their particular context.



7. Ngā pūrongo | Reports

Marking keys for paper tests

Marking keys for paper tests will no longer be available from 2024.

Ākonga data can be entered into the Assist site to immediately generate reports. Assist users choose the assessment they want to enter data for, click on the 'Manage Learners' icon under the 'Actions' area, then select the 'Data entry' icon next to the ākonga they want to enter data for. The data entry process supports both keyboard and mouse input and the question text and correct answer for each question is indicated onscreen. Data can only be entered for tests in the current calendar year.

There are a range of reports available and each one provides a different perspective on ākonga achievement. For example:

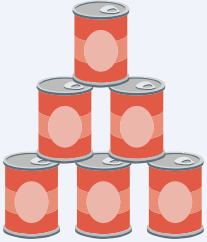
- Individual reports
- List reports
- Year level reports
- Item reports
- Scale score reports
- Individual item reports.

Information about how to generate and interpret the reports is available on the Assist site <https://www.nzcerassist.org.nz/login>.



8. Te Whakamahi i PAT Pāngarau | PAT Mathematics hei whakapiki i te pai o te whakaako me te ako

Using PAT Pāngarau | PAT Mathematics to improve teaching and learning



The primary purpose of assessment is to improve teaching and learning. Assessment, teaching, and learning are tightly interwoven, and each informs the others.³ Assessment for the purpose of improving learning involves the focused and timely gathering, analysis, interpretation, and use of ākonga assessment information that can provide evidence of what ākonga understand, know, and can do and underpin next steps for teaching and learning.

Assessment data can be collected using a range of approaches over multiple time points. These approaches might include:

- observations
- learning conversations
- collecting ākonga work samples
- conducting ākonga self and peer assessments
- using assessment tools created by kaiako.

More formal, standardised assessments such as Progressive Achievement Tests (PATs) have an important role to play alongside informal and in-the-moment assessment approaches. The most important consideration is that they are used purposefully with the ultimate aim of improving teaching and learning.

Te whakamahere mō te whakaako me te ako Planning for teaching and learning

Questioning PAT data supports kaiako to decide what the next mathematics or statistics learning focus should be, and to plan for teaching. Kaiako can analyse, interpret, and use the data to:

- gain insight into current ākonga knowledge and understanding in mathematics and statistics
- pinpoint where ākonga are on their learning pathway
- determine what next steps are needed for ākonga to progress.

³ Hipkins, R. & Cameron, M. (2018). *Trends in assessment: An overview of themes in the literature*. NZCER. <https://www.nzcer.org.nz/research/publications/trends-assessment-overview-themes-literature>

Where available, learner reports include additional information for kaiako, such as common mathematical misconceptions and direct links to the Assessment Resource Banks (ARB) resources (<https://arbs.nzcer.org.nz/>). These are useful for drilling down to find out more about what ākonga are doing and thinking, and targeting teaching in specific areas of need.

Te huritao mō te whakaako me te ako **Reflecting on teaching and learning**

Importantly, using the data and reports from PAT Pāngarau | PAT Mathematics assessments supports kaiako to reflect on their own teaching practices, and gain insight into the impact of their teaching.

Reflective questions kaiako can ask about the data include:

- What patterns can you see—for instance, across questions representing the different strands of mathematics or the options selected for a particular question?
- What mathematical ideas do your ākonga cope with well?
- What mathematical ideas are your ākonga finding difficult?
- Are there common themes across groups of ākonga who did or did not excel?
- How have ākonga experiences and opportunities to learn mathematics and statistics in the classroom affected achievement?
- What could you change in your mathematics and statistics teaching to support achievement and equitable outcomes for all ākonga?



Kia kotahi te hoe
Working together as one



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