

NAPLAN

2018 State report – Year 7

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Queensland
Government



Queensland Curriculum
& Assessment Authority

For all Queensland schools

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Preface

State reports are issued by the QCAA about the performance of Queensland students on the National Assessment Program — Literacy and Numeracy (NAPLAN) paper tests. State reports provide system-level information and are publicly available. This report for Year 7 students in 2018 contains:

- the Queensland performance on each item
- the national performance on each item
- the item descriptors
- a commentary on the state results
- some recommendations for teaching.

Who should use this State report?

The NAPLAN State reports help principals, teachers and other school personnel understand, interpret and use information about student performance on NAPLAN.

School principals can use this report to provide information to the school community on aspects of the tests. This would allow professional conversations with their teachers, curriculum leaders, and department heads. Curriculum leaders can use this information to interpret the more specific information given in their school and class reports. These other reports are explained below.

Since this report is publicly available on the QCAA website, it can also inform providers of teacher training, special education services and educational research and policy.

Parents and carers can use this report to interpret the results on their child's student report. They are also able to judge how their child performed when compared with the whole population of students. The item descriptors provide them with useful information about the scope of the tests.

About the tests

The purpose of the National Assessment Program (NAP) is to collect information that governments, education authorities and schools can use to identify indicative literacy and numeracy skills Australian students can demonstrate. As part of that program, the NAPLAN tests are administered to full cohorts of students in Years 3, 5, 7 and 9 each year. These standardised tests are sources of information about student learning that can be used to inform educational policy and current educational practice.

The NAPLAN tests were initially developed using the nationally agreed Statements of Learning for English and Statements of Learning for Mathematics, 2005. Since 2016 however, the tests are referenced to the Australian Curriculum. The NAPLAN tests are designed to assess student understanding in the following areas:

- Language conventions: The test assesses the ability of students to independently recognise and use correct Standard Australian English grammar, punctuation and spelling.
- Writing: The test assesses the ability of students to convey thoughts, ideas and information through the independent construction of a written text in Standard Australian English.
- Reading: The test assesses the ability of students to independently make meaning from written Standard Australian English texts, including those with some visual elements.

- **Numeracy:** The test assesses students' knowledge of mathematics, their ability to apply that knowledge in context independently, and their ability to reason mathematically.

Marking and scoring the tests

Marking the tests

Markers mark those test items that do not use a multiple-choice format. These markers apply nationally agreed marking guides. There are marking guides for open-ended Reading items if any such items are included. Marking guides allow consistent and reliable judgments by markers. There are guides for the Writing test and one each for the constructed responses in Numeracy and Spelling. For some Numeracy items, students may provide a correct response in different forms. Professional officers decide on agreed scoring protocols for these items.

Calculating raw scores

The simplest calculation made in scoring the tests is the raw score — the number of questions answered correctly. Each of the questions for the Language conventions, Reading and Numeracy tests are marked as either correct or incorrect. Raw scores for the Writing test are sums of the marks on each of 10 criteria.

Raw scores have limited use. They enable the performance of students who have all completed the same test at the same time to be placed in a rank order, but they do not provide information about the level of difficulty of the test nor the relative differences between students.

Constructing scaled scores and bands

To make raw scores more useful, they are transferred to scores on a common scale that reflects how difficult it was to achieve each score. Each year ACARA publishes equivalence tables that allow a student's raw score to be located on the NAPLAN scale. The scale is comparable between year levels for each assessment area. An equating process is also carried out on each year's test to enable scores to be compared between successive years of testing. For example, a raw score of 20 on the Year 3 Reading test might be transformed to a scaled score of 354. This will also represent the same achievement for a student with the same scaled score in Year 5, and for a student with the same scaled score for Reading in a previous year.

Each NAPLAN scale is divided into ten bands used to report student progress.

Using NAPLAN reports to inform teaching and learning

Using scaled scores

The scaled score can compare the results of different students. Scaled scores provide a basis for measuring and comparing students' abilities across years of schooling, for example comparing a student's result in Year 3 in 2016 and Year 5 in 2018. The scales can thus help to monitor the growth of groups of students over time. This enables the school to review and/or consolidate special programs that may have been put in place.

Principals and teachers should take care when making comparisons between small groups of students. For groups of fewer than ten students, differences may not be reliable, particularly small differences.

Using item analysis

While the national and state reports provide the comparative data, class reports provide a school with the information that can be used to inform teaching and learning and to build capacity in schools. Analysis of the NAPLAN class data, in particular the performance on each item, will

provide teachers with information about the understandings and patterns of misunderstandings of students.

Looking at the performance on the items and then analysing the error patterns allows teachers and principals to make hypotheses about why groups of students make particular errors. As mentioned below, more detailed analysis by QCAA staff is available from the QCAA website.

Steps for analysis might be as follows:

- Compare the facility rates (percentage correct) achieved by the school's students with the national and state results available in this document. Is their performance consistent?
- Look at the common errors made by their students and compare them with the common errors made in the state. Only errors from Queensland students are available and are found in the item analyses that are part of SunLANDA Online.
- Form hypotheses about why students are making these errors, e.g.
 - How did students think about this aspect of the curriculum?
 - What misunderstandings might these errors represent?
 - How might the structure of the test question have shaped the response?

Using a combination of the NAPLAN data, school data and professional judgment, teachers may then test these hypotheses to see whether they are valid or whether there is more to be thought about and investigated. Teachers can then plan lessons related to the general areas where students seem to need help. Teachers can also make judgments about teaching approaches and curriculum.

The professional conversations that are part of this process are the most effective and powerful way to use the data, as they are the vehicle for developing shared understandings.

Placing the tests in the assessment context

The results from the NAPLAN tests should be seen as only one input into a school's assessment program. Various forms of assessment are needed to inform the different stages of the teaching and learning cycle. Principals and teachers should keep in mind that NAPLAN is a point-in-time, timed test that can only cover a few curriculum features.

The results from a school's own assessments of students should be consistent with the NAPLAN test results. If the test results are different from what was expected, consider the possible reasons. The results of the tests may indicate aspects of student performance that need further investigation within the classroom, using other forms of assessment.

An item with a low facility rate (percentage correct) may not necessarily indicate a problem in teaching and learning. It may be that this was simply a difficult item for all students in this cohort across Australia.

Other NAPLAN reports

In addition to the State reports, the following reports are produced about the performance of Queensland students who sit the NAPLAN paper tests:

SunLANDA Online

Since 2015, student data has been released on the QCAA School Portal using the SunLANDA Online interface. Access to SunLANDA as application software is also still available on the QCAA website.

SunLANDA Online provides class and school information in an electronic form that permits customised spreadsheet generation by users. In addition, it shows representative samples of students' incorrect responses to constructed responses where applicable. Hyperlinks from within SunLANDA Online lead to the QCAA's test item analysis. Information on how to use this service is available at: www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/sunlanda/accessing-navigating-sunlanda.

Test item analysis

These PDF documents contain an analysis of each test item. They can be downloaded directly from the QCAA website: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/test-item-analysis>. A school Brief Identification Code (BIC) and password is required to access these documents. The analysis reproduces each item followed by expert analyses of how the item operated. It shows the distractors presented in multiple-choice items and explains students' reasoning.

School and class reports

The NAPLAN school and class reports are supplied electronically on the secure section of the QCAA website. These reports are accessible only with the school's Brief Identification Code (BIC) login and password. Individual student reports are distributed to schools as printed copies.

School reports

The QCAA issues NAPLAN School reports giving information about each school's performance. They provide a summary of year-level performance as well as performance by gender, language background and Indigenous status in the following fields:

- distribution of scaled scores
- distribution of achievement bands
- school and state means
- participation of the group.

The school report positions a school's performance within the state on a graph that is shaded to show the range of performance for the middle 60% of Queensland students together with the state mean.

Class reports

The QCAA issues NAPLAN class reports that show the performance of every student on every item. Under the name of each student is recorded the items they had correct and incorrect. They also show students' responses to constructed-response items.

The class report also gives the:

- percentage correct for each item for the class and state, and by gender

- scaled scores for each student
- performance bands for each student.

Individual student reports

The QCAA issues individual student reports to schools after the tests. Schools receive one printed report for each student to distribute to parents/carers.

ACARA reports

As well as the Queensland reports from the QCAA, national reports are available from the website of the Australian Curriculum Assessment and Reporting Authority (ACARA). The *NAPLAN National Summary Report* and the *NAPLAN National Report* allow states and territories to place the achievement of their students in relation to their peers across the nation. This is system-level information and is publicly available.

Literacy

Writing

Stimulus (writing prompt) Years 7 & 9

YEAR 7 AND YEAR 9

New technology

Write a persuasive text about a piece of technology that has been or will soon be invented that will make life so much better.

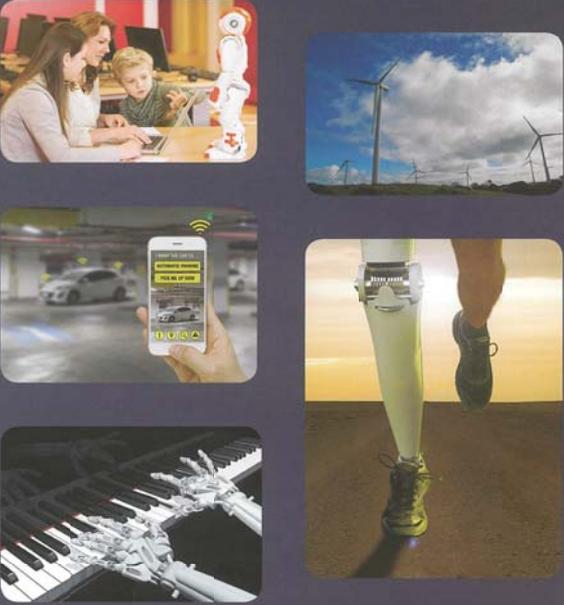
Persuade a reader why this device or machine, such as a self-driving car, a drone helicopter or a fingerprint lock for a bike will benefit people.

You can use your own idea or you can use an idea on this page.

- **Start with an introduction.**
An introduction lets a reader know what you are going to write about.
- **Write your opinions on the topic.**
Give reasons for your opinions.
Explain your reasons.
- **Finish with a conclusion.**
A conclusion sums up your reasons so that a reader is convinced of your opinions.

Remember to:

- plan your writing
- use paragraphs to organise your ideas
- write in sentences
- choose your words carefully to convince a reader of your opinions
- pay attention to your spelling and punctuation
- check and edit your writing.



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About the task

In 2018, the NAPLAN Writing test was based on the persuasive genre. As has been the case since 2015, two prompts were used: one for Years 3 & 5 and another for Years 7 & 9. The test conditions and administration remained the same as in previous years, i.e. teachers delivered the same spoken instructions and read the text aloud to students. Working independently, students had to plan, compose and edit a written response. Students were allowed five minutes to plan, thirty minutes to write their script, and a further five minutes to edit and complete the task. Three pages were provided for students to write a response.

The 2018 prompt for Years 7 & 9 was titled *New technology*. Students were asked, in the textual component of the prompt, to:

- Write a persuasive text about a piece of technology that has been or will soon be invented that will make life so much better.
- Persuade a reader why this device or machine, such as a self-driving car, a drone helicopter or a fingerprint lock for a bike will benefit people.

Students were told they could use their own idea, or an idea mentioned or pictured on the page.

Additional textual information was provided. This named the structural components, and further defined these elements, e.g. *Start with an introduction. An introduction lets the reader know what you are going to write about.* Other notes were also provided in relation to the conventions associated with the writing task, e.g. write in sentences, check and edit your writing. Five images were shown on the prompt sheet, covering a range of possible topics/ideas such as wind turbines (technology for renewable energy), mechanical artificial limbs that use technology and an app for a mobile phone.

The prompt was relatively open-ended, allowing students to base their writing on one or more of the images provided, or compose their own text around a particular idea.

Markers for this Writing test were trained using the national persuasive writing marker training package, delivered as part of ACARA's national assessment program. Markers were recruited and trained in accordance with national protocols. Registered Queensland teachers marked the NAPLAN Writing test scripts. All markers applied the 10 criteria and related standards from the marking rubric. Writing test scripts were marked on screen in all states and territories. Stringent quality-control measures were applied to the marking of student scripts, including a prescribed percentage of scripts to be double-marked, and the daily application nationally of control scripts for all markers. As part of the Queensland marking operation for 2018, referee marking continued, further ensuring marking reliability. There was also provision for appeal over individual Writing test scores after the results were released.

An earlier version of the NAPLAN Persuasive writing marking guide is available at: www.nap.edu.au/_resources/Amended_2013_Persuasive_Writing_Marking_Guide_With_cover.pdf.

Performance

The 2018 writing prompt was particularly suited to many students in Years 7 and 9 as technology is something they know about, have an interest in and have seen develop throughout their life. For many students it would be something they have looked at in their STEM subjects and studies. The prompt did provide some examples of technology for students and did also allow students to select a topic of personal interest with which they had some familiarity. It appears that few students had difficulty in finding a subject on which their text could be based, and the majority of students went with suggestions from the prompt, particularly self-driving cars and fingerprint locks for bikes.

Students typically introduced their subject (e.g. a piece of technology that will make life better) in an opening paragraph, stating broadly why this piece of technology would make life better, then provided information regarding the uses and benefits of the technology. The danger here was that following the introduction, some students tended to move into informative text rather than persuasive text. Conclusions then tended to focus on simple re-statements of main points referred to in the body of the text. Often there was a very close parallel between the wording of the introduction and conclusion.

If students did follow the informative line, without taking a stance on the subject in question, they were deemed to be 'off genre', an outcome that may have considerable impact on their scores. Some students adopted a 'review'-type response, tending to provide information rather than persuasive argument, defending their choice of technology. Typically, this information was sandwiched between an introduction and conclusion which reflected some persuasive elements. These students were deemed to be 'on-genre', though their final scores were impacted by the absence of persuasive elements throughout their texts.

In most cases, students in Year 7 showed competence with the persuasive form. Introductions provided more natural orientation for the reader, with quite passionate statements of position often presented.

For example:

Imagine being excluded, unable to be like and with everyone else, just because of a terrible accident or rare medical condition. These horrifying issues can be ended with the innovative new technology of bionic limbs. This masterful discovery executes the three key issues; It allows mobility, allows acceptance and may encourage more brilliant progressions in scientific discoveries. (Year 7 student)

As the Writing test is an 'on-demand' task, where students are given 5 minutes planning time, 30 minutes to write their persuasive task and 5 minutes for editing and completing their work, students frequently lacked some detail about the technology they were referring to. Though time in a demand writing task obviously affects the way in which student writing concludes, many responses included only a brief summation or re-statement of the text. Those students who, in conclusion, challenged the reader to fully consider the arguments presented, produced highly effective closure to their writing, as the following extract demonstrates:

In conclusion, GNNs (Genetic Neural Networks) and other types of neural networks will be a huge and helpful part of the near future. With us being driven around by cars, rather than us driving them, and quickly solving huge physics problems with ease, a new age of exploration is coming. Humans are limited, machines don't have the same limitations, let's build the future together. (Year 7 student)

As previously indicated, the body of texts tended to be more substantial and showed accurate use of credible information. The use of improbable data, quotations etc. was less evident than in previous Persuasive Writing tests. Teachers should be wary of approaches to writing that suggest the inclusion of implausible data or dubious supporting evidence attributed to some 'invented' authority. Markers are trained to accept what is on the page at face value, but irrelevant or erroneous information does little to support a writer's point of view, particularly at the higher end of the writing spectrum.

Though scored independently, the strong connection between the criteria of *audience*, *persuasive devices* and *ideas* in this type of task rewards students who are prepared to take on 'the big idea' and explore this in a more engaging way. Alternatively, students who wrote with passion and commitment about a subject they knew very well produced credible responses.

The NAPLAN marking rubric also allocates significant score points to the skills areas of *sentence structure*, *punctuation* and *spelling*. Persuasive writing almost encourages the use of adverbial clauses and phrases indicating causation and condition. Stronger scripts showed variety and control over complex sentence forms, with 'punchy' simple sentences (and even sentence fragments) occasionally used for marked effect. Punctuation, particularly sentence boundary punctuation, still indicates room for improvement. The use of 'run-on' sentence forms, often associated with the use of 'splice commas' as breaks, is a significant factor. Much of this has to do with the shift from oral to written language modes. The formalities associated with writing, in test conditions and elsewhere, need constant attention in writing programs. Punctuation can easily become a casualty of contemporary communication forms if it is not dealt with through a rigorous and contextualised writing program, closely associated with reading good-quality published texts.

Undoubtedly this year, students were more acquainted with the topics of their choice and could 'flesh out' arguments with plausible supporting detail. Some students' field knowledge led them to write quite detailed texts designed to persuade readers to agree with the stance they were taking regarding the type of technological improvements that could be made.

The End of Silicon

Every material has its limits, and silicon is no exception. That is why progress is being made each day to phase this material out of the mainstream electronics industry. Replacement materials are able to deliver the benefits of smaller size, greater density and lower power draw.

It has become no longer viable to continue reducing the size of components carved in silicon. There exists a quantum physics principle named 'electron tunnelling' in which trapped electrons, which are essential to function in modern devices, are able to escape. This effect increases as the trapping material decreases in volume. Studies have shown that a process shrink to less than 7nm with silicon will be extremely inefficient. Replacements such as carbon nanotube chips can be reduced to as low as 1nm, making even smaller gadgets viable.

This additional downscaling ability will result in a greater density of components in electronic chips, so a 1nm square transistor would be 49 times as powerful as a 7nm transistor in a chip of equal area. For the older audience, this will make Excel calculations, CAD software etc. (...) run much faster. For the younger audience, who wouldn't like more performance in games?

As unimportant as it sounds, power draw is a major factor in the electronics industry. Imagine one day having the performance of a 2018 desktop computer in a tiny chip running off

the milliwatts provided by a solar wristband. This would be made possible by alternatives to silicon, because smaller transistors require less power to deliver the same performance per transistor.

Stay tuned, all of you technology buyers. The next computer you buy could be your last silicon device, and alternatives will bring with them countless benefits, including reductions in gadget size, increases in performance and lower power requirements.

Commentary on sample script

This persuasive text is focused on the use of silicon in the electronics industry — its uses, drawbacks and need for replacement. The writer adopts an authoritative, expert stance, informing the reader of the benefits of replacing silicon and the possible alternatives. *Replacement materials are able to deliver the benefits of smaller size, greater density and lower power draw.* (Paragraph 1)

The script orients the reader and provides sufficient information for the reader to follow easily. The introductory paragraph sets the scene — *Every material has its limits, and silicon is no exception*, and then goes on to inform the reader of the uses of silicon and the many benefits of replacing it.

As the reader moves through the text it becomes obvious that the writer is knowledgeable about the topic. The writer takes the stance of an expert and enthusiastically imparts the knowledge he has of the electronics industry and of the improvements that will be made in this field.

Following the introduction, the next three paragraphs inform the reader of more specific details about changes that are being investigated and developed currently. Terms such as *electron tunnelling, carbon nanotube chips, nano-metres, downscaling ability, greater density, power draw* and *millivolts*, are all referred to and explained so that the reader is able to read and understand what the writer is referring to.

The tone of the text is informative and the writer's position about *The end of silicon* is clear. This Year 7 student effectively uses words and phrases to demonstrate knowledge of the topic and to persuade the reader that the changes being made in the electronics industry are for the best.

The conclusion has a direct address to the reader which has the effect of drawing the reader to identify with the writer's position. It also draws together the three main ideas elaborated on in the body of the text.

Stay tuned, all of you technology buyers. The next computer you buy could be your last silicon device, and alternatives will bring with them countless benefits, including reductions in gadget size, increases in performance and lower power requirements.

Structurally, all textual elements work in a coordinated and deliberate fashion as the argument is built. The text is highly cohesive and the choice of text connectives and conjunctions strongly contribute to this, together with lexical chains that effectively link the stages of the text. The vocabulary is well suited to the overall flavour of the text.

Similar to other aspects of the text, the skills areas of spelling, punctuation, paragraphing and sentence structure are well handled by this young writer, making this script an excellent example of a demand writing task by a Year 7 student.

Language conventions

Spelling

Results and item descriptions

The percentage columns give the facility rate (percentage correct).

Item	Answer	QLD %	Aust. %	Description
Proofreading — Error identified				
1	sugar	87.28	88.36	Corrects the spelling of a two-syllable word ending in -ar.
2	microphone	79.34	80.37	Corrects the spelling of a three-syllable word starting with micro-.
3	subscription	65.92	65.72	Corrects the spelling of a three-syllable word with scrip.
4	misjudged	60.08	59.76	Corrects the spelling of a two-syllable word with dge.
5	machinery	52.04	53.10	Corrects the spelling of a multisyllable word with the suffix -ery.
6	familiar	44.91	47.60	Corrects the spelling of a three-syllable word ending in -liar.
7	excitement	58.91	59.47	Corrects the spelling of a three-syllable word with the suffix -ment.
8	awkwardly	50.09	49.39	Corrects the spelling of a three-syllable word starting with awk-.
9	cereal	34.65	36.19	Corrects the spelling of a three-syllable homophone starting with ce-.
10	distressed	32.55	34.42	Corrects the spelling of a two-syllable word ending in -ssed.
11	category	42.27	42.21	Corrects the spelling of a multisyllable word ending with -egory.
12	renowned	22.13	22.57	Corrects the spelling of a two-syllable word with ow.
Proofreading — Error not identified				
13	toxic	86.56	86.80	Identifies and corrects an error in a two-syllable word ending in -ic.
14	continued	89.20	89.52	Identifies and corrects an error in a three-syllable word with nn.
15	expression	69.72	69.38	Identifies and corrects an error in a three-syllable word with ss.
16	wisdom	60.38	64.30	Identifies and corrects an error in a two-syllable word with is.

17	radiates	49.69	51.50	Identifies and corrects an error in a three-syllable word ending in -ates.
18	withered	37.17	38.83	Identifies and corrects an error in a two-syllable word ending in -ed.
19	appropriate	38.09	39.18	Identifies and corrects an error in a multisyllable word ending in -ate.
20	casualty	35.65	38.09	Identifies and corrects an error in a three-syllable word ending in -ualty.
21	treaties	31.62	33.01	Identifies and corrects an error in a two-syllable plural word ending in -ies.
22	scenario	18.33	20.18	Identifies and corrects an error in a multisyllable word starting with sc-.
23	juvenile	23.36	24.63	Identifies and corrects an error in a three-syllable word ending in -enile.
24	equipped	9.97	11.52	Identifies and corrects an error in a two-syllable word with a double consonant before -ed.
25	controversial	6.95	8.45	Identifies and corrects an error in a multisyllable word with trov.

About the test

The 2018 Year 7 test focused on the following spelling features:

- affixed words: **microphone**, **distressed**, **category**, **controversial**, **machinery**, **familiar**, **excitement**, **toxic**, **subscription**, **expression**, **wisdom**, **appropriate** and **casualty**.
- inflected words: **radiates**, **treaties**, **withered** and **equipped**
- complex vowels and consonants: **misjudged**, **awkwardly**, **renowned**, **scenario** and **cereal**
- unaccented syllables: *sugar* and *juvenile*.

Both sets of questions in the Spelling test use proofreading formats. The target words in the first set are misspelt and identified by being circled. Those in the second set are misspelt but not identified, so students have to find them inside sentences containing other words (distractors) that are correctly spelt. These supplied misspellings may lead students to spell differently from when they write to dictation or compose their own sentences.

Performance

Compared to the national average, Year 7 students in Queensland performed slightly lower on most words. They did a little better than the national average on the words *subscription*, *misjudged*, *awkwardly*, *category* and *expression*.

Compared to previous Queensland cohorts, Year 7 students performed similarly in Spelling to recent years.

About 10% of students omitted any response to the last six words. The reading load and vocabulary demand in these items was high. When facility rates fall below 10%, as on the words *equipped* and *controversial*, it can be an indicator that very few students in the cohort have knowledge of the words.

Student error patterns revealed that many students attempt to spell phonetically where they should be using knowledge of morphemes (meaning chunks). Many students accepted the supplied phonetic misspelling of the word *appropriate* without its final *e*. They did not realise it contained the adjective-forming suffix *-ate*. Similarly, there were very many phonetic misspellings of the affixes *micro-*, *mis-*, *dis-*, *-ic* and *-ar*.

In some cases, phonetics is a rough guide to spelling, but the correct pronunciation must be known for this to happen. Some students spelt *appropriate* as 'appropriate', suggesting they had not heard or seen the word used correctly.

The common errors for the word *excitement* show that many students are not confident about the application to mature words of the spelling rule for retaining a final *e* (e.g. *excite*) when adding a suffix beginning with a consonant (such as *-ment*).

For some of the items in the second set (e.g. *equipped*, *wisdom* and *withered*), a very large percentage changed the correct spelling of the distractor words instead of trying to spell the target word.

Implications for teaching

Test-wiseness

Proofreading skills should be taught as an authentic writing skill. This will also help students read test questions carefully and to avoid being influenced by supplied misspellings.

Inappropriate 'sounding-out'

Students need to realise that 'sounding out' has limited application to advanced words. Of course, pronunciation is not entirely irrelevant. For example, the difference between words beginning *ex-* and *exc-* can be heard in words such as *exit* and *excite*. The letter *c* adds a longer 's' sound. Similar help from pronunciation can guide spelling of words with soft /*g*/ (e.g. *judge* versus *huge*). Also, students need to hear the pronunciation and contextual use of advanced words so that they know how many syllables and which affixes and inflections are involved.

Mainly, however, advanced spelling involves advanced word study. Word study belongs in all subjects, not just subject English. In the course of cross-subject teaching, teachers should highlight the grammar and etymology of mature vocabulary and explain how these aspects of meaning are conveyed by spelling. Word knowledge rather than sound is needed to understand and to spell words such as *wisdom* (from *wise*), *casualty* (from *casual*) and *familiar* (from *family*).

Students should learn the link between grammar and spelling. For example, the adjectival suffix *-ic* is always spelt *-ic* (e.g. *toxic*, *plastic*, *formulaic* etc.). Similarly, the spelling of the prefix *micro-* ('small') remains the same whether it is pronounced with a long /*o*/ sound (as in *microscope*) or with a short /*a*/ sound (as in *microphone*).

However, all spelling generalisations have exceptions and these also need to be learned. While most words with the prefixes *cata-* and *contra-* retain those spellings (e.g. *catalogue* and *contradict*), the exceptions are *category* and *controversy*.

QCAA resources

Full analysis of student performance and error patterns for each item is published in the SunLANDA program: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/sunlanda/accessing-navigating-sunlanda> and as PDF documents: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/test-item-analysis>. A school BIC and password is required to access each year level document.

Grammar and punctuation

Results and item descriptions

The percentage columns give the facility rate (percentage correct).

Item	Answer	QLD %	Aust. %	Description
26	D	88.87	89.45	Identifies the correct article for a word beginning with an unsounded h-.
27	A	93.90	94.50	Identifies a word that cohesively links two parts of a complex sentence (synonymy).
28	B	78.09	81.26	Identifies that a sentence has the text features of a procedure.
29	B	82.39	82.44	Identifies the correct use of clause commas in a complex sentence.
30	A	62.53	60.54	Identifies the reference for a pronoun in a short passage.
31	C	74.03	72.84	Identifies a simple sentence that needs quotation marks.
32	D	86.65	87.84	Identifies the sentence which correctly combines information from two sentences.
33	C	76.97	77.66	Identifies a complete sentence.
34	D	86.31	87.43	Identifies the correct verb form for a sentence with tense staging.
35	B	72.85	74.31	Identifies the correct use of a connective to create a coherent sentence.
36	B	73.78	73.18	Identifies the sentence containing an adverb of manner.
37	C	50.11	50.91	Identifies the sentence boundary between two sentences.
38	D	53.43	52.60	Identifies the sentence expressing the greatest certainty.
39	C	45.50	45.91	Identifies a participle used as an adjective in a complex sentence.
40	A	47.59	49.54	Identifies the correct use of a colon.
41	A	65.47	67.56	Identifies the correct placement of commas in a list with single items.
42	D	49.65	49.78	Identifies an adverb in a complex sentence.
43	A	39.08	40.07	Identifies the simple sentence containing a nominalisation.
44	C	33.90	32.63	Identifies correct location of quotation marks for direct speech.
45	2,1,2,1	27.29	26.22	Identifies correct pronoun in four sentences.

46	AC	23.91	23.53	Identifies correct apostrophes of possession in two words.
47	C	21.65	20.45	Identifies the verb that agrees with the subject of the main clause.
48	C	17.53	17.47	Identifies an adverbial phrase in a sentence.
49	B	25.67	25.66	Identifies a complete sentence.
50	3,1	12.17	12.39	Identifies the word class of a noun and the adjective formed from it.

About the test

The quantity and complexity of the items on the 2018 paper requiring knowledge of grammatical terminology (metalanguage) was moderate. These were:

- Item 28 refers to the terms report, procedure, narrative and review
- Item 31 refers to quotation marks
- Item 40 refers to a colon
- Item 46 refers to an 'apostrophe of possession'.
- Items 36, 39, 42, 43, 48 and 50 all refer to names for the parts of speech (that is functions of referring to adverbs, adjectives, nouns and verbs).

On this year's test, several items touch on text cohesion. Texts are said to be cohesive if their ideas are linked in a way that the reader can follow. Cohesion is best understood in the context of reading and writing extended texts where ideas are explored across multiple sentences and paragraphs. Some NAPLAN items, however, use short examples to test knowledge of some specific language conventions related to cohesion. Item 30 required students to choose a pronoun that matched the topic noun established in a preceding sentence. Also related to cohesion are Items 32, 34, 35, 38 and 47, which required students to think about clear and logical meaning as well as grammatical correctness.

It is also better to use whole texts to teach about genre and register; that is, how different purposes and audiences lead writers to choose different genres of writing and registers of vocabulary and grammar. Nevertheless, aspects of genre and register were tested with single-sentence examples in Items 28 and 43.

The items focusing on punctuation show that punctuation helps the writer to convey meaning clearly. For example, the conventions for apostrophes of contraction and apostrophes of possession allow writers to write what they mean (see Item 46).

Items 33, 37, and 49 test knowledge of complete sentences and fragmentary sentences. Students also need to be able to extend and elaborate sentences with adverbial and adjectival details. This ability is tested by Items 42, 48 and 39. Similarly, Item 40, on the use of a colon, shows one way in which a noun group extends and links ideas.

Questions about the punctuation of direct and indirect speech are always included in the NAPLAN test (see Items 31 and 44).

Performance

Queensland Year 7 students performed about the same as the national average. The number of students who omitted answers was very small, even on the difficult items. Some items had

weaker 'fit' characteristics than others, meaning that a correct response to those items was less closely linked to students' literacy ability. For example, fewer than expected of the more able students chose correct options for the Items 45 and 48. Possibly in these cases their knowledge of formal language led them too quickly to choose a formal-sounding distractor option. Advice on test-wiseness can reduce careless errors by stressing the importance of reading a test question very carefully.

Implications for teaching

Metalanguage

Teaching the Curriculum implies teaching the terminology of grammar where this helps the effective use of language to communicate in different contexts and for different purposes. Some test items do not include metalanguage and yet the knowledge tested can be taught to students while using the correct terms. For example, clause commas are used to separate a subordinate clause that precedes or is embedded inside the main clause. Items 29 and 37 test this knowledge by asking, 'Which sentence is punctuated correctly?', but in answering that question students should be recalling both the rules and the terms for clauses and clause punctuation.

Mature sentences

It is timely that the test included items on sentence structures. As students start to read and write more mature sentences, they need explicit teaching about the structure and punctuation of elaborated simple sentences and sophisticated complex sentences.

Writers make these sentence choices for specific reasons and with specific effects on the meaning of the writing. In fact, a wide repertoire of sentence structures is needed to signal the links between ideas in an extended text. For example, placing the subordinate clause first is a way to cohesively link to the topic of the previous sentence.

QCAA resources

Full analysis of student performance and error patterns for each item is published in the SunLANDA program: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/sunlanda/accessing-navigating-sunlanda> and as PDF documents: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/test-item-analysis>. A school BIC and password is required to access each year level document.

Reading

Results and item descriptions

The percentage columns give the proportion of correct answers (facility rates).

Item	Answer	QLD %	Aust. %	Description
<i>Moving on</i>				
1	A	80.31	79.83	Infers the meaning of descriptive details in a narrative.
2	C	84.59	84.78	Identifies the reason for the use of repetition in a narrative.
3	B	92.96	92.60	Identifies details about the setting from dialogue in a narrative.
4	C	84.79	85.34	Interprets a character's outlook in a narrative.
5	C	85.81	86.26	Interprets a statement in context in a narrative.
6	B	83.30	83.06	Interprets information to make an inference in a narrative.
<i>All you ever wanted to know about chewing gum</i>				
7	B	88.84	89.76	Identifies the main purpose of an informative webpage.
8	A	92.00	91.63	Locates directly stated information in an informative webpage.
9	B	58.47	60.24	Identifies the purpose of capital letters in an informative webpage.
10	A	71.93	73.90	Locates directly stated information in an informative webpage.
11	A	69.42	70.45	Interprets directly stated information in an informative webpage.
12	D	11.85	13.20	Interprets the intention of images in an informative webpage.
<i>Wave-driven generator</i>				
13	B	79.51	80.56	Identifies the purpose of a diagram in an information text.
14	A	77.46	78.18	Interprets a diagram in an information text.
15	A	78.21	78.65	Interprets directly stated information in an information text.
16	A	46.96	47.59	Interprets directly stated information in an information text.
17	D	48.04	50.19	Identifies the purpose of a subheading in an information text.

18	D	59.59	58.81	Analyses information to make an inference in an information text.
19	D	60.37	61.90	Identifies a difference between an information text and a persuasive text.
<i>Titanic</i>				
20	B	42.97	42.50	Identifies the purpose of the text layout in an advertisement.
21	D	36.85	39.88	Interprets a device used to engage readers of an advertisement.
22	D	50.21	51.67	Identifies evaluative language to match a theme in an advertisement.
23	B	46.71	47.47	Interprets vocabulary that contributes to the tone of an advertisement.
24	B	35.22	37.78	Identifies directly stated information in an advertisement.
25	C	32.09	34.66	Identifies an author's assumption in an advertisement.
26	A	29.20	30.79	Identifies the author's perspective in an advertisement.
<i>The forging</i>				
27	C	78.10	79.87	Interprets the purpose of text structures and language features in a narrative.
28	D	40.31	39.67	Interprets figurative language in a narrative.
29	B	43.21	44.03	Interprets technical language in a narrative.
30	D	66.71	66.89	Identifies a character's mood change across a narrative.
31	A	47.07	48.37	Synthesises information from dialogue and description in a narrative.
32	B	42.77	42.97	Interprets dialogue in the final two paragraphs of a narrative.
33	4,1,3,2	20.81	20.85	Identifies the sequence of events in a narrative.
<i>Rewilding: Should wolves be reintroduced in Britain?</i>				
34	D	38.97	41.13	Infers the purpose of an introductory paragraph in a persuasive discussion.
35	C	23.25	23.80	Interprets a metaphor in a persuasive discussion.
36	B	25.34	25.02	Interprets emotive language in a persuasive discussion.
37	C	38.91	39.59	Infers the author's point of view at the end of a persuasive discussion.

38	C	22.60	22.17	Identifies a secondary theme in a persuasive discussion.
<i>Lost for words</i>				
39	AE	16.82	18.07	Identifies how a title reflects aspects of a speech with internal commentary.
40	BD	29.68	30.90	Infers a character's perspective in a speech with internal commentary.
41	C	62.84	65.45	Analyses the effect of language devices in a speech with internal commentary.
42	D	29.77	29.81	Interprets an allusion in the middle of a speech with internal commentary.
43	BCD	6.00	6.96	Identifies a character's perspective in a speech with internal commentary.
44	ABGH	20.24	22.35	Interprets an implied meaning in a speech with internal commentary.
<i>Saffron: the true cost</i>				
45	AC	17.85	18.36	Interprets the effect of vocabulary choices to influence meaning in a detailed information text.
46	CD	11.91	12.65	Evaluates the tone of a rhetorical question in a detailed information text.
47	B	38.87	38.42	Identifies the purpose of italics in a detailed information text.
48	D	35.31	37.23	Interprets a phrase using context in a detailed information text.
49	ACEF	9.70	10.27	Evaluates the validity of statements using information from across a detailed information text.
50	AE	3.97	3.93	Identifies how a sentence signals a conclusion in a detailed information text.

About the test

In 2018, the Year 7 Reading test consisted of 50 items based on eight reading magazine units covering several genres:

1. Moving on
2. All you ever wanted to know about chewing gum
3. Wave-driven generator
4. Titanic
5. The forging
6. Rewilding: Should wolves be reintroduced in Britain?
7. Lost for words
8. Saffron: the true cost.

Rewilding: Should wolves be reintroduced in Britain? and *Saffron: the true cost*, have elements of persuasive texts and information texts. This has implications for any items where students are drawn to distractors that appeal to a certain narrow interpretation of the text. An example is Item 34, in which two of the more popular distractors refer to *opinions* and *issues*, which may have appeal to students who recognise that this text had features of a persuasive text.

There were no short-response items for Year 7 this year. The first thirty-two items were standard four-option, multiple-choice format. Of the remaining eighteen items, one required sequencing (Item 33), and another required more than one selection. Usually students were told to *Choose two*, but for Items 49 and 50 students were simply instructed to *Choose all that apply*, which greatly increased complexity.

The facility rates for each of these non-standard format items were low regardless of the question type. Facility rates declined as students progressed from the first reading unit to the last due to several variables: reading demands generally increase, distractors appear to be more sophisticated and item construction becomes more complex.

The exception to the trend appeared to be *Titanic*. Average facility rates for this unit dropped to 39.04% (the previous unit, *Wave-driven generator*, recorded an average facility rate of 64.31%) then increased again in the next unit. The average facility rate for *The forging* rose to 48.43% again before gradually declining to 19.6% in the last unit (*Saffron: the true cost*). As the question types were no more demanding in the *Titanic* unit, it seems likely that readers found the text more difficult to access because it lacked paragraphs, headings and any of the other reading signposts which make a text more readable. There was a valid reason for formatting the text in the shape of an iceberg.

Rather than categorise the reading units by genre, it is more useful to categorise the items by question type (see table below). This is partly because many of the reading stimulus texts cannot be categorised exclusively as one genre or another. Furthermore, reading the individual item analysis, the error analysis sometimes shows that students will select a distractor because it refers to a specific genre. Even capable students will be drawn to these distractors.

Categorising the items by *question type* puts the focus on the more relevant reading strategies. For example, an examination of the question type makes it apparent that simply underlining or highlighting text may only be useful for one of the seven question types — Literal-recall questions. See the *Implications for teaching* section in this text, and SunLANDA for a range of reading strategies that are specific to the types of questions.

	Question type:	The reader is asked to:
Literal	Recall	Recognise or recall information.
	Translation	Change information into a different form — it might involve paraphrasing the ideas or restating them in terms or forms other than those in the text.
Text-based inferential	Interpretation	Identify the relationships among ideas, definitions, facts and values — these would involve such relationships as comparisons and cause and effect; they involve a minimum of higher-order thinking as the reader/learner needs only to respond to and manipulate ideas in the text.
Higher-order (Context-based) inferential	Application	Solve real-life problems by extrapolating what is in the text — readers/learners need to combine ideas from the text with prior knowledge.
	Logical analysis	Analyse and judge the quality of the logic inherent in the text — readers/learners might, for example, identify fallacies or points of view represented in a text.
Creative	Synthesis	Respond to a problem or idea with original and creative thinking.
	Evaluation	Make judgments with respect to specific criteria.

Performance

There was generally an increasing level of difficulty across the Reading test, with facility rates decreasing as students progressed through the test due to the variables discussed earlier.

The relatively high facility rates for the first three units can be attributed to the greater prevalence of literal question types, but also because the texts were easier to read, item construction simpler and options were generally easier to interpret. The first three texts were also simple in terms of structure and language use. *Moving on* is a short narrative with very few technical terms. *All you ever wanted to know about chewing gum* is presented like a webpage with subheadings and short paragraphs. *Wave-driven generator* has a supporting diagram and corresponding numbered paragraphs.

Item 12, in *All you ever wanted to know about chewing gum*, was the exception in the first three units with an 11.85% facility rate. This is likely in part because it was a higher-order inferential question. Another factor in the difficulty of this item is that it appeared that many of the capable students selected distractors which seemed plausible without referring to the magazine and viewing the images.

The fourth unit, *Titanic*, has been referred to already for being significantly more difficult than the preceding three units. Viewing this in the reading magazine, the lack of headings and paragraphs makes it a difficult text to skim, scan and extract main ideas. Queensland students performed better than the national average in Item 20 of this unit. The lowest facility rate in this unit (Item 26) suggests that even capable students had difficulty identifying an overarching idea.

The forging had a slightly higher facility rate than *Titanic*. Three of the items were literal-translation type questions. The item with the lowest facility rate in this unit was one of those literal translation questions (Item 33). This is likely because it is the first non-conventional item format in the Reading test. It requires students to sequence four events. Many students were tempted to sequence the events as they occurred in the text. These students did not understand that the first event was one that appeared in the second paragraph of the text. This is often the case with sequencing items in the Reading test.

Rewilding was the most challenging units for students so far. Queensland students performed marginally higher than the national average in two of these items (Items 36 and 38). The most

difficult item in this unit was Item 38 with a 22.6% facility rate. Students found two of the distractors in particular very attractive. This item demonstrated the importance of reading each option very carefully and the ability to find alternative themes rather than just main themes in a text.

Half the items in the remaining two units contained non-conventional, multiple-choice formats. This always increases difficulty.

The most challenging item in *Lost for words* was Item 43. This was the second most difficult item in the Year 7 Reading test. This item required text-based inference and had three keys in the five options. To make it more difficult, the number of correct options was unspecified. Readers had to identify multiple perspectives of the writer in a text where some readers struggled to distinguish the writer's actual perspective from what she stated.

The final unit, *Saffron: the true cost*, contained the most demanding question types. The first two questions required creative thinking, and both required two options to be selected. However, the most difficult item in the unit, and the whole test, was Item 50. This item has two keys, but that is not specified. Not only that, but the distractors are more sophisticated and difficult to interpret. One of the correct options requires a skill that relatively few students possess, combining information and ideas from the entire text.

In summary, Year 7 students had 50 questions in the Reading test: eleven of these were literal, twenty-eight required text-based inference, nine were categorised as context-based inference and two were creative.

Question type	Average facility rate	Number of items
Literal (recall and translation)	59.90	11
Text-based inference (interpretation)	47.48	28
Context-based inference (application and logical analysis)	33.38	9
Creative	14.88	2

The items that involved purpose, tone and character had lower facility rates than literal and lower-order inferential items. This is because they required higher-order reasoning and comprehension. Students need to form an understanding of the whole text as well as pay attention to subtle clues in the text that help them make the inferences. As a result, implications for teaching should reflect these demands.

Implications for teaching

The lower facility rates on non-literal items demonstrates the importance of giving students strategies to help them make inferences as they read, i.e. to make statements about the unknown based on the known.

As a general note, all items involving purpose, main idea, theme or tone of the text (in whole or part) challenge students because they need to understand the whole of the text to answer the item. The big challenge for teachers is to get students to annotate texts in the classroom and discuss them in groups so that they can see how all the parts of the text contribute towards the meaning of the whole.

This is the time to discuss patterns in the text (e.g. cause and effect), identify connections between ideas in the text, the two or three main parts of the text and how the parts contribute to the overall meaning. All of this should occur before students begin a close study of the text. Students will handle the distractors in the items much better if they are clear about the subject matter and the purpose of the text before they proceed to the items.

Teachers can encourage students to read for pleasure and recreation to extend their knowledge of themselves and the world around them. Reading develops empathy for characters and people in difficult situations. Students also need to be able to participate confidently in a close study of a text, to check for fallacies and persuasive techniques, and to identify emotive language and literary techniques. The goal should be for students to be discerning and capable readers and confident speakers and writers about those texts.

The complexity of the reading process is made visible when students discuss texts and share how they arrive at their personal understanding of the text. Teachers are the facilitators of this process, not the leaders. Their focus should be on:

- finding authentic texts which engage their students
- providing a range of genres and texts from classic or traditional texts to texts with postmodern elements
- promoting higher-order questioning of texts (both set texts for special study and unseen texts for close study)
- reading aloud to students to promote reading for pleasure (sometimes at Year 7 this is forgotten)
- talking about texts and authors respectfully and disagreeing with each other about their interpretations appropriately
- developing an awareness of how the parts of the text combine to create a whole through both semantic (links between the ideas) and syntactic (grammatical links) cohesion
- encouraging students to make inferences as they read (an informed guess backed by evidence or a statement about the unknown based on the known)
- encouraging the link between reading and writing by asking students to regularly write analytical paragraphs about an aspect of what they have read, e.g. Can this character be trusted? Is there a shift in tone in this text? Is the writer manipulating the reader unfairly?
- encouraging students to see connections between the text and their own knowledge and experience, between different things within the text and between this text and other texts in a similar genre or on similar subject matter
- providing students with opportunities to discuss and share their understandings of a text while always asking them to substantiate their interpretation using the text.

QCAA resources

Full analysis of student performance and error patterns for each item is published in the SunLANDA program: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/sunlanda/accessing-navigating-sunlanda> and as PDF documents: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/test-item-analysis>. A school BIC and password is required to access each year level document.

Additionally, further advice and support can be found in: QCAA 2015, *Beyond NAPLAN: How to read challenging texts*, Beyond NAPLAN series: www.qcaa.qld.edu.au/downloads/p_10/naplan_read_challenging_texts.pdf.

Numeracy

Results and item descriptions

The Numeracy strands from the Australian Mathematics Curriculum are abbreviated as follows: Number and Algebra (NA); Measurement and Geometry (MG); Statistics and Probability (SP).

All items are worth one score point. However, there is a range of difficulty across the items.

The percentage columns give facility rates (percentage correct) for each item.

Item	Strand	Answer	QLD %	Aust. %	Description
Calculator-allowed items					
1	MG	A	95.69	96.09	Chooses the most appropriate unit of measurement.
2	SP	B	80.19	81.05	Identifies an event where one cannot happen if the other happens.
3	MG	B	82.43	81.70	Identifies a shape after a rotation.
4	MG	A	90.69	90.76	Identifies the top view of a collection of cylinders.
5	NA	B	85.27	85.97	Solves a multistep problem involving multiplication and division of whole numbers.
6	SP	C	80.82	79.85	Compares data in a column graph and a picture graph.
7	MG	C	77.53	79.08	Counts the number of blocks to calculate the volume of cubes.
8	NA	B	66.37	66.86	Uses a variable to represent a value in an expression.
9	SP	B	57.67	60.14	Selects the most likely results in a spinner experiment.
10	MG	C	64.51	65.86	Converts litres to millilitres to solve a capacity problem.
11	NA	50	54.52	55.92	Calculates the difference between two integers.
12	NA	B	53.98	56.21	Uses an expression to solve a multiplicative problem involving a unit fraction.
13	SP	C	58.26	59.91	Interprets a Venn diagram to solve a problem.
14	NA	A	50.54	53.06	Calculates the profit made in a simple financial plan.
15	NA	15	48.54	50.67	Calculates a fraction of a quantity in context.
16	MG	D	50.36	51.76	Uses a timetable to solve a problem involving duration of time.
17	MG	E	48.35	48.05	Locates the relative position of a point on a grid given compass directions.

18	SP	E	50.47	52.12	Selects the appropriate method to collect the required data.
19	NA	D	43.17	46.01	Solves a division problem to determine the remainder.
20	NA	C	48.93	51.70	Subtracts decimals and multiplies by one million.
21	MG	AD	45.24	47.02	Compares the area of irregular polygons.
22	SP	A	43.44	43.89	Indicates the probability of an event on a 0 to 1 scale.
23	NA	C	47.14	48.27	Evaluates an algebraic expression by substituting a value into the equation.
24	MG	D	48.41	49.67	Identifies the face opposite a given face on the net of a cube.
25	NA	D	39.45	42.65	Follows a pattern to continue a number sequence involving doubling.
26	NA	D	41.50	43.28	Represents numbers to three decimal places on a number line.
27	NA	C	29.78	31.35	Solves a problem using simple ratios and the addition and subtraction of decimals.
28	SP	B	47.36	48.53	Assigns probabilities of events without replacement and describes using percentages.
29	NA	32.95	24.72	25.11	Rounds a cost, expressed in dollars, to the nearest five cents.
30	MG	C	29.38	31.15	Calculates the perimeter of a shape given the area.
31	NA	D	26.90	29.15	Selects the appropriate order of operations to give a correct expression.
32	MG	D	20.77	22.25	Uses properties of straight lines and angles to calculate an unknown angle.
33	MG	27	6.82	8.22	Calculates the volume of a cube and converts to litres, to determine capacity.
34	MG	1.7	21.44	23.06	Solves a problem involving perimeter.
35	NA	C	17.93	19.34	Compares items of different size by determining the unit price of each.
36	SP	48	20.63	22.60	Compares data in a side-by-side column graph.
37	NA	3.8	15.61	16.80	Solves a multistep addition and subtraction problem involving decimals.
38	NA	D	12.02	13.45	Identifies the product of powers of prime factors for a given whole number.
39	MG	AD	9.26	10.09	Solves a problem involving the conversion of grams to kilograms.

40	NA	442.5	2.82	3.42	Uses all four operations to solve a multistep financial plan with whole numbers.
Non-calculator items					
1	NA	A	75.09	77.13	Calculates the change required for a simple transaction.
2	NA	360	64.19	67.44	Applies place value knowledge to solve a subtraction problem.
3	NA	C	53.35	56.88	Solves a two-step word problem involving multiplication and division.
4	NA	A	52.33	53.79	Calculates the length of an object by subtracting decimal metric units.
5	NA	17	42.33	43.90	Estimates total cost by rounding amounts to the nearest dollar.
6	NA	C	28.44	31.00	Solves a problem involving the combination of multiples of 3, 7 and 9.
7	NA	AE	19.76	21.35	Identifies the five-digit numbers that satisfy a given rule.
8	NA	3 213 000	9.83	11.02	Calculates the cost of an item after a percentage discount.

About the test

The Year 7 Numeracy test consisted of 48 items covering concepts and skills from the Australian Mathematics Curriculum across two tests — a Calculator-allowed (CA) paper with 40 items and a Non-calculator (NC) paper with 8 items. However, not all items in the CA paper required the use of a calculator.

Student results for Numeracy in Year 7 are reported as a single score.

The distribution of the 48 items across the Australian Mathematics Curriculum strands was:

- Number and Algebra (26 items)
- Measurement and Geometry (14 items)
- Statistics and Probability (8 items).

All 8 items in the Non-calculator paper were from the Number and Algebra strand.

Over the entire test of 48 items, 37 (77%) were multiple-choice, with the remaining 11 items (23%) requiring students to arrive at their own answers (constructed responses). Interpretation of tables, graphs or diagrams was required in 26 of the 48 items (54%). The other 22 items (46%) were word problems that usually incorporated numerals within the information and question stems.

Performance

While the majority of students attempted to answer all test items, a number omitted the more difficult items towards the end of the test, particularly items in the constructed response format rather than the multiple-choice format. For example, the omission rate rose to 20% for the last item in the Calculator-allowed paper, Item 40.

Possible reasons for high omission rates could be the increase in complexity of the item stems. Being near the end of the test, students may have felt pressured by time and not paid close attention to all of the instructions in order to complete these questions satisfactorily.

Examples of notable omission rates:

- Non-calculator Item 8 – constructed response: Multistep problem. Calculating the price paid after a percentage discount is given on a very large quantity of money
- Calculator-allowed Item 33 – constructed response: Calculating the volume of a cube with dimensions stated in centimetres and converting the answer to litres to determine capacity. Students appear to find it difficult to connect volume and capacity
- Calculator-allowed Item 34 – constructed response: Problem solving. Students needed to understand that the opposite sides of a rectangle have the same lengths
- Calculator-allowed Item 36 – constructed response: Representation of data. Required to interpret vertical numerical scales on a side-by-side column graph to compare the data
- Calculator-allowed Item 37 – constructed response: Addition and subtraction problem. Required to systematically and logically work through the information to calculate distances. Required visualisation on a number line and careful reading. Many students were unsure how to apply the multiple steps required in this calculation
- Calculator-allowed Item 38 – multiple choice: Representing. Identify the prime factors of a given number, interpret the index notation used and select the correct expression
- Calculator-allowed Item 39 – multiple choice: Problem solving. Required to visualise and convert from grams to kilograms. Students appeared to experience difficulty solving a multistep problem that needed to satisfy more than one criterion
- Calculator-allowed Item 40 – constructed response: Problem solving. Required to use all four operations to solve a multistep financial problem. The multiple cognitive and literacy demands of this item proved challenging for many students.

Queensland students performed slightly better than the national facility rates in three Calculator-allowed items:

- Item 3 – Measurement and Geometry: Identifies a shape after a rotation (0.73% higher)
- Item 6 – Statistics and Probability: Compares data in a column graph and a picture graph (0.97% higher)
- Item 17 – Measurement and Geometry: Locates the relative position of a point on a grid given compass directions (0.3% higher).

Queensland students achieved comparable facility rates with the national cohort on four Calculator-allowed items:

- Item 4 – Measurement and Geometry: Identifies the top view of a collection of cylinders
- Item 5 – Number and Algebra: Solves a multistep problem involving multiplication and division of whole numbers
- Item 8 – Number and Algebra: Uses a variable to represent an algebraic expression
- Item 22 – Statistics and Probability: Indicates the chance of an event on a 0 to 1 scale.

The percentage of Queensland students answering the Calculator-allowed items correctly ranged from 96% for Item 1, to 3% for Item 40. This trend is typical of diminishing facility rates for NAPLAN Numeracy test performance, as the most difficult questions are located towards the end of the test. Non-calculator item facility rates ranged from 75% for Item 1 to 10% for Item 8.

Challenging items

The more challenging items provided capable students with opportunities to apply their knowledge and skills to solve problems. Students with a good knowledge of a range of concepts, who are confident in using these in a variety of contexts, were more likely to solve these items given sufficient time.

Examples of challenging items:

- Calculator-allowed Item 30 required students to calculate the length of a frame from a given area using appropriate units. Students felt confident answering this challenging question (omission rate of 4%) even though only 29% of students answered correctly. Initially the stem makes a reference to area, but students had to calculate the length of a frame using the area of a picture. Students who selected incorrect responses seemed unable to see the relationship between side length and area.
- The familiar context of Calculator-allowed Item 35 allowed almost all students to engage with this question (omission rate of 6%), even though many selected incorrect options (only 18% of students answered correctly). It is likely that this was because the context was familiar and student friendly, and students felt reasonably confident selecting at least one correct option. It is also possible that students felt confident to attempt this item because it was the only multiple-choice item amongst several constructed response items.
- Calculator-allowed Item 39 required students to visualise the number of blocks required to make a given mass and then convert from grams to kilograms ($1000\text{ g} = 1\text{ kg}$). Students needed to pay close attention to all the instructions given to decode important information, conceptualise the problem, and then solve the problem. Students found the multistep demand and the requirement to satisfy more than one criterion very challenging. The complexity of this item is further increased because students had to interpret a combination of visual information and written text. Those students unable to do so may have found the context challenging and may not have had sufficient time to complete processing the calculations.

Teachers may want to look at their class results and compare how their students performed on items such as these. Poor performance in items may suggest that students would benefit from being introduced to a greater range of problems with slightly increased complexity to develop their ability to reason mathematically.

Teachers should incorporate problem solving into their maths lessons to develop fluency and assist students to become familiar with solving problems related to the maths they are learning rather than teaching it as a separate concept.

Schools and teachers can use overall performance data for Queensland and Australia to compare against their own data in SUNLANDA. They can also use this to evaluate how difficult a particular aspect of numeracy was for all Queensland Year 7 students. If teachers combine this with similar data from previous NAPLAN tests, they can judge for themselves the relative difficulty of various concepts and skills.

Particular items of interest

Calculator-allowed Item 15 provides evidence that many students understand basic mathematical content — that fractions are part of a whole — but were unable to apply this knowledge to solve a problem. Many students failed to attend to the whole question and missed the final step in the process, to calculate the amount left over. These students seem to understand basic concepts and calculations involving fractions, but may experience difficulty with worded problems or applying fractions in an unfamiliar context.

Calculator-allowed Item 25 specifically assesses the ability to recognise and create a number sequence that involved a power of 2 and a subtraction of 1. Students need to identify a rule to continue a sequence and calculate the value of Pile 6, but the item complexity is increased by omitting Pile 5. Interestingly, students solved the most difficult part of the question but only identified the number of counters in Pile 5 and not in Pile 6 as required.

Calculator-allowed Item 27 requires students to solve a problem involving simple ratios. A number of students calculated the mass of the science book, instead of the maths book. It is interesting that these students have solved the most integral part of the question by calculating the mass of the science book (half the mass of her notes folder), demonstrating that they solve problems involving simple ratios. Some students seem to have overlooked important information in the stem regarding the mass of the science book and it appears that they forgot to complete the second part.

Implications for teaching

Problem solving

Problem solving involves a plan or process using a variety of methods, either learned or reasoned, in a logical manner to find a solution. Students require opportunities to make their own decisions about how to solve a problem. Teachers can pose maths problems derived from different curriculum areas.

When a problem is encountered that requires initiative, students should be equipped with problem-solving approaches where they feel enabled to:

- Identify the problem (What am I being asked to do?)
- Analyse the problem (What do I have to work with?)
- Take appropriate action (Select and apply procedures to solve the problem)
- Reflect on the answer (Check my answer — Does it work? Is my answer reasonable? Are there other correct answers?).

While all steps are important, 'Does my solution work?' and 'Is my answer reasonable?' are particularly beneficial in test situations, especially when students are asked to construct a response. The items with the highest omission rates in the 2018 Numeracy test were those involving constructed responses.

Students should be habitually asked to consider the reasonableness of their answers. See for example Items 8, 12 and 31 of the Calculator-allowed section.

Word problems

Items that proved to be difficult were those presented as word problems describing real-world contexts, often including diagrams or tables. Students had to interpret the presented information before determining the mathematical procedure(s) required to solve them. Many students find word problems particularly challenging. It seems that reading, interpreting and deciding what to do may be part of the difficulty. Understanding relies on familiarity with mathematical and everyday language used in a mathematical context.

Students need exposure to a range of word problems that involve different combinations of mathematical operations and visual text, so they become familiar with the language associated with operations in different contexts.

Students should familiarise themselves with the terminology used when solving word problems. This would help develop a greater understanding.

Teachers should provide opportunities for students to share and discuss their strategies to expand students' repertoire of problem-solving strategies for word problems.

Students should be encouraged to read the whole question more than once, the first time to get a general idea of what it is about, and subsequent readings to identify important information and what the question is asking. Sorting information into a more useful form by drawing a diagram or making a table or list can also be a valuable habit for students to develop.

Complexity

Typically, item complexity was increased by the following means in the Calculator-allowed paper:

- Item 15 – completing the second part of the question
- Item 21 – the need to identify more than one option, rather than the more common single option
- Item 27 – needing to use logic to systematically work towards the required option. Trial and error may have a place here in the problem-solving process
- Item 31 – providing similar options with subtle differences
- Item 39 – by interpreting a combination of visual information and written text. Students need to decode what is important information
- Item 40 – presenting multiple cognitive and literacy demands. Students had to read the information very carefully. Part of the skill in solving problems in the items is to deduce what is important information and how to apply that information.

Test-wiseness

Test-wiseness is any skill that allows a student to search for any unintentional clues that can be found in a test. Being test-wise allows students to pick the correct alternatives when they are not completely sure of the correct answer. The test-wise student takes advantage of clues that are present in test situations.

Students benefit from pacing their test progress to allow more time for the most challenging questions towards the end of the test. Teachers should instruct students to answer all multiple-choice items. Even if this involves guessing some answers before the test time runs out, it is better practice to answer these items than not answering at all. An educated guess may sometimes be correct.

Tables, graphs, diagrams

Of the 48 items on the 2018 Year 7 Numeracy paper, 26 items required interpretation of a grid, diagram, table, graph or other images. It is important that students have skills to interpret graphics and use strategies to solve a range of problems. Strategies include visualisation, spatial recognition and estimation.

Students should recognise that the different ways that data and information can be represented is an important element of numeracy. Teacher-led class discussions about the visual representations of mathematical concepts will help students develop the skills and experience required to interpret them.

QCAA resources

Full analysis of student performance and error patterns for each item is published in the SunLANDA program: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/sunlanda/accessing-navigating-sunlanda>

and as PDF documents: <https://www.qcaa.qld.edu.au/p-10/naplan/test-reporting-analysis/test-item-analysis>. A school BIC and password is required to access each year level document.

A useful reference for the teaching of spatial reasoning and geometric properties is given here: QSA, 2005, *Mathematics: About space*, https://www.qcaa.qld.edu.au/downloads/p_10/kla_maths_info_space.pdf