LITERACY AND NUMERACY TEST FOR INITIAL TEACHER EDUCATION STUDENTS

Assessment framework 2023

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PREAMBLE

In 2013, the Australian Council for Educational Research (ACER) was contracted by the Australian Institute of Teaching and School Leadership (AITSL) to develop the Assessment Framework and the pools of assessment items for the first two years of a national literacy and numeracy assessment. This assessment was designed to assess the literacy and numeracy levels of students enrolled in initial teacher education courses. The program is known as the literacy and numeracy test of initial teacher education students, hereafter referred to as the Test.

An assessment framework was published in 2015, providing information to students and other stakeholders before the launch of the Test in 2016. As noted in the published edition, 'the framework may undergo further reviews and revisions as the Test program matures.' This version of the assessment framework has been revised to include updated and fuller information about the Test, and to consider the change in potential cohort from the beginning of 2023 to include candidates not currently enrolled in initial teacher education courses.

The main revisions to this new edition of the Assessment Framework are:

- updated references to the revised National Program Standards in the *Accreditation of Initial Teacher Education Programs in Australia* (AITSL, 2015) on which the Test is based

- updated descriptions of the Test's alignment to relevant literacy and numeracy assessments and frameworks (which have themselves been revised since the original publication of the Assessment Framework)

- minor changes to the test construct, taking into account changes to the eligible cohort of test takers

- a new section explaining how standards for the Test were set

- an expanded description of reporting

- new sample items (Appendix 3 Literacy; Appendix 4 Numeracy).

INTRODUCTION

Overview

The Test aims to assess aspects of the literacy and numeracy proficiency of prospective and enrolled students of initial teacher education programs in Australia, to support the goal that graduates of initial teacher education programs demonstrate literacy and numeracy skills as per the National Program Standards (AITSL, 2015). This outcome is associated with an expectation that the personal literacy and numeracy skills of students graduating from initial teacher education courses be in the top 30% of the Australian population.

The purpose of this assessment framework is to define the aspects of literacy and numeracy relevant to the context of the Test and to provide details of how these aspects of literacy and numeracy are measured so that the necessary judgements of student proficiency can be made. It is important to acknowledge that the aspects of literacy and numeracy measured in the Test do not span the full range of literacy and numeracy capabilities required of practising teachers. The aspects specified in this framework are those that can be validly measured under the practical constraints of a point-in-time computer-based assessment delivered to many candidates. One key component of the development of the assessment framework was to consider the degree to which the aspects of literacy and numeracy included in the framework, and consequently the Test, can be regarded as core rather than peripheral to the broader personal literacy and numeracy of potential Test candidates.

In this document, the terms *literacy* and *numeracy* are used to refer to the two domains included in the Test.

The framework begins by giving some background and context to the development of a literacy and numeracy test that was originally developed for students enrolled in initial teacher education courses. Following this are separate sections on literacy and numeracy, outlining content specific to each domain. Reporting of results is also described. The body of the framework concludes with notes on aspects of the Test that are common to literacy and numeracy. Appendices provide background to the development of the Assessment Framework and the role of literacy and numeracy expert groups (Appendix 1), an explanation of the process of equating items to an adult literacy scale (Appendix 2), and sets of sample literacy items (Appendix 3) and sample numeracy items (Appendix 4).

Background

In 2011, all Education ministers agreed to a national approach to the accreditation of initial teacher education programs. While the standards have been modified since 2011, the relevant standard of the current National Program Standards in the *Accreditation of Initial Teacher Education Programs in Australia* preserves the essence of the agreement about the levels of literacy and numeracy required by new teachers[1]:

> 3.5 Entrants to initial teacher education will possess levels of personal literacy and numeracy broadly equivalent to the top 30 per cent of the population. Providers who select students who do not meet this requirement must establish satisfactory arrangements to ensure that these students are supported to achieve the required standard before graduation. The National Literacy and Numeracy Test is the means for demonstrating that all students have met the standard. (AITSL, 2015, Standard 3.5)

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[1] For further background on the genesis and development of the Test, see Appendix 1.

It will be noted that the standard now refers explicitly to the place of the National Literacy and Numeracy Test (the Test) in measuring attainment of the required levels of personal literacy and numeracy. It will also be noted that the standard includes reference to the responsibility of initial teacher education programs to support students admitted who do not yet meet the levels of personal literacy and numeracy required on entry to the program. This is consistent with the new policy of allowing pre-enrolled students to sit the Test, giving additional information to both prospective students and the programs as to where support may be needed.[2]

AITSL commissioned the development of an online assessment to assess the personal literacy and numeracy of prospective teachers. The Test assesses whether students meet the level of personal literacy and numeracy required by Standard 3.5.

Two programs concerned with general adult literacy and numeracy in Australia are relevant to the development of the Test: namely, the Australian Core Skills Framework (ACSF) and the Programme for International Assessment of Adult Competencies (PIAAC). Both were drawn on extensively to underpin the concepts and constructs to be assessed by the Test.

The Australian Core Skills Framework (ACSF)
The pre-eminent description of generic adult literacy and numeracy in Australia is the ACSF (Commonwealth of Australia, 2012).[3] The ACSF evolved from the Australian National Reporting System (NRS), which had been in use in Australia since 1995. The Australian Government released the ACSF in 2008 as a multi-purpose framework that is used to support teaching and learning, as well as benchmarking adult learners against levels. Because of its status and visibility in Australian adult education (and in this case, with reference to adult literacy and numeracy), the ACSF was chosen as the starting point for the development of the literacy and numeracy frameworks for the Test. The described levels in the ACSF also provide the reference framework against which the item development plan for the Test was established.

The ACSF was neither intended nor designed to be an assessment framework for the purposes of developing assessments of prospective and enrolled initial teacher education students, and its content is too broad to serve this purpose. However, the ACSF definitions relating to literacy (reading and writing) and numeracy were used to inform the relevant definitions in this framework, and the descriptions of the levels of the ACSF were used to help elaborate the kinds of skills that the assessment items should address within each domain.

The ACSF does not specify, to the level of detail required in an assessment framework for a program such as the Test, the measurable content and skills (such as reading processes or numeracy content) that underpin the definitions of literacy and numeracy. Accordingly, it was necessary to look beyond the ACSF to support development of the frameworks for the Test.

The Programme for International Assessment of Adult Competencies (PIAAC)
PIAAC, commissioned by the Organisation for Economic Co-operation and Development (OECD), was administered in 33 countries between 2011 and 2016. PIAAC evolved from two earlier international adult skills surveys, the International Adult Literacy Survey (IALS), administered in 21

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[2] As part of the process of revision of the framework, cognitive interviews were conducted with a small number of current Year 12 students. The purpose of the interviews was to validate the suitability of representative literacy and numeracy items for candidates not currently enrolled in initial teacher education courses.
[3] Full text and supporting documentation for the ACSF can be found at:
https://www.dese.gov.au/skills-information-training-providers/resources/australian-core-skills-framework

countries between 1994 and 1998, and the Assessment of Adult Literacy and Life Skills (ALLS), administered in 11 countries between 2004 and 2007. Australia has participated in all three surveys. In 2021, the PIAAC assessment framework was revised in preparation for Cycle 2. Data collection for Cycle 2 of PIACC, in which Australia may participate, is scheduled for 2022–23. The adult literacy surveys have been built on internationally developed and endorsed assessment frameworks (OECD and STATCAN 1995, Murray, Clermont et al. 2005, OECD 2010). In its most recent iteration, and in conjunction with its frameworks for adult literacy and numeracy, PIAAC provides useful content to inform development of this framework. Another way in which PIAAC is relevant to the Test has been in validating the capacity of the Test to set standards equivalent to the top 30 per cent of the Australian adult population's literacy and numeracy. The Australian results of PIAAC Cycle 1, administered in 2012, is the most recent national standardised and validated source of data on the percentages of Australian adults demonstrating described levels of literacy and numeracy. The process of standard setting for the Test, and the use of PIAAC in this process, is described in Appendix 2.

LITERACY FRAMEWORK

The literacy framework defines and explicates literacy as assessed in the Test.

The literacy test comprises reading and technical skills of writing. The literacy test does not include extended written communication, oral or aural modes of literacy. While it is acknowledged that these skills are essential attributes of literacy, it is not possible to assess the full scope of literacy within the constraints of the Test. As indicated in the previous section, the definition and explication of literacy developed for use in the Test program draws on those described in the ACSF and PIAAC.

Definition of literacy

The ACSF provides separate definitional descriptions of reading and writing.

The ACSF defines reading as follows:

> *The core skill of Reading describes a reader's performance in making meaning from different text types, including their awareness of an author's purpose and intended audiences, of their own purposes for reading, and of the role they themselves play in the construction of meaning.* (Commonwealth of Australia, 2012)

Some parts of this definition – such as the focus on 'making meaning' as the key skill and including different text types – are reflected in the literacy assessment framework for the Test. Other parts of this definition apply to more general teaching and learning contexts and are not used here. Assessing students' own purposes for reading or the role they play in the construction of meaning is outside the scope of the Test.

The ACSF defines writing as follows:

> *The Writing core skill identifies a set of skills, knowledge and strategies concerned with the ability to shape written language according to purpose, audience and context. Effective writers employ a combination of strategies, including 'big picture' strategies (e.g. audience and purpose) and strategies around the 'mechanics' of writing (e.g. spelling and punctuation). The writer needs to consider the appropriate text type to convey the message in each context.*
>
> *The Writing skill includes traditional pen and paper modes of writing. In different contexts it can also include other forms of writing such as computer literacy (e.g. word processing, chat or emailing), and other technologies such as mobile phone SMS.* (Commonwealth of Australia, 2012)

Several elements of this description are relevant to the Test. The elements of writing referred to as 'mechanics' in the ACSF are key and explicit elements of the technical skills of writing. Moreover, since understanding of audience and purpose are integrated into the structure, register and vocabulary choices of written text, the 'big picture' elements referred to in the ACSF are also components of technical skills of writing that can be assessed in the Test.

In the first cycle of PIAAC, literacy was defined as

> *understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential.* (OECD, 2012)

This definition underpinned the development of the reading component of the original Assessment Framework for the Test. The PIAAC definition was selected ahead of the ACSF definition as the

starting point for the literacy definition applicable to the Test because of its greater focus on the measurable literacy skills that are relevant in an assessment context.

The processes of 'understanding', 'evaluating', 'using' and 'reflecting' in the PIAAC definition provided clear guidance about the kinds of reading processes that need to be assessed. The reference to 'written texts' frames the range of text types for inclusion in the assessment. The PIAAC definition also provides guidance about the purpose of the reading tasks that should be included in the assessment: the texts included in the assessment should be of the kind that could assist readers to participate in society, achieve goals and develop their own knowledge and potential.

For PIAAC Cycle 2, the definition of literacy was revised to:

> *accessing, understanding, evaluating and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.* (OECD, 2021, p. 42)

The process of 'accessing' was added to direct attention to reading in a digital environment with interactive multi-layered interfaces (not relevant to the Test in its current form).

The original PIAAC literacy definition referred to 'engagement' as part of literacy and assessed engagement through a questionnaire about reading habits and enjoyment of reading. However, this aspect of reading was not included in the Test, so its removal from the PIAAC definition does not impact alignment with the Test.

While there is very strong alignment between the definition of literacy in PIAAC and the literacy focus of the Test, there is one major difference: PIAAC is confined to reading literacy and does not include any elements of writing. Because the Test includes some focus on technical skills of writing (as an indicator of writing ability), it is necessarily broader than the PIAAC definition.

The definition of literacy developed for the Test represents reading and writing in terms of content, contexts and processes that are relevant to prospective teachers.

Personal literacy, for the purpose of the Test, is defined as:
understanding, evaluating, using and shaping written texts to participate in an education community, to achieve one's goals, and to develop one's knowledge and potential as a teacher.

The terms 'using' and 'shaping' incorporate the elements of writing that are part of the Test's literacy construct. Furthermore, given the specific purpose of the assessment – to measure the personal literacy of prospective education students and teachers – the definition of literacy for the Test includes specific contextual focus on teaching and education.

Balance between reading and technical skills of writing

The assessments of reading and the technical skills of writing are administered in a single literacy test. It is recognised that writing can only be partially assessed in this instrument; therefore, the proportion of the literacy assessment dedicated to writing skills is smaller than that dedicated to reading, which can be more comprehensively measured. Two-thirds of the literacy test assesses reading and one-third technical skills of writing.

While the overarching definition of literacy underpins both reading and the technical skills of writing, they are dealt with separately in the following discussion.

Reading

This section begins with details of different aspects of the reading texts (and their relevant test items) used in the Test, followed by an explanation of the reading processes measured in the assessment.

Text medium
The medium for the texts used as stimulus in this assessment is digital in the sense that the assessments are computer delivered. However, the texts are print-style texts that are to be read on-screen and do not include interactive multi-layered digital texts.

Text format
The Test draws on descriptions of text formats used in the ACSF and PIAAC. Both the ACSF and PIAAC identify continuous and non-continuous texts as the main text formats. The ACSF definition is taken from the same source as that for PIAAC: the reading framework for the Programme for International Student Assessment (PISA) (OECD 1999). The 2018 reading framework for PISA also includes the format of mixed texts (OECD, 2019).

Continuous texts are defined as those in which sentences are organised into paragraphs, pages, sections and chapters.

Non-continuous texts organise information in graphic or diagrammatic forms such as lists, tables, graphs, maps or forms.

Mixed texts consist of a set of elements including both continuous and non-continuous formats.

It is useful to differentiate predominantly non-continuous texts, in which clearly more than half the content is in a non-continuous format, from mixed texts that have half or less of the content in a non-continuous format.

The reading assessment in the Test uses these three categories of text format.

Test items are classified according to the text formats to which they refer. Where stimulus is in a *mixed text* format, items that address a continuous section of the text are classified as *continuous* and items that address a non-continuous section are classified as *non-continuous*. Only items that require the reader to draw on both continuous and non-continuous parts of the stimulus are classified as *mixed text* format. It follows that the proportion of items that are classified as *mixed* in terms of text format may be smaller than the proportion of texts that would be classified in this way. Table 1 shows the target proportions of test items for each of the text format categories.

Table 1: Target proportions of reading items in each text format category

Text format	Proportion of reading items
Continuous	Approximately 45–65%
Non-Continuous	Approximately 25–35%
Mixed	Approximately 10–20%

Text type
While *text format* refers to the structure of the text, *text type* refers to the purpose or orientation of the text – sometimes called 'genre'. The ACSF identifies seven text types. The PIAAC framework refers

to six text types that are more or less equivalent to those identified in the ACSF. The Test includes seven text types largely modelled on those described in the ACSF and PIAAC, since teachers may reasonably be expected to encounter all of these text types as part of their professional life. Table 2 shows the text types included in the ACSF, PIAAC and the Test.

Table 2: Text type in the ACSF, PIAAC and the Test

ACSF	PIAAC	The Test
Creative	Narration	Narrative
Descriptive	Description	Descriptive
Informative	Exposition	Informative
Persuasive	Argumentation	Persuasive
Procedural	Instruction	Procedural
Regulatory	–	Regulatory
Technical	–	Technical
–	Transaction	–

For the Test, the term *narrative* has been used rather than *creative* because it is more easily recognised and more clearly defined in the literature as a text type. The narrative texts selected for the reading assessment may include realistic and imaginative scenarios from fiction and drama, as well as biographies and autobiographies, but are unlikely to include poetry or such genres as fantasy. It is considered important to include narrative texts in the literacy assessment because they typically present language structures and features that are not commonly found in other text types, and also because they often reflect human affect and relationships – areas of strong concern to prospective teachers.

The ACSF provides examples of each of the other text types (Commonwealth of Australia, 2012). Adaptations of these are presented here by way of elaboration of the text-type categories.

Descriptive: recount of a school excursion; essay comparing two pedagogical approaches.

Informative: school newsletter; research paper on main developments in school buildings in the last 20 years.

Persuasive: report to principal presenting argument and recommendations for new equipment.

Procedural: standard operating procedures for use of digital whiteboards; fire drill instructions.

Regulatory: professional development course completion requirements; education department directive.

Technical: tabular information on features of a new computer system in a school library.

While it is possible to ensure that there is a range of text types across the item pool, it is not possible to ensure that each test form (that is, each individual test that could be administered to an individual candidate) includes the full complement of text types. Consequently, the text types have been grouped into three categories, with the aim that all three text-type categories are represented in each test form. The first category comprises the *descriptive*, *informative* and *persuasive* text types; the second category comprises the *procedural*, *regulatory* and *technical* text types; and the *narrative* text type

remains distinct in this arrangement. These classifications are used for the purpose of assembling test forms, but the seven text types identified in the reading framework for the Test are used during test item development to ensure balance of text types across the full item pool.

The target proportions of test items for each of the broad text-type categories of reading texts are shown in Table 3.

Table 3: Target proportions of reading items in each text-type category

Text type	Proportion of reading items
Descriptive, informative, and persuasive	45–55%
Procedural, regulatory, and technical	25–35%
Narrative	15–25%

These targets apply at test form level, as well as across the full item pool.

Text length and number of texts

Texts in the reading assessment for the Test range from around 100 words (for some non-continuous texts) to around 900 words.

Using a range of shorter texts in the reading item pool allows for the inclusion of a diversity of text types, contexts and topics. Moreover, shorter texts are well suited to reading on a computer screen with minimal scrolling. On the other hand, longer texts are an essential part of real-world reading, and can be used to assess a wider range of reading processes than shorter texts, as readers need to deal with more information and to track ideas within and across the text. It is important to include some longer texts in the Test to allow for the full range of requisite reading skills to be assessed.

Each reading test completed by a student includes a variety of shorter and longer texts. In the assessment, longer texts are typically associated with larger numbers of items than shorter texts. This means that the amount of reading time per test item is relatively consistent.

Topics

Material is selected that is likely to have broad appeal. The set of texts encompasses diverse topics, points of view and life experiences. Some texts are unavoidably of more interest to particular candidates than others, but each test form contains a variety of topics, with the intention that the overall content of each test form is of a similar level of interest to all candidates.

Texts are selected deliberately to include material that is unlikely to be familiar to the candidates – in the form of new ideas, structure or language, or a combination of all three. One of the main purposes of reading is to gain new information and understanding – we read to learn – and therefore an assessment of reading literacy legitimately measures, in part, whether learning from a text is occurring.

Complexity

There is not always a simple match between text complexity and question difficulty. Complex questions can be based on simple texts and, conversely, simple questions can be based on complex texts. Most complex texts are themselves a mix of complex and simple aspects. For example, a linguistically simple and clear text is more complex when based on unfamiliar content than on familiar

content. The reading items for the Test are constructed taking into account the interplay between task difficulty and text complexity. The different levels of complexity among the texts in the reading test allow for targeting of test items at varying levels of difficulty.

The introduction to the ACSF includes a summary definition of the complexity of contexts and texts across all of the skills areas of the ACSF, at each of Levels 1 to 5 (Commonwealth of Australia, 2012). The definitions for Levels 2 to 5 – those relevant to the Test – are shown in Table 4.

Table 4: ACSF definitions of context and text complexity, Levels 2 to 5

Level	Context	Text complexity
2	• Familiar and predictable contexts • Limited range of contexts	• Single familiar texts with clear purpose • Familiar vocabulary
3	• Range of familiar contexts • Some less familiar contexts • Some specialisation in familiar/known contexts	• Routine texts • May include some unfamiliar elements, embedded information and abstraction • Includes some specialised vocabulary
4	• Range of contexts including some that are unfamiliar and unpredictable • Some specialisation in less familiar/known contexts	• Complex texts • Embedded information • Includes specialised vocabulary • Includes abstraction and symbolism
5	• Broad range of contexts • Adaptability within and across contexts • Specialisation in one or more contexts	• Highly complex texts • Highly embedded information • Highly specialised language and symbolism

These descriptions of complexity are used as a guide in selecting the reading texts for the Test.

Reading Processes
Reading processes are the skills or cognitive processes that readers deploy to make meaning from texts. Both the ACSF and PIAAC frameworks refer to reading processes.

The descriptions of task complexity from Level 1 to Level 5 of the ACSF reflect the hierarchy in Bloom's Taxonomy (Bloom, 1956), with locating and recognising skills in Level 1, advancing to simple interpreting and sequencing at Level 2, then sequencing, integrating, interpreting, simple extrapolating, simple inferencing and simple abstracting at Level 3. At Level 4 this becomes extracting, extrapolating, inferencing, reflecting and abstracting, and by Level 5 the processes become synthesising, critically reflecting, evaluating and recommending (Commonwealth of Australia, 2012).

This hierarchy is not so clearly evident in reading assessment frameworks or empirical data from reading assessments. Typically, readers at every stage of development engage in all the above activities to some extent. Even very young readers reflect on what they are reading, relating it to their own lives.

Highly proficient readers continue to locate and identify information. In practice, task difficulty and text complexity are strongly associated. Tasks that require a reader to identify information can range in difficulty from low to high because the task is easy when it is applied to a simple text and hard when it is applied to a complex text. Similarly, making inferences or synthesising information is not inevitably difficult. Given a simple text and a familiar idea with prominent clues, inferencing will be a simple task. Increasing the complexity of the text, the unfamiliarity of the idea and the subtlety of the clues makes it a complex task.

In contrast to the ACSF, PIAAC takes an approach that identifies three broad processes of reading that are demonstrable through all reading levels. These processes were first defined in PISA (there they are called 'aspects'); a similar set of variables is used in the Progress in International Reading Literacy Study (PIRLS) (see, for example, Mullis et al. 2007). The PIAAC Cycle 2 and parallel PISA terms are shown in Table 5.

Table 5: Reading processes in PISA and PIAAC

PISA 2009–2015 aspects	PISA 2018 aspects	PIAAC Cycle 2 processes
Access and retrieve	Locate information	Accessing text
Integrate and interpret	Understand	Understanding
Reflect and evaluate	Evaluate and reflect	Evaluating

Extracts from the PISA reading literacy aspect subscales, shown in Figure 1, illustrate the increasing complexity of the three reading processes over the levels of the PISA scale (OECD, 2010). The descriptions of Levels 2 to 6, shown here, provide some guidance to test developers about the level of complexity of the tasks that are required for this assessment.[4]

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[4] The PISA descriptions from the fourth cycle of PISA (2009) are provided here because they offer summaries of the processes per level. Later editions of PISA reporting combine the processes into a single level description. PIAAC has not, to date, provided reporting on the development of reading processes across levels at the same level of detail.

Level	Access and retrieve	Integrate and interpret	Reflect and evaluate
6	Combine multiple pieces of independent information, from different parts of a mixed text, in an accurate and precise sequence, working in an unfamiliar context.	Make multiple inferences, comparisons and contrasts that are both detailed and precise. Demonstrate a full and detailed understanding of the whole text or specific sections. May involve integrating information from more than one text. Deal with unfamiliar abstract ideas, in the presence of prominent competing information. Generate abstract categories for interpretations.	Hypothesise about or critically evaluate a complex text on an unfamiliar topic, taking into account multiple criteria or perspectives, and applying sophisticated understandings from beyond the text. Generate categories for evaluating text features in terms of appropriateness for an audience.
5	Locate and possibly combine multiple pieces of deeply embedded information, some of which may be outside the main body of the text. Deal with strongly distracting competing information.	Demonstrate a full and detailed understanding of a text. Construe the meaning of nuanced language. Apply criteria to examples scattered through a text, using high level inference. Generate categories to describe relationships between parts of a text. Deal with ideas that are contrary to expectations.	Hypothesise about a text, drawing on specialised knowledge, and on deep understanding of long or complex texts that contain ideas contrary to expectations. Critically analyse and evaluate potential or real inconsistencies, either within the text or between the text and ideas outside the text.
4	Locate several pieces of embedded information, each of which may need to meet multiple criteria, in a text with unfamiliar context or form. Possibly combine verbal and graphical information. Deal with extensive and/or prominent competing information.	Use text-based inferences to understand and apply categories in an unfamiliar context, and to construe the meaning of a section of text by taking into account the text as a whole. Deal with ambiguities and ideas that are negatively worded.	Use formal or public knowledge to hypothesise about or critically evaluate a text. Show accurate understanding of long or complex texts.
3	Locate several pieces of information, each of which may need to meet multiple criteria. Combine pieces of information within a text. Deal with competing information.	Integrate several parts of a text in order to identify the main idea, understand a relationship or construe the meaning of a word or phrase. Compare, contrast or categorise taking many criteria into account. Deal with competing information.	Make connections or comparisons, give explanations, or evaluate a feature of a text. Demonstrate a detailed understanding of the text in relation to familiar, everyday knowledge, or draw on less common knowledge.
2	Locate one or more pieces of information, each of which may need to meet multiple criteria. Deal with some competing information.	Identify the main idea in a text, understand relationships, form or apply simple categories, or construe meaning within a limited part of the text when the information is not prominent and low-level inferences are required.	Make a comparison or connections between the text and outside knowledge, or explain a feature of the text by drawing on personal experience or attitudes.

Figure 1: PISA Reading Literacy described scale, by process

The PISA described process subscales are based on the assessment of 15-year-olds, but it is likely that adults demonstrate a similar progression in the development of these reading processes. The PIAAC *Reader's Companion* refers to the categories of processes described in PISA and PIAAC as 'the same' (OECD 2013).

The PIAAC Cycle 1 terms are used for this reading framework because of the adult focus of the assessment.[5]

Access and identify is about locating one or more pieces of information in the text.

Integrate and interpret is about relating parts of the text to each other, construing implied meanings within the text, and coming to an understanding of the text as a whole.

Evaluate and reflect is about relating the text to knowledge, ideas or values that are external to the text.

Evaluate and reflect questions most commonly require students to respond in writing and consequently require human scoring (or machine scoring that is beyond the current scope of the Test). However, it is possible to write some evaluate and reflect questions in machine-scorable formats and up to 20% of the reading questions for the Test assess the evaluate and reflect process.

The target proportions of test items for each of the reading process categories are shown in Table 6.

Table 6: Target proportions of reading items in each process category

Process category	Proportion of reading items
Access and identify	35–45%
Integrate and interpret	40–50%
Evaluate and reflect	10–20%

While the whole item pool reflects these proportions of items, there may be some variation in the proportions within each test form.

Technical skills of writing

The Test does not include an assessment of writing in continuous prose, and it is acknowledged that testing the technical skills of writing will only provide a partial measure of prospective teachers' global writing proficiency. The assessment of the technical skills of writing should thus be viewed as a measure of some important but constrained aspects of writing literacy.

Content
The ACSF includes 10 focus areas for writing, which have been used to guide the development of the technical skills of writing in the framework for the Test (as indicated previously, PIAAC does not assess writing.) These ACSF focus areas for writing are shown in Table 7.

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[5] There are slight differences between the names of the processes in PISA and PIAAC: PISA's 'Access and retrieve' becomes 'Access and identify' in PIAAC; and PISA's 'Reflect and evaluate' is termed 'Evaluate and reflect' in PIAAC.

Table 7: ACSF focus areas for writing

Audience, purpose and meaning-making	The mechanics of writing
• Range • Audience and purpose • Structure and cohesion • Register • Plan, draft, proof and review	• Vocabulary • Grammar • Punctuation • Spelling • Legibility

The assessment of writing in the Test is limited by the decision to deliver it as entirely computer-based and automatically scored. Nevertheless, a subset of the ACSF focus areas of writing is both relevant to and able to be assessed as part of the assessment of the technical skills of writing. Assessable elements include all of those listed in Table 7 in the column headed 'The mechanics of writing' with the exception of *legibility* (which is not relevant in the computer-based format). Assessable elements are also found in the column headed 'Audience, purpose and meaning-making': *structure and cohesion*, and *plan, draft, proof and review* (not including *draft*). The skills of planning, proofing and reviewing are required in items that, for example, ask candidates to locate errors (such as mistakes in spelling or punctuation) or to suggest the best order of presentation of ideas in a text. In addition, an understanding of audience, purpose and register is implicit in appropriate word usage and syntax.

The technical skills of writing assessed in the Test, together with their relevant ACSF writing focus areas, are shown in Table 8 and followed by brief notes on how each skill may be assessed in the Test.

Table 8: The technical skills of writing assessed in the Test and their corresponding ACSF focus areas

Technical skills of writing in the Test	ACSF focus area
Syntax and grammar (including punctuation)	Grammar, punctuation
Spelling	Spelling
Word usage	Vocabulary, audience and purpose, register
Text organisation	Structure and cohesion

The *syntax and grammar* content area includes the arrangements of words in sentences to convey intended meaning, the use of appropriate verb forms, subject/verb agreement, and correct use of pronouns (including relative pronouns). Punctuation performs both syntactic and grammatical functions in written language, so it is treated as part of this content area. Elements of punctuation assessed in the Test include the use of commas and apostrophes, and the punctuation of speech. Students may be asked to identify errors or to generate a correct or appropriate form in a given short text.

Spelling in the assessment focuses on words that are frequently misspelled and that are likely to be part of the vocabulary of an adult whose literacy is within the top 30% of the population. There is a focus on the spelling of words with regular patterns or those that are common but have irregular forms. Like *syntax and grammar*, *spelling* is assessed through the identification of errors and generation or identification of the correct form in short texts.

In the *word usage* category, vocabulary is assessed by candidates identifying the word that is closest in meaning to a given word. At a minimum, the given word is placed in a sentence, but the sentence may give little clue as to the meaning of the word. Writing involves not just knowledge of words but also an understanding of how they can be used in specific contexts. Good writers are able to draw on a wide vocabulary to present ideas precisely and concisely. They choose words that are appropriate to the purpose, audience and context. Understanding and use of register, including a sense of audience and purpose, may be measured in single items with specifically created stimulus, or in the context of a longer text.

Text organisation is about structuring texts so that they are logical and coherent. This occurs at the level of a whole text, through a logical progression of ideas (for example, coherence across paragraphs); and also more locally with the use of syntactic features such as reference, and lexical features such as discourse markers and connectives (cohesion within paragraphs). In the assessment of this content area, candidates may be asked to nominate the appropriate location in a text for a designated phrase, paragraph or idea; to reorder the sentences in a given text; or to identify an ambiguity caused by poor cohesion.

The target proportions of test items for each of the categories of the technical skills of writing content areas are shown in Table 9.

Table 9: Target proportions of items in each technical skill of writing category

Writing skills	Proportion of Technical skills of writing items
Syntax and grammar (including punctuation)	20–30%
Spelling	20–30%
Word usage	20–30%
Text organisation	20–30%

Stimulus and prompts
Items assessing technical skills of writing are based on short stimulus texts or brief item-specific prompts.

Stimulus texts may be presented as documents including errors that need to be edited. Such texts are used as the basis for identifying and correcting one or more mistakes in spelling, grammar or syntax (addressing the *spelling* and *syntax and grammar* skill categories, respectively). Short texts are used as the basis for tasks that require reorganising sentences or paragraphs into a more coherent or logical sequence (*text organisation* category) or substituting a more appropriately formal word for an informal word (*word usage* category).

The assessment of technical skills of writing also includes some item-specific prompts. As far as possible, these 'stand-alone' items are grouped together under a common topic or theme to provide a context for the tasks. Item-specific prompts are usually in the form of one or two sentences. Because of their brevity, these kinds of prompts allow efficient assessment of technical skills of writing, with minimum time-on-task. Such items also allow flexibility in constructing test forms with the appropriate distribution of items across framework variables.

NUMERACY FRAMEWORK

The numeracy framework defines and explicates numeracy as assessed in the Test.

It is widely accepted that, in order to be numerate and function effectively in society, adults need a broad understanding encompassing not just number but also measurement, space, data, chance and algebra. In addition to knowing facts, numerate members of society need to be able to apply their skills and reason and solve problems. They also need to be able to read and interpret mathematical information and communicate accordingly.

Numerate adults should also be able to estimate and use tools such as measurement aids (rulers, tape measures, scales etc.), calculators and in some instances computer software and applications (for example, spreadsheets). Any definition of numeracy should also recognise that numeracy changes over time, along with social change and technological development (Lindenskov & Wedege, 2001).

Definition of numeracy

Numeracy was a component of the OECD ALLS and PIAAC surveys, in both of which Australia participated.

The definition of numeracy used in the ALLS survey was:

> *Numeracy is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations.*

The definition of numeracy used in PIACC Cycle 1 was:

> *Numeracy is the ability to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life.*

For PIAAC Cycle 2, the definition of numeracy has been revised to:

> *Numeracy is accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life.* (OECD, 2021 p. 93)

The ACSF draws on these understandings to define numeracy as 'active' and with a functional role in society:

> *Numeracy in the ACSF is about using mathematics to make sense of the world and applying mathematics in a context for a social purpose. Numeracy gives meaning to mathematics and mathematics is the tool (the knowledge and skills) to be used efficiently and critically.*
>
> *Numeracy involves understanding and applying mathematical skills. It also involves drawing on knowledge of the context in deciding when to use mathematics, extracting the mathematical information from the context and choosing the appropriate mathematics to use.*
>
> *Numeracy requires reflecting on and evaluating the use of the mathematics and being able to represent and communicate the mathematical results.* (Commonwealth of Australia, 2012, p. 113)

While the ACSF definition is most appropriate for this assessment, it is a description of numeracy for the wider adult community and not a definition of personal numeracy as it relates to teaching. The

definition of numeracy for the Test was developed to represent the numeracy content, contexts, processes and applications that are relevant to teachers.

> **Personal numeracy, for the purpose of the Test, is defined as:**
> *interpreting and communicating important non-technical mathematical information and using such information to solve relevant real-world problems to participate in an education community, to achieve one's goals, and to develop one's knowledge and potential as a teacher.*

Personal numeracy for teaching is about using important, everyday mathematics to make sense of the world, and applying this mathematics in a meaningful context for a social purpose related to education. It involves drawing on an understanding of the context in deciding how to use mathematics, extracting the mathematical information from the context, and choosing the appropriate mathematics in order to solve real-world problems that teachers are likely to come across in their daily and professional lives. It includes knowing how to use everyday technologies such as calculators and includes performing some basic calculations unaided by technology. It is assumed that candidates sitting the Test who are not currently enrolled in an initial teacher education program will nevertheless be anticipating entry to such a course. Accordingly, the kind of personal numeracy required by teachers is appropriate for all candidates.

The definition of numeracy for the Test refers to 'non-technical' mathematics. This term has been used to distinguish between the common, typical real-world uses of mathematics that are represented under the notion of *numeracy* and those mathematical operations and procedures that are typically reserved for the specific study of mathematics. For example, being able to read given Cartesian points on a parabola representing a real-world value (such as representing average maximum daily temperatures over a period of a year) would be seen as non-technical content, but suggesting an equation that could represent the parabola (such as a quadratic equation) would represent technical content and be out-of-scope for the Test. Similarly, substituting values into a given equation to calculate the area of a simple shape would be seen as non-technical, but using the Pythagoras' theorem to solve the side length of a triangle would be seen as technical content.

Given the computer-based medium of the Test, it is not possible to assess the behavioural or functional aspect of numeracy in its purest sense (Drake et al, 2012). For example, candidates are not able to manually use tape measures or scales to measure and weigh as they would in the real world. However, in order to maintain a real-world focus, the assessment of numeracy in the Test includes a selection of real-world numeracy contexts and makes use of real-world data and information wherever possible.

Numeracy content

The PIACC Cycle 2 numeracy framework comprises the following four content areas:

- Quantity and number

- Space and shape

- Relationships and change

- Data and chance.

The Australian Curriculum: Mathematics (version 9.0) comprises six content areas:

- Number

- Algebra

- Measurement

- Space

- Statistics

- Probability.

The ACSF comprises three content areas:

- Number and algebra

- Measurement and geometry

- Statistics and probability.

The three content areas from the ACSF have been adopted for use in the Test.

Table 10 shows the mathematical content regarded as in-scope for the numeracy assessment in the Test according to the three content areas. While the list is not exhaustive, it aims to give an impression of the content that is considered appropriate for the assessment.

Table 10: Selected relevant topic content by numeracy content area

Numeracy area	Example content
Number and algebra	Proportional reasoning; ratio; fractions (including score conversions); percentages (including weighted percentages across assignments); decimals; scientific notation; money; budgeting; interest calculations; basic operations; simple formulae; calculation of GST
Measurement and geometry	Time; timetabling and scheduling; knowledge about space and shape, symmetry and similarity relevant to common 2D and 3D shapes; quantities, including areas and volumes; use of given relevant routine formulae; conversion of metric units; use of maps and plans, scales, bearings, GPS data
Statistics and probability	Interpreting mathematical information such as graphs; statistics and data; comparing data sets or statistics; statistics and sampling, including bias; distributions; data and interpretation validity; reliability; box plots – matching data to displays; actual against predicted scores; assigning a grade based on a raw score; evaluating and drawing conclusions about student achievement based on data

As a guiding principle, the Test focuses on fundamental numeracy content assessing 'big ideas' and key concepts that are common in the real-world and defensible in that they are important for all teachers to know to effectively carry out their role.

Table 11 shows the target percentages of test items in each of the numeracy content areas in the Test.

Table 11: Target proportions of numeracy items in each content category

Content area	Proportion
Number and algebra	40–50%
Measurement and geometry	20–30%
Statistics and probability	25–35%

Numeracy processes

Both PIAAC and the ACSF describe three numeracy processes (referred to as 'responses' in PIAAC and '[performance] indicators' in the ACSF) that can, for the purposes of this framework, be regarded as roughly equivalent. Table 12 shows a mapping of the three ACSF indicators against the PIAAC responses.

Table 12: Numeracy processes in the ACSF and PIAAC

ACSF indicator	PIAAC Cycle 2 response
Identifying mathematical information and meaning in activities and texts	Access and assess situations mathematically (25–35%)
Using and applying mathematical knowledge and problem solving processes	Act on and use mathematics (30–40%)
Communicating and representing mathematics	Evaluate, critically reflect, make judgements (25–35%)

The first two ACSF indicators above have been adopted as the numeracy processes for the Test. The third numeracy process in the Test combines elements of the third ACSF and PIAAC processes.

The ACSF does not recommend relative proportions of the numeracy processes. In the PIAAC test instrument, the three numeracy responses that are comparable to the processes used in the Test are not equally weighted. PIACC Cycle 2 uses the following weightings for the three responses:

- *access and assess situations mathematically*, 25–35% (previously 10%)
- *act on and use mathematics*, 30–40% (previously 50%)
- *evaluate, critically reflect, make judgements*, 25–35% (previously 40%).

This unequal weighting reflects an assumption about the relative need to apply the responses in real-world contexts, an assumption that is similarly relevant when considering the numeracy processes used in the Test. Accordingly, the target proportions of items in each numeracy process category for the Test have been derived from those given for PIAAC Cycle 2, as shown in Table 13.

Table 13: Target proportions of numeracy items in each process category

Process	Proportion
Identifying mathematical information and meaning in activities and texts	20–30%
Using and applying mathematical knowledge and problem solving processes	45–55%
Interpreting, evaluating, communicating and representing mathematics	20–30%

Identifying mathematical information and meaning in activities and texts relates to a person's ability to identify and extract the mathematics embedded in a contextualised task. The explicitness and complexity of the mathematical information embedded in the text determine the complexity of this process.

Using and applying mathematical knowledge and problem solving processes relates explicitly to doing the mathematics and includes estimating and using a range of mathematical skills, methods, strategies and tools.

Interpreting, evaluating, communicating and representing mathematics relates to the ability to interpret, evaluate, critically reflect, communicate and represent the mathematics embedded in a situation. This includes use of common mathematical symbolism, notation and conventions, and representations such as graphs and tables that are evident in real-world contexts.

Use of calculators and other mathematical tools

Mathematical tools today include calculators, computers, and related software such as spreadsheets. The appropriate use of these tools is a key aspect of numeracy.

It is noted that there are considerable differences between countries and even between Australian jurisdictions and tertiary institutions regarding policy on calculator use in schools and examinations. There is also an expectation in the community that educated adults (such as teachers) should be able to perform basic calculations without access to a calculator. The numeracy assessment in the Test has two sections. In one section, comprising 75–85% of the test items, an on-screen calculator is available for use by students. In a second section, comprising 15–25% of the test items, students are **not** allowed to use a calculator.

LEVEL OF DIFFICULTY OF THE TEST'S LITERACY AND NUMERACY ITEMS

Establishing the target difficulty range of the test items

Standard 3.5 of the National Program Standards in the *Accreditation of Initial Teacher Education Programs in Australia* give an indication of levels of literacy and numeracy required by new teachers:

> 3.5 *Entrants to initial teacher education will possess levels of personal literacy and numeracy broadly equivalent to the top 30 per cent of the population. Providers who select students who do not meet this requirement must establish satisfactory arrangements to ensure that these students are supported to achieve the required standard before graduation. The National Literacy and Numeracy Test is the means for demonstrating that all students have met the standard.* (Australian Institute for Teaching and School Leadership [AITSL], 2015)

In efforts to interpret the meaning of the 'top 30 per cent of the population' referred to in Standard 3.5, several approaches have been implemented.

These parallel approaches considered the essential questions of how a student could be deemed to be in the top 30 per cent of the population and how this normative judgement of student proficiency could be married with criterion-based descriptions of the necessary literacy and numeracy proficiency of aspiring teachers.

One approach was to research empirical data on the literacy and numeracy achievement of Australian adults, and to consider this in the context of the ACSF.

A second approach was to establish expert judgements of the necessary literacy and numeracy proficiency of people entering the teaching profession against the contents of the ACSF. This second approach was conducted in 2013 with expert groups in teacher education and literacy and numeracy, aimed at determining indicative levels of personal literacy and numeracy commensurate with the description in Standard 3.5.

The aspiration for new teachers to have standards of literacy and numeracy that enable them to be effective teachers and positive role models, regardless of which subject or year group they teach, was used as the starting point for considering the standard.

Elaborations to this definition were derived, to establish benchmark literacy and numeracy standards for aspiring primary school teachers. The elaborations provided operational descriptions of the standard when applied to literacy and numeracy, as well as describing three contexts in which the standard could be demonstrated:

- in everyday life and the workplace
- when modelling literacy and numeracy as a professional
- as a graduate of a four-year tertiary education program.

Adapted versions of the elaborated standards were used for discussion in the two-day workshop conducted in 2013. These elaborations are presented as Figure 2.

Defining standards of personal literacy and numeracy for new teachers

Standards of literacy and numeracy expected of new teachers should enable them to be effective teachers and positive role models, regardless of which subject or year group they teach.

Aspiring teachers should therefore demonstrate:

- applications of their personal literacy and numeracy across a range of relevant everyday and workplace contexts that are typical of the experience of teachers entering the profession, such as:
    - reading and implementing school-related policy and procedure documents; and
    - applying mathematical reasoning and numeracy skills to everyday school-related organisational contexts, such as budgeting and resource allocation.
- the capacity to model the application of personal literacy and numeracy in their everyday work, such as:
    - confidently using accurate Standard Australian English to communicate with students, peers, parents and the broader community; and
    - confidently applying mathematical reasoning and numeracy skills (as required) in the classroom and when communicating with students, peers, parents and the broader community.
- levels of literacy and numeracy equivalent to those specified in adult frameworks relevant to graduates of a four-year professional tertiary education program, such as:
    - reading professional educational literature (discipline content- and pedagogical content-related) in relevant areas of teaching and learning;
    - interpreting data from a range of sources relevant to educational, school and teaching practices; and
    - communicating relevant aspects of educational theory, teaching programs and student learning outcomes to students, parents and peers.

Figure 2: Definition and elaboration of benchmark standards for beginning teachers

The elaborated standards were then considered with reference to the contents of the ACSF and considering test items from an existing adult literacy and numeracy test mapped against the ACSF. As a result of the workshop, initial indicative standards of personal literacy and numeracy (expressed as ranges on the ACSF) were established for students graduating from initial teacher education courses and entering the profession.

The range for personal literacy agreed to by the literacy panel corresponded to an indicative ACSF range defined by the upper end of ACSF Level 4 and lower end of Level 5.

The range for personal numeracy agreed to by the numeracy panel corresponded to an indicative ACSF range defined by the middle and upper ends of Level 4.

Subsequently, these indicative standards were used as a starting point to guide the development of the pools of the literacy and numeracy items in the Test.

Range of difficulty of test items

An accurate judgement as to whether a student's skills fall above or below the benchmark standard is the primary goal of the Test. It is important therefore to obtain as precise a measure as possible of students' skills around the benchmark standard to ensure students' proficiencies are accurately identified as meeting or falling below the standard. One efficient way of achieving this is to maximise the number of items in each assessment at a level of difficulty located around the benchmark standard.

A secondary goal is to provide useful feedback to students who do not meet the standard. It is recognised that higher education institutions as well as candidates are likely to be interested in receiving some form of report that can point to areas of specific need of any candidate who does not meet the benchmark standard. The best way to achieve this ancillary purpose is to include items in each assessment that are below the benchmark standard, so that a description can be generated of what such candidates know and can do, as a basis for improving personal literacy and/or numeracy.

To support the primary goal of the Test, for each of literacy and numeracy, there is a concentration of test items in each pool developed to target the anticipated initial benchmark standard. To support the ancillary goal of providing information to those who do not meet the benchmark standard, a larger proportion of items is developed to target below, rather than above, each anticipated standard. Table 14 shows the target proportions of the literacy and numeracy items in the Test against the levels of the ACSF.

Table 14: Target proportions of items addressing levels of the ACSF

ACSF	Literacy % items	Numeracy % items
Level 5	10–20%	5–15%
Level 4	40–50%	35–45%
Level 3	30–40%	35–45%
Level 2	0–10%	5–15%
Level 1	0	0

The variation between literacy and numeracy in the target proportions of items at each level is related to the different locations of the literacy and numeracy benchmark standards; that is, in relation to the ACSF, the numeracy benchmark for this assessment was set slightly lower than the literacy benchmark. Consequently, there is a larger proportion of numeracy than literacy items in ACSF Level 2, and a smaller proportion in ACSF Level 5.

LITERACY AND NUMERACY TEST ITEM CONTEXTS

The ACSF and PIAAC recognise that adults need to use literacy and numeracy across a variety of contexts. There is generally common agreement about the range of contexts in which literacy and numeracy need to be exercised, with some variation in the way the contexts are grouped. Table 15 shows the literacy and numeracy contexts described in the elaborated standards (see Figure 2 above), the ACSF and PIAAC.

Table 15: Contexts in which literacy and numeracy are demonstrated

Elaborated standard adopted for 2013 workshop	ACSF	PIAAC Cycle 2
Everyday life and the workplace	Personal and community	Personal
Modelling literacy and numeracy as a professional	Workplace and employment	Work
As a graduate/graduand of a four-year tertiary education program	Education and training	Societal/community

The 2013 elaborations were developed with consideration of the contexts listed in the ACSF and PIAAC. However, while both the ACSF and PIAAC contexts are concerned with general adult populations, the elaborated standards were developed to reflect the literacy and numeracy demands specific to aspiring teachers.

Accordingly, the assessment contexts used in the Test have been adapted from the three ACSF contexts to reflect the personal literacy and numeracy contexts of aspiring teachers, namely:

- personal and community
- schools and teaching
- further education and professional learning.

The *personal and community* context is concerned with everyday, domestic and local scenarios that are related to education, childhood and adolescence. For literacy, the texts that fit this context are written for a broad, general audience, but focus on content likely to be of interest to aspiring teachers, such as that relating to children and youth. Narrative texts, for example, might be biographical or fictional accounts of education and growing up. Numeracy contexts in this category are situations where it is required to interpret mathematical information and representations written for a broad, general audience but which are relevant to education. They include situations that teachers are likely to come across as part of their everyday life that require the application of important mathematical skills to solve relevant real-world problems.

The *schools and teaching* context is concerned with the day-to-day professional working life of a teacher in a school. This context is focused on the individual school and concerns general teaching work rather than specialist subject skills. The literacy texts that fit this context are written for or used

by teachers and cover any general texts that teachers might reasonably be expected to read or use as part of their everyday work, whether in the classroom, as part of the staff team or as a member of the school community. Contexts for numeracy in this category are any general, school-based situations where teachers might reasonably need to interpret mathematical information or representations about schools, teachers or students, or apply important mathematical skills in order to operate effectively and professionally as a teacher in a school community. In this sense, the concept of 'numeracy across the curriculum' is relevant. The proportion of items in this context category for literacy has been reduced, considering the opening of the Test to candidates not enrolled in initial teacher education programs. However, all candidates will have experience of school education – at least from the student perspective – and the *schools and teaching* context will be relevant to all candidates, whether thinking of enrolling in an initial teacher education program or already enrolled.

The *further education and professional learning* context is concerned with broadly focused educational issues beyond the immediate school workplace. Issues might be considered at a regional, state, national or international level, and from a wide range of perspectives. This context is concerned with overarching issues about education. The texts used for the literacy assessment that fit this context are written for an audience of teachers and educational professionals – though they do not require a specialist vocabulary or professional knowledge unique to teachers. Texts might include theoretical or other contemporary perspectives on teaching and learning that aspiring teachers might be expected to read as part of their training and on-going professional development. Contexts for numeracy are education-related, with a broader focus than an individual school, including the interpretation and use of comparative data, statistics and graphical representations about education and schooling.

The target proportions of items representing each of the context categories are the same for literacy and numeracy, as are shown in Table 16.

Table 16: Target proportions of items in each context category for literacy and numeracy

Context	Proportion of test
Personal and community	45–55%
Schools and teaching	30–40%
Further education and professional learning	10–20%

While the word 'personal' appears in the first of the contexts, it should be noted that the term 'personal literacy and numeracy' that is used in Standard 3.5 of the National Program Standards applies to all the contexts. *Personal* in Standard 3.5 is interpreted as marking a distinction from *pedagogically-focused* literacy and numeracy, which are the skills, knowledge and understanding that a teacher of literacy and numeracy would deploy in teaching subjects such as English and mathematics. Further, while the term 'personal literacy and numeracy' could be interpreted as applying to any context in the life of an individual, the emphasis in constructing the Test is on setting tasks in contexts that are transparently related to the professional role and interests of prospective teachers.

REVISION OF STANDARDS

The provisional benchmarks and standards set by expert groups were validated in a separate equating study conducted in 2017. The equating study provided information on how the literacy and numeracy skills of candidates achieving the test standards compared to those of Australian adults as measured by the OECD Programme for International Assessment of Adult Competencies (PIAAC). PIAAC was administered to a representative sample of Australian adults (aged 16–74) in 2011–12. The equating study showed that the professional judgements of the expert groups when determining the provisional standards were very close to, but slightly below, the desired empirical outcomes. The provisional literacy standard of 106 scale score points was equivalent to the 68th percentile (top 32%) of the Australian adult population. The provisional numeracy standard of 107 was equivalent to the 62nd percentile (top 38%) of the Australian adult population. The equating exercise revealed that the test scale score equivalent to the 70th percentile (top 30%) of Australian adults is 107 for literacy, and 110 for numeracy.

Considerable discussion about when to apply the revised standards took place between ACER and the then Australian Department of Education and Training (DET) and between DET and the Governance Committee. The main concerns were fairness to students and transparency. Given that there would be resitting candidates in each test window, it was agreed that no test window would suit all candidates. It was agreed that the new standard would apply from and include test window 3 in 2017. It was also agreed to release the Described Proficiency Scale with sample items located in bands reflecting the new standards before 2017 test window 3 to facilitate student preparation. A letter announcing the new standards and explaining the reason for their revision was jointly developed by DET and ACER and forwarded to all Higher Education Providers before 2017 test window 3.

For further information about the establishment of the benchmark standards for the Test, see Appendix 2.

TEST DESIGN

Assessment design considerations

Each literacy test comprises 60 items: 40 reading items and 20 technical skills of writing items.

Each numeracy test comprises 60 items: 48 items for which an online calculator is available and 12 items for which the online calculator is not available.

An additional five items are included in each of the literacy and numeracy tests. These items are being trial tested for possible inclusion in future tests. The students' responses to these items do not contribute to their scores. This kind of trial testing ('in-test trialling') is standard practice for high-stakes testing, where maintaining security of the test is essential.

Each year the item pool is refreshed with new items that have been trialled and proven to be statistically sound.

The time allowed for each test (including the trial test items) is two hours. Additional time is allowed for a short orientation to the test screen and the various response formats.

All testing is administered in a secure computer-based testing environment.

Response formats
The items are either in selected-response formats or constructed-response formats that can be automatically scored.

Selected response items are of two types: *simple multiple-choice* items are standard multiple choice, usually with four response options from which students are required to select the best answer; *complex multiple-choice* items present several statements for each of which students are required to choose one of two (or more) possible responses (for example, yes/no, true/false, or correct/incorrect).

Constructed-response items include such tasks as keying in the correct spelling of a misspelt word (for literacy) or entering a numeric response (for numeracy).

Other response formats capable of automated scoring may be used in future, considering the accessibility requirements of candidates.

REPORTING

Given that the main purpose of the Test is to determine whether a candidate has achieved standards of personal literacy and numeracy judged sufficient for entry to an initial teacher education program, reports to candidates are focused around the standards. Some additional information is provided, indicating broad areas of strength and weakness, as evidenced by candidates' performance on the Test(s).

Reporting candidate achievement

In their statement of test results, candidates receive advice as to which of three bands their test score falls within for each test component (literacy and numeracy).

The three bands are:

- Band 3: Clearly above the test standard
- Band 2: At and above the test standard
- Band 1: Below the test standard.

A small number of candidates may achieve scores above Band 3 or below Band 1. (It is not possible to describe these regions on the proficiency scale because there are insufficient questions at these levels on the Test.) Descriptions of Bands 1, 2 and 3 are provided in tables 17 to 21 below. The band achieved, together with any bands below it, shows candidates the kinds of personal literacy or numeracy skills and knowledge they are currently demonstrating. Where appropriate, candidates can refer to the statement in the band above their test score to inform them of the skills that are required to reach a higher standard of personal literacy or numeracy.

The literacy report provides an indication of performance on reading and on technical skills of writing. The numeracy report describes an individual's performance on each of the three content areas and on the 'calculator available' and 'calculator not available' parts of the Test.

Candidates who have not achieved Band 2 should consider seeking support before re-sitting the Test. If a candidate is already enrolled in an initial teacher education program, their higher education provider should be consulted. This level of detail in the reporting is intended to assist candidates in directing their attention to improving skills in the applicable sub-domain(s). Examples of the skills, knowledge and understanding demonstrated by candidates in each of the three bands are given with the sample literacy and numeracy items (Appendix 3 and Appendix 4).

Described proficiency bands

These descriptions are based on the empirical calibration of the Test's items.

Additional information about the nature of the skills, knowledge and understanding typically demonstrated by candidates performing within the three bands for each of literacy and numeracy is provided in 'Described Proficiency Scale for the literacy and numeracy test for initial teacher education students' (ACER, 2017).

Described proficiency bands for literacy

The following descriptions reflect the main content and processes assessed in the literacy component of the Test. For literacy, the content elements are reading and technical skills of writing (syntax, grammar and punctuation, spelling, word usage and text organisation). The process elements of reading are access and identify, integrate and interpret, and evaluate and reflect.

Reading	Band 1: Below the test standard	Band 2: At and above the test standard	Band 3: Clearly above the test standard
	Candidates can typically	Candidates can typically	Candidates can typically
	• locate directly stated information in a range of forms of writing, including factual, persuasive and narrative texts, and texts with combinations of written material and images, graphs or tables • identify attitudes and opinions clearly expressed in the texts	• demonstrate the skills described in Band 1 • make connections between information from different parts of texts that take a variety of forms • apply this information in making interpretations • infer the position adopted by the writer of the text	• demonstrate the skills described in Band 1 and Band 2 • synthesise, evaluate information from multiple parts of texts that take a variety of forms, including academic texts employing high-level vocabulary • interpret the effect of language in communicating ideas and feelings • evaluate the strategy adopted by the writer of a text • evaluate the significance of textual elements (e.g. a quotation within an academic text)
	Skills required to transition from Band 1 to Band 2 • make connections between information in texts • interpret information and the writer's position in texts • negotiate more sophisticated contexts and more subtle purposes in texts		
		Skills required to transition from Band 2 to Band 3 • evaluate information, positions and strategies • interpret the effect of language and other textual elements	

Figure 3: Band descriptions for Reading

Technical skills of writing	Band 1: Below the test standard	Band 2: At and above the test standard	Band 3: Clearly above the test standard
	Candidates can typically	Candidates can typically	Candidates can typically
	• identify written language use that is clearly inappropriate to a situation and purpose • correctly spell and use some words that are frequently misspelt, including homophones (e.g. new and knew) • recognise and apply aspects of punctuation (e.g. in direct speech) • extend plans for writing (e.g. accurately place a new idea into an existing structure of ideas)	• demonstrate the skills described in Band 1 • select appropriate over inappropriate written language for a situation and purpose • correctly spell some polysyllabic words (words with several syllables), including some that are frequently misspelt • recognise and apply aspects of punctuation that are frequently misused (e.g. apostrophes) • revise plans for writing (e.g. identify whether and how a new idea fits into an existing structure of ideas)	• demonstrate the skills described in Band 1 and Band 2 • identify synonyms for high-level words • correctly spell some difficult polysyllabic words • correctly use less common punctuation marks (e.g. semi-colons) • critique and improve upon an existing structure of ideas in a plan for writing
	• **Skills required to transition from Band 1 to Band 2** ➡		
	• correctly spell more difficult words • correctly use more commonly misused punctuation • have greater understanding of how to express ideas in a piece of writing and how they should be structured		
		Skills required to transition from Band 2 to Band 3 ➡	
		• know the meaning and spelling of more difficult words • correctly use less common punctuation • structure writing in a sophisticated way	

Figure 4: Band descriptions for Technical Skills of Writing

Described proficiency bands for numeracy

The following descriptions reflect the main content and processes that are assessed in the numeracy component of the Test. For numeracy, the content elements are number and algebra, measurement and geometry, and statistics and probability with a focus on number, measurement and statistics. The process elements are identifying mathematical information and meaning in activities and texts; using and applying mathematical knowledge and problem solving processes; and interpreting, evaluating, communicating and representing mathematics. An online calculator is available for 80 per cent of the questions.

Number and Algebra	Band 1: Below the test standard	Band 2: At and above the test standard	Band 3: Clearly above the test standard
	Candidates can typically	Candidates can typically	Candidates can typically
	• use whole numbers and some common fractions, decimals and percentages (such as $\frac{1}{8}$, 0.5, 10%) to solve one- or two-step routine problems, with or without a calculator • identify an appropriate formula (such as how to calculate an average in a spreadsheet) to solve problems in familiar contexts	• demonstrate the skills described in Band 1 • identify and use the appropriate operation (+, −, ×, ÷) and use proportional reasoning, and a variety of fractions, decimals and percentages (such as $\frac{3}{5}$, 0.4, 85%) to solve multi-step problems in familiar situations, with or without a calculator • use a formula in familiar contexts to calculate a value	• demonstrate the skills described in Band 1 and Band 2 • estimate and calculate accurately and use a variety of less familiar fractions, decimals and percentages (such as $\frac{1}{16}$, 9.93, 0.02%) to solve problems set in less routine contexts, with or without a calculator • use a graphical representation of an algebraic relationship (such as a linear graph) to calculate a value (such as a rate) in meaningful contexts
	Skills required to transition from Band 1 to Band 2		
	• calculate with a wider variety of fractions, decimals and percentages • solve problems of greater complexity (such as with more than two steps) • understand and use the formulae in real-world contexts		
		Skills required to transition from Band 2 to Band 3	
		• calculate with a wider variety and less familiar fractions, decimals and percentages • solve multi-step problems in less routine contexts • understand and use representations of formulae in less routine contexts	

Figure 5: Band descriptions for Number and Algebra

Measurement and Geometry	Band 1: Below the test standard	Band 2: At and above the test standard	Band 3: Clearly above the test standard
	Candidates can typically	Candidates can typically	Candidates can typically
	• interpret simple diagrams, read common scales, and use spatial skills such as interpretation of simple maps to identify a location or follow directions • use routine timetables and calendars to calculate durations and identify times and dates	• demonstrate the skills described in Band 1 • solve problems by applying knowledge and understanding of measurement concepts such as the speed-distance-time relationship • apply spatial skills such as using scale to find distance, and reorienting maps and plans to determine directions and relative positions • interpret and use schedules and time displays to determine durations and times, and to solve problems	• demonstrate the skills described in Band 1 and Band 2 • link different information sources and apply measurement knowledge and understanding such as rates and area • use spatial reasoning to interpret less routine maps and diagrams, and solve multi-step problems • interpret and use time-related criteria such as schedules and regulations to solve multi-step problems
	Skills required to transition from Band 1 to Band 2		
	• understand and use rates and relationships (such as speed) to solve problems • orient maps and use information such as scale to solve spatial problems • use information on schedules and displays to accurately calculate durations		
		Skills required to transition from Band 2 to Band 3	
		• calculate area and volume using metric units in real-world contexts • use ratio in relation to maps and plans to solve less routine spatial problems • solve multi-step problems involving conversions between hours and minutes	

Figure 6: Band descriptions for Measurement and Geometry

Statistics and Probability	Band 1: Below the test standard	Band 2: At and above the test standard	Band 3: Clearly above the test standard
	Candidates can typically • interpret familiar data representations, evaluate some related statements and solve routine problems using the data • calculate everyday probabilities (such as 20%) in familiar contexts	Candidates can typically • demonstrate the skills described in Band 1 • interpret less familiar, relatively complex data representations (such as multi-category graphs and tables), evaluate related statements and solve routine problems using the data • calculate and interpret small probabilities (such as 0.3%) in meaningful contexts	Candidates can typically • demonstrate the skills described in Band 1 and Band 2 • interpret additional data representations and diagrams (such as box-and-whisker plots and Venn diagrams) and use them to identify key aspects of the representations, evaluate related statements and solve more complex problems using the data • interpret written text containing statistical information and calculate a range of statistics (such as median and quartile) • calculate conditional probabilities in meaningful contexts
	Skills required to transition from Band 1 to Band 2 → • interpret a wider variety of more complex data displays and representations • understand, use and calculate probability in a wider variety of situations		
		Skills required to transition from Band 2 to Band 3 → • interpret more detailed statistical information and less routine data representations • understand and use a wider range of statistics • understand how probability can depend on given events and conditions	

Figure 7: Band descriptions for Statistics and Probability

Sample items illustrating the three Bands are provided in Appendix 3 for literacy and Appendix 4 for numeracy.

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APPENDIX 1: DEVELOPMENT OF THE ASSESSMENT FRAMEWORK AND THE ROLE OF LITERACY AND NUMERACY EXPERT GROUPS

The Assessment Framework was first published in 2015. It was initially prepared by members of the ACER project team, in consultation with AITSL. In order to ensure high quality and fitness for purpose of the assessment framework, ACER convened an expert advisory group for each of literacy and numeracy, consisting of members bringing expertise in literacy or numeracy assessment, or teacher education, or both.

The assessment framework document underwent several iterations: first as a discussion paper presented to the initial literacy and numeracy expert group meeting in September 2013; then as a version revised considering the expert groups' discussion to incorporate its recommendations; and subsequently for consideration by a Literacy and Numeracy Steering Committee convened by AITSL, which met in October 2013.

The draft assessment framework that emerged from these reviews underpinned the development of the assessment instruments for literacy and numeracy over the ensuing months. Instrument development was also overseen by the expert groups at regular intervals, and the assessment items reviewed in light of their adherence to the framework.

A field trial of the literacy and numeracy items was conducted in universities across Australia in the second half of 2014 and early 2015, with the first live administration in 2016.

The literacy and numeracy expert groups have continued to meet regularly, to advise on the content of the assessments.

ACER gratefully acknowledges and thanks past and current members of the expert groups, who have contributed to the conceptual development of the Assessment Framework and the quality of the assessment instrument since the program's inception.

Past and present members of the literacy expert group

Geraldine Castleton, Australian Catholic University, Queensland
Anna Cohen, Australian Curriculum, Assessment and Reporting Authority (ACARA)
Chris Davison, University of New South Wales, New South Wales
Sue Ollerhead, Macquarie University, New South Wales
Lorraine Rowles, Department of Education and Communities, New South Wales
Garth Stahl, University of Queensland, Queensland
Rebecca Swain, Carey Baptist Grammar School, Victoria
Claire Wyatt-Smith, Australian Catholic University, Queensland

Past and present members of the numeracy expert group

Peter Aubusson, University of Technology, New South Wales
Kim Beswick, University of New South Wales, New South Wales
Julie Clark, Flinders University, South Australia
Doug Clarke, Australian Catholic University, Victoria
Pat Drake, Victoria University, Victoria
Brian Foster, education consultant, Victoria
Katie Makar, University of Queensland, Queensland
Thelma Perso, Swan Christian Schools, Western Australia
Wee Tiong Seah, University of Melbourne, Victoria
Peter Sullivan, Monash University, Victoria

APPENDIX 2: ESTABLISHING AND REVISING THE STANDARDS FOR THE LITERACY AND NUMERACY TEST FOR INITIAL TEACHER EDUCATION STUDENTS

Background

Having agreed in 2011 that students completing initial teacher education courses would be required to demonstrate they are in the top 30 per cent of the population for personal literacy and numeracy, Australian Education Ministers determined in 2015 that the literacy and numeracy test for Initial Teacher Education students ('the Test') would be the means for demonstrating that all students have met the standard. (AITSL, 2015. Standard 3.5). From 1 July 2016, all initial teacher education students were expected to meet the literacy and numeracy benchmarks established with reference to the Test prior to graduation, as part of meeting their course requirements.

Preparation of the Test commenced in mid-2013. In conjunction with this, several activities were commissioned by the Department of Education and Training (DET) and AITSL to ensure that the Test and the benchmarks were set at an appropriate level.

In May 2013, AITSL convened a two-day workshop with groups of literacy, numeracy and teacher education experts, resulting in initial indicative standards of personal literacy and numeracy (expressed as ranges in the ACSF) being established for students graduating from initial teacher education courses and entering the profession. These indicative standards were used as a starting point to guide the development of literacy and numeracy questions for the Test.

The provisional benchmarks

From July 2014 to January 2015, a pilot of the test items was conducted with 1336 initial teacher education students. The purpose of this pilot was to test the quality of the test items and select the items for use in the live test. For these reasons, no performance results were provided to participants.

Based on this selection of items and on the data collected from the pilot, an initial benchmarking activity took place in February 2015. The expert panel members for the literacy and numeracy benchmark setting procedure were drawn from the following groups:

- the expert groups who reviewed the assessment framework and test instruments during their development
- teacher educators, especially those who work closely with initial teacher education students in their pre-service course
- senior staff from schools who work directly with beginning teachers
- representatives from teacher regulatory authorities responsible for initial teacher education program accreditation.

This resulted in the setting of provisional benchmarks. (For details of the pilot and the procedures used to establish the provisional benchmarks for literacy and numeracy, see Australian Council for Educational Research, 2016a and 2016b)

A trial of the Test was conducted in August and September 2015; 4131 initial teacher education students completed the trial test. These students received a report indicating whether they had met the standard on each of the literacy and numeracy tests, in accordance with the provisional benchmarks.

The provisional benchmarks were applied to the newly calibrated scale, to yield results against the standard for each student participating in the August–September trial. (For further details of the August–September trial test and its analyses, see ACER, 2016a and 2016b)

Benchmark content validation

A second benchmarking activity, or benchmark *content validation*, took place in early March 2016, using the data collected from the August–September 2015 trial. The content of the items at and around the provisional benchmarks was reviewed with the aim of either confirming or adjusting the benchmarks to ensure that they would be appropriate for the national implementation of the Test from 1 July 2016.

The benchmark content validation comprised two main parts:

1. Panels of literacy, numeracy and teacher education experts were convened for a one-day meeting on 9 March to review the provisional benchmarks and make a recommendation as to whether they should be confirmed or adjusted.
2. Representatives of DET and ACER met the following morning to consider the panels' recommendations and agree on the location of the benchmarks.

It was agreed that, though neither the literacy nor the numeracy panel reached a unanimous recommendation on the benchmarks, the majority opinion was at or near the provisional benchmark in both cases. ACER's recommendation was to leave the benchmarks in their pre-existing locations, based on the feedback of the panels and the available empirical data. DET endorsed ACER's recommendation.

A decision was thereby made that the content of the provisional benchmarks had been validated, and that the validated benchmarks would be applied to the Test from 1 July 2016. The report concluded, 'It is understood that the benchmarks will be reviewed in light of full cohort empirical data, not later than 2018.'

(For details of the pilot and the procedures used to establish the provisional benchmarks for literacy and numeracy, see Australian Council for Educational Research, 2016a and 2016b)

Equating the test standard against the PIAAC scale (normative validation)

An additional normative validation exercise was conducted in order to determine the appropriateness of the provisional benchmarks and the subsequent content-validated benchmarks to select the top 30% of the adult population in each of literacy and numeracy. This was completed in 2017 as an equating exercise to make an empirical comparison of the literacy and numeracy skills of candidates achieving the test standards compared to those of Australian adults, as measured by PIAAC. PIAAC had been administered to a representative sample of Australian adults (aged 16–74) in 2011–12.

As noted in the body of the present document, the constructs of PIAAC literacy and numeracy assessments are similar to those of the Test, and the PIAAC assessment framework has been a significant reference for the Test assessment framework. The emphasis in PIAAC on using literacy and numeracy in real-life contexts is broadly similar to that of the Test's literacy and numeracy constructs. (As noted earlier, however, PIAAC has no equivalent to the Test's assessment of the technical skills of writing.)

Permission to use PIAAC items for the equating study was kindly granted by the OECD. For the purpose of the study, a set of PIAAC items (15 literacy items and 16 numeracy items) was selected as common items for scaling. These items were grouped into clusters: four numeracy clusters (four items in each cluster) and three literacy clusters (five items in each cluster). Each PIAAC item cluster was included at the end of a test, replacing the in-test-trial items (referred to in the section, Test Design). The tests with PIAAC items were randomly assigned to the candidates. The PIAAC items were not used for estimating candidate performance.

The equating exercise revealed that the projected test scale score equivalent to the 70th percentile (top 30%) of Australian adults was 107 for literacy, and 110 for numeracy. For literacy, the projected scale score was similar to the scale score of the established content-validated standard (106). However, for numeracy, the projected scale score was marginally higher than the scale score of the established content-validated standard (107).

The established content-validated test standards were equivalent to the 68th percentile of the Australian adult population for literacy, and the 62nd percentile for numeracy.

The normative equating showed that the professional judgements of the expert groups when determining the provisional standards were commensurate with the desired empirical outcomes. For literacy, the experts had agreed that the content-validated standard lay within the range 106 to 110 scale score points. Based on the outcomes of the equating exercise, the scale score equivalent on the Test to the 70th percentile of the Australian adult population was 107 scale score points which is within the range agreed on by the experts.

For numeracy, the experts had agreed that the content-validated standard lay within the range 107 to 109 scale score points. Based on the outcomes of the equating exercise, the scale score equivalent on the Test to the 70th percentile of the Australian adult population is 110 scale score points, which is one scale score point above the upper limit of the range agreed on by the experts.

Items at and around the higher normative standards were viewed by the expert groups and were considered appropriate for the purpose of the Test.

In the 2016 testing, 93.3 per cent of candidates achieved the content-validated literacy standard and 92.5 per cent of candidates achieved the content-validated numeracy standard.

If the normative standards equivalent to the 70th percentile in each domain (107 scale score points for literacy and 110 scale score points for numeracy) were applied to the 2016 test data[6,] it was estimated that 91.2 per cent and 88.1 per cent of candidates would have achieved the literacy and numeracy standards respectively. The difference in the percentage of candidates who achieved the established content-validated standard and the estimated percentage who would have achieved the higher normative standard was 2.1 per cent fewer for literacy and 4.4 per cent fewer for numeracy.

When to apply the revised standards?

Considerable discussion about when to apply the revised normative standards took place between ACER and the expert groups, ACER and DET and between DET and the Governance Committee[7].

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[6] The data consists of candidates in test windows 1–4 in 2016. For candidates who resat the test, only the result from their first attempt was included in the data.

[7] The role of the Governance Committee is to provide advice and expertise on test policies to the Department of Education and the Minister of Education. The Committee also provided strategic oversight of implementation in the test's early years.

The main concerns were fairness to students and transparency. Given that there would be resitting candidates in each testing window, it was agreed that no testing window would suit all candidates. It was agreed that the revised normative standards would apply from and include the third testing window in 2017. It was also agreed to release the Described Proficiency Scale with sample items located in Bands reflecting the revised normative standards before 2017 test window 3 to facilitate student preparation. A letter announcing the revised normative standards and explaining the reason for their revision was jointly developed by DET and ACER and forwarded to all Higher Education Providers before 2017 test window 3.

Outcomes of the revised standards

Table 22 below compares the percentages of students achieving the original content-validated standards and the revised normative standards in both literacy and numeracy in 2017 test window 3 by number of attempts. It can be seen that the difference in the percentage of candidates achieving the standard on their first attempt was as predicted by earlier modelling. It should be noted, however, that these results were for one testing window only and that there is variation between testing windows.

Table 22: Comparison of percentage of students achieving old and new standards

Domain	Attempt number[8]	Total Candidates	% Candidates achieving old standard	% Candidates achieving new standard	Difference (new standard – old standard)
Literacy	1st	6164	89.6	86.8	-2.7
	2nd	434	52.8	45.9	-6.9
	3rd	63	34.9	28.6	-6.3
	4th	7	28.6	28.6	0.0
		6668	**86.6**	**83.6**	**-3.0**
Numeracy	1st	6232	92.7	88.3	-4.4
	2nd	352	58.8	43.2	-15.6
	3rd	61	44.3	21.3	-23.0
	4th	17	58.8	35.3	-23.5
		6662	**90.4**	**85.2**	**-5.3**

Future revisions of the standards

It is likely that the literacy and numeracy skills of the Australian population will change over time. PIAAC was the third survey of international comparisons of adult proficiency skills in specific domains conducted in Australia. Its predecessors were the Adult Literacy and Life Skills Survey (ALLS) 2006 and Survey of Aspects of Literacy (SAL) 1996 (internationally known as the International Adult Literacy Survey [IALS]). The Australian Bureau of Statistics (ABS) warns that data previously released in the ALLS and SAL publications are not directly comparable with PIAAC data and that meaningful trends are not able to be reliably determined[9]. With this qualification in mind, the ABS analysis shows that, from 2006 to 2011–2012, the percentage of persons aged 15–64 years achieving in numeracy levels 3–5 declined, particularly for those whose first language was

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[8] For further detail refer to DET's resit policy document
[9] www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4228.0Explanatory Notes12011-12

English[10].This is in keeping with recent declines in the numeracy achievement of Australian 15-year-olds in the PISA assessments.

The next PIAAC survey (2018 to 2024) is an opportunity to revisit the test standards, should Australia participate again.

Another reason for revisiting the standards would be a change in policy; for example, changing from the top 30% to some other percentage. A change in the population; for example, changing from the Australian adult population as defined in PIAAC (15–64 years) to another age group such as 21–64 years, to align better with the age of Australian teachers, would also warrant new analysis.

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[10] www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4228.02011-12

Leading the future

The following flyer is an advertisement for an education conference.

Leading the future

What does a 21st century school leader look like?

Educators are preparing students for jobs and lifestyles that may not even exist yet.

Now, more than ever, we need capable leaders who will guide our schools and teachers through this momentous task.

Join us for the Leading the Future Conference 15–16 July — part two of our Owning the Future Conference Program.

This conference is for principals and all staff who want to make a difference to the culture of schools and ensure relevance in a rapidly changing world. Our program for the two days is arranged around four themes:

- Inspiring Transformation
- Envisioning Futures
- Ensuring Relevance
- Models for Moving Forward.

Conference Location

The Mews Auditorium, Massey Street, Brisbane

Transportation

There is limited parking on Mews Street.

Massey Railway Station is 300 metres away.

You can register directly with workshop preferences at

LTFconference@onused.edu.au

Full two days $600

Single day rate: $350

Single Session attendance is available at $100 per person per session.

Discounts

Subscribers to Onus publications receive 5% discount.

Register before 15 February to receive 10% early bird discount.

School group bookings for three or more personnel receive an additional 15% discount.

*Discounts apply only to full conference bookings.

Closing date for registrations: 30 June.

Full details and registration are also available on our website:

The Massey busway station is 500 metres away.

Conference Speakers

Keynote Address: Anastasia Polinski presents 'Absolving Solomon: Can wisdom be overrated?'

Anastasia is a futurist and Chair of Education Studies at Marshall University. She is author of the best-selling book, *The Future is upon us*.

Plenary Address: Winston Jones, 'The impact of robotics on the 21st century jobs market'.

Winston is Dean of Studies at Einstein University

Workshop Convenors:

1. Aleisha Fairweather M Psych
   Senior Lecturer, Wellborn University
   Author: *1000 Reasons to Smile at School*
2. Trang Nguyen BEd MBA
   Human Relationships Manager, Stealth Solutions Inc.
3. Keith Dwyer PhD
   Senior Lecturer, Frampton University
   Author: *What Leads to Leadership and What's Keeping the Cavalry?*
4. Jose Mendaros MBA
   Futurist and CEO Futuristics Inc.

WORKSHOPS

Inspiring Transformation

101 Change happens from the top down	Trang Nguyen
102 Healing the workplace – countering resistance to change	Jose Mendaros

Envisioning Futures

201 The best we can be	Keith Dwyer
202 Mining for gold – Utilising your existing resources in future directions	Trang Nguyen
203 Global change – A wider perspective	Jose Mendaros

Ensuring Relevance

301 What works here?	Aleisha Fairweather

302 Where have we been? So, where are we going? Using the lessons of history to create a unified future direction.　　　　Aleisha Fairweather

Models for Moving Forward

401 Thinking outside the Tetrahedron : Supporting growth of creative cultures in schools　　　　Keith Dwyer

402 Building solid structures　　　　Trang Nguyen

Schedule of Conference Events

Times	Day 1	Day 2
8.00 – 8.30	Registration	Registration
8.30 – 9.30	Keynote Speaker: Anastasia Polinski, 'Absolving Solomon: Can wisdom be overrated?'	Plenary Speaker: Winston Jones, 'The Impact of Robotics on the 21st century jobs market.
9.30 – 10.00	Morning Tea	Morning Tea
10.00 – 12.30	Workshop: 101	Workshop: 301
12.30 – 1.30	Lunch	Lunch
1.30 – 3.00	Workshops 102/201/202	Workshops 102/302/401
3.00 – 3.30	Afternoon Tea	Afternoon Tea
3.30 – 5.00	Workshops: 201/202/302	Workshops: 203/302/402
6.30 – 9.30	Conference dinner	

Presenters are available to provide mentorships for individual schools by arrangement. Email mentorchoice@onused.edu.au

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For more information contact: OliverWEntright@onused.edu.au

For upcoming Onus events: onused.edu.au

Commentary
The text is a persuasive text that incorporates elements of informative and procedural texts. It uses a combination of formats: prose (continuous), and dot points, numbered items and a table (non-continuous), to provide a range of information about an educational conference. Accordingly, the text belongs to the *mixed* format, although individual questions may be classified as either *continuous*, *non-continuous* or *mixed*, depending on which part(s) of the text are required to answer the question. Because the theme of the conference relates to in-service training for teachers, the context is classified as *further education and professional learning*.

Literacy Sample Question 1

Which of the following will give a conference attendee a discount?

    A. booking early
    B. being a student
    C. presenting at the conference
    D. being a local

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Access and identify
Context	Further education and professional learning
Key	A: booking early
Band	1: Below the test standard

Commentary

To answer this question, candidates need to locate the part of the flyer that deals with discounts, indicated by the heading 'Discounts' in the box on the first page. The information is presented in sentence form, hence the question is classified as *continuous*. Three ways of obtaining a discount are given. Candidates are required to choose which of these is offered as an option in the question. The answer 'Booking early' refers directly to the sentence 'Register before 15 February to receive 10% early bird discount', so the Reading Process involved is *access and identify*. There is possibly a minor distraction in the option, 'being a student', since the flyer refers to a discount for 'School group bookings'. However, the flyer states clearly that the conference is for 'principals and all staff', ruling out 'being a student' as a correct answer.

Literacy Sample Question 2

Which theme of the conference is likely to deal directly with the following question?

How do we evaluate proposals for change in the curriculum to meet the changing needs of students?

    A. Inspiring Transformation
    B. Envisioning Futures
    C. Ensuring Relevance
    D. Models for Moving Forward

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Mixed
Text type	Descriptive, informative and persuasive
Process	Integrate and interpret
Context	Further education and professional learning
Key	C: Ensuring Relevance
Band	2: At and above the test standard

Commentary

This question requires candidates to *interpret* the brief titles of the four themes given in the flyer and identify which one is most likely to relate directly to a question that might be asked by an attendee: *How do we evaluate proposals for changes in curriculum to meet the changing needs of students?* The issue of trying to ensure that curriculum meets the needs of students could be construed as ensuring the curriculum is relevant to the students, so the answer is 'Ensuring Relevance'. While the other options may possibly deal with meeting students' needs, 'Ensuring Relevance' is the only one that is explicitly devoted to the topic. The four themes are presented in a part of the flyer that includes both sentences and short dot points, so the format is *mixed*.

Literacy Sample Question 3

What does the text suggest delegates can do if they have missed the previous conference in the series?

     A. attend a repeated offering of the earlier conference
     B. watch a video of the first conference
     C. buy a copy of the conference proceedings
     D. read about the previous conference in the newsletter

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Integrate and interpret
Context	Further education and professional learning
Key	B: watch a video of the first conference
Band	2: At and above the test standard

Commentary

In this question, candidates are required to interpret a suggestion in the text: 'Didn't attend our first conference? "Leaders, Reach for the skies" highlights can be viewed here: onused.edu.au/reachfor theskies'. This implies a recommendation to watch an online video as a way of making up for not having attended an earlier conference in the series. The relevant part of the text uses idiomatic language in *continuous* format.

Literacy Sample Question 4

Which of these workshops do the organisers seem to think has the broadest appeal?

    A. 201
    B. 301
    C. 401
    D. 402

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Non-continuous
Text type	Descriptive, informative and persuasive
Process	Integrate and interpret
Context	Further education and professional learning
Key	B: 301
Band	3: Clearly above the test standard

Commentary

Answering this question calls for candidates to interpret the apparent rationale for an aspect of the conference program: namely, the allocation of workshops to sessions. Three of the four workshops listed occur only as one of a number of workshops offered in a single session, in competition with each other. By contrast, 301 is offered as the only workshop in a particular session. The required inference is that this workshop will appeal to all participants, while the others might relate to more specialised interests. The part of the flyer that contains this information is in *non-continuous* format.

Literacy Sample Question 5

To which address are you referred in order to make an enquiry about Onus's free online newsletter?

    A. onused.edu.au

    B. LTFconference@onused.edu.au

    C. onused.edu.au/reachfortheskies

    D. OliverWEntright@onused.edu.au

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Access and identify
Context	Further education and professional learning
Key	D: OliverWEntright@onused.edu.au
Band	2: At and above the test standard

Commentary

To answer this question, candidates need to identify explicitly stated information in the flyer, regarding the method of obtaining more information about the newsletter: 'For more information contact: OliverWEntright@onused.edu.au'. The preceding sentence refers to the online newsletter, making it clear that the information referred to is information about the newsletter. The other options are all internet or email addresses included in the flyer with reference to other purposes. The section of the flyer that relates to the newsletter is in sentences, so the question is classified as *continuous*.

The effects of study and employment on the movement of non-metropolitan youth towards the cities

This text is an extract adapted from Movement of non-metropolitan youth towards the cities*, by Kylie Hillman and Sheldon Rothman, ACER, 2007. The report forms part of the Longitudinal Surveys of Australian Youth project, which collects data through annual interviews with young people.*

The current report used data from Longitudinal Surveys of Australian Youth (LSAY) to focus on the group of young people who were living in non-metropolitan areas at the time of the 1997 interview (when most were in Year 11). The analyses were prompted by concern that young people are leaving their rural communities because those communities are not able to supply further education and training, employment and other opportunities that are available in the major cities of Australia.

Among young people in the 1995 Year 9 LSAY cohort who had been living in non-metropolitan areas in 1997, 26 per cent were living in a metropolitan area in 2004, with 36 per cent having experienced at least one year in a major city during 1998–2004. For many of the young people who did leave their non-metropolitan areas, that move was associated with participation in post-compulsory education, and more frequently university study. Other studies have reported that 40 per cent of young people from non-metropolitan areas attend university in the major cities of Australia, but figures to support this claim were not recorded in LSAY.

This difference may be an artefact of how location has been obtained for this report — namely, using the postcode provided by participants when annual contact details are updated for LSAY, which may very well be the participant's parents' address. Nevertheless, a reluctance to change one's address while at university may indicate a reluctance to consider the move to a metropolitan area as anything more than a temporary move for study.

The analyses allowed some exploration of relationships between early school achievement and school attitudes, plans for further study, and their influence on leaving non-metropolitan areas. For both young men and young women, high levels of early achievement were associated with an increased likelihood of leaving, although this relationship decreased when post-school plans were taken into consideration. The relationships between post-school plans (particularly plans to study at university) and leaving non-metropolitan areas in turn decreased once actual participation in this activity (current full-time study at university) was added to the model. These findings suggest that the decision to leave non-metropolitan areas to pursue the educational opportunities and experiences available in the city is not a spontaneous one; rather, it develops over a period of time and within the context of other decisions about one's future, including educational and occupational aspirations and expectations.

Although the analyses showed that some young people do return to non-metropolitan areas after spending some time in the cities, the return migration did not reach the same level as migration towards the cities. For young men, being involved in full-time employment in the last year they were located in a metropolitan area was the only significant influence on whether they were likely to return to a non-metropolitan area or not over the period covered in this study. Those who were working full-time were less likely to return to a non-metropolitan area. For young women, full-time employment also had a negative influence on the likelihood of return to a non-metropolitan area.

The relationship between full-time employment and a disinclination to leave a metropolitan area is relatively straightforward. Young men and women who have already succeeded in securing a full-time position in the labour force have not only reached a significant milestone in their own journey but have also made a commitment to remaining in the area of that position for at least the term of their contract. They have, to an extent, begun to put down roots. Young women who held tertiary qualifications were also less likely to return to non-metropolitan areas than were young women who did not hold such qualifications. The negative influence of tertiary qualifications on the likelihood of young women returning to non-metropolitan areas is less straightforward. It may be that these young women perceive fewer opportunities for them to apply their qualifications in non-metropolitan areas.

Commentary

The text is a slightly adapted extract from an academic research report. It presents the kinds of reading challenges often associated with this genre, such as abstract terminology and complex sentences. It is an *informative* text, reporting and commenting on the findings of a larger report, but not attempting to be *persuasive* about any position that could be supported by the data.

Literacy Sample Question 6

Look at paragraph 4.

What does the report reveal about high levels of early school achievement?

   A. They were associated with spending longer in the city.
   B. They lowered the likelihood of moving to the city.
   C. They increased the likelihood of moving to the city.
   D. They had no bearing on staying in or leaving the city.

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Access and identify
Context	Further education and professional learning
Key	C: They increased the likelihood of moving to the city.
Band	2: At and above the test standard

Commentary

To answer this question, candidates need to *identify* a statement that provides a direct answer to the question; namely, 'high levels of early achievement were associated with an increased likelihood of leaving'. Recognising this as a direct answer is dependent to some extent on understanding the technical term 'associated with'. It is also made more difficult by the paragraph's elaborations of subtler points relating to this broad conclusion. Indeed, most of the paragraph is made up of these subtler points. The first of these occurs in the same sentence as the statement quoted above: 'high levels of early achievement were associated with an increased likelihood of leaving, although this relationship decreased when post-school plans were taken into consideration'. The skill being tested, then, goes beyond simple recognition of a relevant statement and includes identifying such a statement in the presence of competing information.

The paragraph reference would, in an actual text, be hyperlinked to its location in the passage, so that candidates would immediately be taken there rather than being required to find it themselves by counting paragraphs.

Literacy Sample Question 7

According to the text, how does having a full-time job affect young people who have moved to the city?

- A. They feel trapped in their new location.
- B. They are encouraged to move to even larger metropolitan areas.
- C. They start to form a connection with their new location.
- D. They encourage other young people to move to the city too.

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Access and identify
Context	Further education and professional learning
Key	C: They start to form a connection with their new location.
Band	1: Below the test standard

Commentary

This question requires candidates to recognise a direct reference to forming a connection with a location in these sentences in paragraph 6: 'Young men and women who have already succeeded in securing a full-time position in the labour force have … made a commitment to remaining in the area of that position for at least the term of their contract. They have, to an extent, begun to put down roots.' The match here is explicit enough to make the question's Reading process *access and identify*.

Literacy Sample Question 8

While others have reported that 40 per cent of young people from non-metropolitan areas attend university in the major cities of Australia, such figures were not recorded in LSAY.

What explanation is given for the different figures in this report?

    A. The other studies have overestimated the figures.
    B. The other studies dealt with an earlier time.
    C. This report used different definitions of what a non-metropolitan area is.
    D. This report used a different method for gathering location data than other studies.

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Integrate and interpret
Context	Further education and professional learning
Key	D: This report used a different method for gathering location data than other studies.
Band	2: At and above the test standard

Commentary

To answer this question, candidates need to read on from the provided quotation to find a reference to a different method for gathering location data (the use of postcodes provided by participants in LSAY), and interpret the rather technical observation, 'This difference may be an artefact of …'. The other options provided by the question are plausible but not supported by the text. As part of the online test, the provided quotation would be hyperlinked.

Literacy Sample Question 9

Nevertheless, a reluctance to change one's address while at university may indicate a reluctance to consider the move to a metropolitan area anything more than a temporary move for study.

Which of the following descriptions best matches this sentence from the text?

    A. a finding
    B. a justification
    C. speculation
    D. a query

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Integrate and interpret
Context	Further education and professional learning
Key	C: speculation
Band	2: At and above the test standard

Commentary

To answer this question, candidates need to make distinctions between four descriptions of the provided statement, each of which has some plausible appeal in the context of a research report. 'A finding' is too decisive to describe the tentative statement; 'a query' captures the uncertainty of the statement but mis-states its purpose; 'a justification' may be thought to apply to vindicating participants' behaviour. 'Speculation', however, captures the tentative nature of the suggestion. As part of the online test, the quotation provided in the question would be hyperlinked to the text.

Literacy Sample Question 10

What is the main function of the last paragraph?

    A. to summarise facts
    B. to offer possible explanations
    C. to present evidence to support an argument
    D. to plan a future investigation

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Reading
Text format	Continuous
Text type	Descriptive, informative and persuasive
Process	Evaluate and reflect
Context	Further education and professional learning
Key	B: to offer possible explanations
Band	2: At and above the test standard

Commentary

This question calls for candidates to stand back from the content of the text (in this case, a paragraph of the text) and reflect on the function of the paragraph in relation to the text as a whole. The last paragraph begins with an assertion: 'The relationship between full-time employment and a disinclination to leave a metropolitan area is relatively straightforward.' The remainder of the paragraph explores possible explanations of this relationship: attachment to a new location, the gaining of tertiary qualifications and the limited opportunities outside of metropolitan areas to apply these qualifications. The answer, then, is 'to offer possible explanations'. These explanations do not involve a summary, new evidence, or reference to a future investigation.

Outdoor Learning

A primary teacher is drafting a letter to parents as part of a professional learning course. Her letter is designed to introduce parents to the benefits of 'outdoor learning' for students.

The questions that follow relate to this draft.

Literacy Sample Question 11

Which punctuation should be inserted in the space?

Part of outdoor learning involves students engaging in so-called 'risky play'. There are several ways to do this_____ climbing trees, moving rocks, playing in the rain, or getting dirty in the mud.

    A. a colon
    B. a comma
    C. an ellipsis
    D. a semicolon

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Technical skills of writing
Skill	Syntax, Grammar and Punctuation
Context	Schools and teaching
Key	A: a colon
Band	3: Clearly above the test standard

Commentary

To answer this question, candidates need to identify the correct punctuation mark to signify transition to specifying instances of an idea that has just been mentioned in a general way; namely, a colon. In this case, the general idea is ways of engaging in risky play, and the instances of the idea are climbing trees, moving rocks etc.

Literacy Sample Question 12

If the sentence below contains a spelling error, correct the error by typing the word as it should appear (type **only one word**); if there is no error, type **N**.

With outdoor learning, your children will have the opportunity to cultivate a vocabulary that they may not otherwise aquire.

_____

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Technical skills of writing
Skill	Spelling
Context	Schools and teaching
Key	acquire
Band	2: At and above the test standard

Commentary

To answer this question, candidates need to recognise a commonly misspelt word ('aquire') and provide the correct spelling (acquire). The provided sentence contains several other words that are commonly misspelt but are correctly spelt here: opportunity, cultivate, vocabulary.

Literacy Sample Question 13

On days when there will be outdoor learning we ask that families pack their child's bag with spare clothes to encourage children to fully participate in, and take full advantage of, the learning.

After proofreading the sentence above, the teacher wishes to replace the words *take full advantage of* with the words *make the most of.*

What changes as a result of this replacement?

      A. only the meaning of the sentence
      B. only the formality of the sentence
      C. both the meaning and the formality of the sentence
      D. neither the meaning nor the formality of the sentence

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Technical skills of writing
Skill	Word usage
Context	Schools and teaching
Key	B: only the formality of the sentence
Band	Band 3: Clearly above the test standard

Commentary

This question relates to Word usage and requires candidates to evaluate the kind of change made to a sentence resulting from a change to a phrase within it. To replace 'take full advantage of' with the slightly more colloquial 'make the most of' does not result in a significant difference in meaning. It does, however, represent a slightly more formal way of expressing the idea.

Discipline and Small Groups

Literacy Sample Question 14

A teacher is revising rough diary notes for inclusion in a journal article. The article is about maintaining discipline when students are working in small groups.

The writer has expressed four ideas in the following sentences, which are in the order she wants (numbered **I–IV**).

I. *Working in small groups has some limitations.* **II.** *Disciplining a student can sometimes interrupt the entire lesson, at least for the group.* **III.** *Interrupting a lesson can make other students in the group lose focus.* **IV.** *Unfocused students inevitably turn into disruptive students.*

Where would the following additional sentence best be placed in this sequence?

Admittedly, that's a generalisation, but one that often feels true.

   A. directly after **I**
   B. directly after **II**
   C. directly after **III**
   D. directly after **IV**

ASSESSMENT FRAMEWORK VARIABLES

Literacy domain	Technical skills of writing
Skill	Text organisation
Context	Schools and teaching
Key	D: directly after IV
Band	2: At and above the test standard

Commentary

This question requires candidates to consider connections between ideas in sentences in a paragraph to identify where an additional sentence could best be placed. The additional sentence refers back to a generalisation. It also, through its defensive tone, suggests that the generalisation, while justified, is rather regrettable. The first three options imply reservations ('some', 'can') that already qualify potential generalisations. The final sentence, however, is clearly intended to present the kind of generalisation that overstates the case.
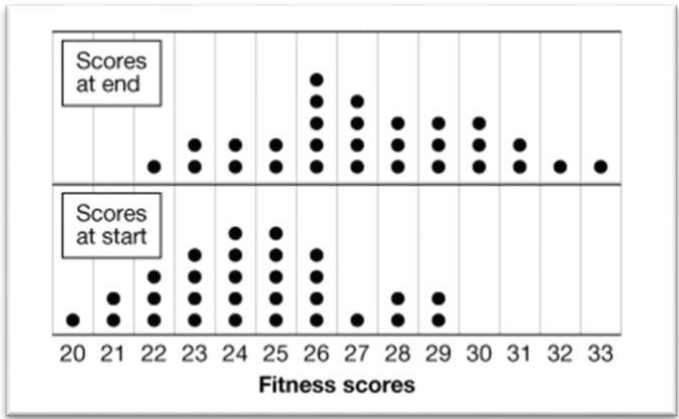
Section 1: Calculator available questions

Numeracy Sample Question 1

Fitness Scores

These plots compare the fitness scores of 29 students at the start and end of a program.

Below are some statements about the plots.

Click on 'True', 'False' or 'Not possible to determine' for each statement.

Statement	True	False	Not possible to determine
Only three students improved their fitness scores.	○	○	○
Four of the five students who scored 25 at the start scored 27 at the end.	○	○	○
At the end of the program, more than half of the students had scores greater than 28.	○	○	○

Answer: False, Not possible to determine, False in that order

ASSESSMENT FRAMEWORK VARIABLES

|	
Content	Statistics and probability
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Available
Band	2: At and above the test standard

Commentary

This statistics item represents data as dot plots. In this case, two plots are located on the same scale and candidates must *interpret* and make comparisons between the two. Presented with a set of statements about the plots, they must decide if each is true or false. An additional challenge is assessing if the information given in the plots is sufficient to determine true or false.

The first statement must be false as at least seven (scores greater than 29) must have improved. With the second statement, it is not possible to identify specific individuals so cannot determine who scored 27 at the end. It might be true but cannot be determined. The third statement must be false. There are 29 students in total so at least 15 would need to have a score greater than 28. There are only 10.

Evolution Timeline

This timeline shows approximately when the first dinosaurs evolved.
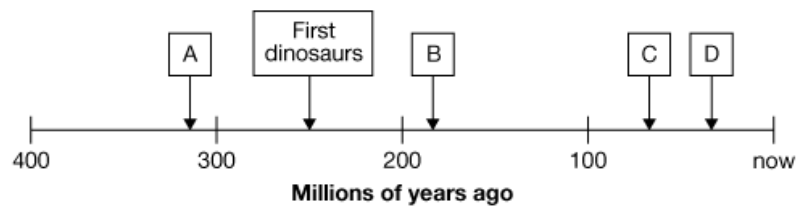
Source: Natural History Museum, London

It is widely thought that dinosaurs became extinct sixty-six million years ago.

Which location on the timeline is closest to the time of extinction of the dinosaurs?

○ location A

○ location B

○ location C

○ location D

Answer: C – location C

ASSESSMENT FRAMEWORK VARIABLES

Content	Measurement and geometry
Process	Identifying
Context	Personal and community
Availability of Calculator	Available
Band	1: Below the test standard

Commentary

This question requires the *identification* of the location of a given whole number value on a timeline that is from the present to 400 million years before. The main challenge is to identify the direction of the values – increasing from right to left.

Numeracy Sample Question 3

Overall Score

A teacher gives three assessments to students during a term.

The teacher uses this formula to calculate the overall score for each student.

overall score = (score one ÷ 3) + score two + (score three × 2)

The three scores for one student are:

score one = 21

score two = 25

score three = 24

What is the student's overall score?

Answer: 80

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Available
Band	1: Below the test standard

Commentary

This algebra item requires candidates to *calculate* a score by putting given numbers into a weighted, worded formula.

Numeracy Sample Question 4

A student wants to have an overall score of at least 70 at the end of the term.

So far the student's results are:

  score one = 18

  score two = 22

To achieve her aim, what is the minimum value she needs for score three?

Answer: 21

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Available
Band	2: At and above the test standard

Commentary

For this algebra item, an overall minimum score is given. Candidates need to *use* the formula again to determine one component of the score.

Numeracy Sample Question 5

Forming Groups

A teacher wants to place all 50 students into groups according to the following conditions:

- Each group must have 5 or 6 students.
- The total number of groups is as small as possible.

How many groups of each size should there be?

	groups with 6 students

and

	groups with 5 students

Answer: 5 and 4 in that order

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Available
Band	3: Clearly above the test standard

Commentary

This number item has a problem-solving element to it. Candidates *use* their knowledge of number facts to organise groups of students given specific criteria. Trial-and-error could be used to organise the groups to ensure there are none remaining.
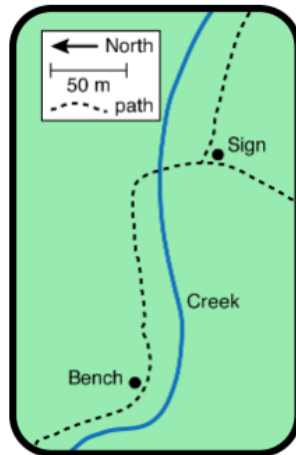
Numeracy Sample Question 6

Field Trip

A teacher and a group of students assemble at a bench beside a local creek.

From the bench, pairs of students walk along the path to complete an assignment.

This is a map on the teacher's phone.

The direction of north is shown on the map.

Which of the following directions is closest to the direction of the sign from the bench?

○ north-east

○ south-east

○ north-west

○ south-west

Answer: B – south-east

ASSESSMENT FRAMEWORK VARIABLES

Content	Measurement and geometry
Process	Identifying
Context	Schools and teaching
Availability of Calculator	Available
Band	2: At and above the test standard

Commentary

This question requires the *identification* of a direction given a non-routine orientation of a map. The candidate must identify the two locations on the map and then identify the direction they are in relation to one-another, noting that North is not oriented to the 'top' of the map.
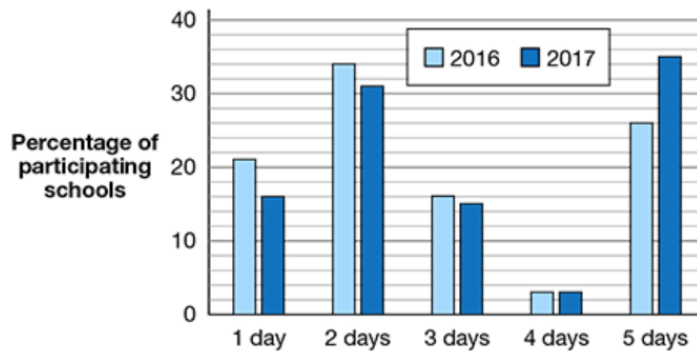
Breakfast Club

Some schools provide breakfast for students in need. These are known as 'Breakfast Club' schools.

The number of days the participating schools offer Breakfast Club ranges from 1 day per week to 5 days per week.

This graph shows how the number of days varied between participating schools for two years of the program.

Adapted from: Evaluation of the School Breakfast Clubs Program, Victoria University, 2018

In 2017, what percentage of the participating Breakfast Club schools provided breakfast for 5 days per week?

○ 23%

○ 26%

○ 32.5%

○ 35%

Answer: D – 35%

ASSESSMENT FRAMEWORK VARIABLES

Content	Statistics and probability
Process	Identifying
Context	Schools and teaching
Availability of Calculator	Available
Band	Band 1: Below the test standard

Commentary

This statistics item requires *interpretation* of a side-by-side column graph to identify a specific value. The item requires candidates to locate the 2017 data columns, the column for schools providing breakfast for five days and then read a scale with increments greater than one.

Numeracy Sample Question 8

Seminar Ratings

One hundred teachers who attended a seminar were asked to rate it from 1 (Poor) to 5 (Excellent).

The ratings by the first 20 teachers are shown in this table.

Rating	1 (Poor)	2 (Fair)	3 (Good)	4 (Very Good)	5 (Excellent)
Number of teachers	1	2	8	7	2

If the ratings by the first 20 teachers are typical, what is the predicted number of 'Very Good' ratings by the 100 teachers?

Answer: 35

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Further education and professional learning
Availability of Calculator	Available
Band	Band 2: At and above the test standard

Commentary

This item requires candidates to *use* a value from a frequency table to predict an amount. Proportional reasoning allows a rating of Very Good given by seven out of 20 teachers to predict for 100 teachers. There are five 20s in 100, $7 \times 5 = 35$.

Numeracy Sample Question 9

What is the average rating by the first 20 teachers?

Give your answer to two decimal places.

Answer: 3.35

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Further education and professional learning
Availability of Calculator	Available
Band	Band 3: Clearly above the test standard

Commentary

This item relates to the same frequency table as for question 8. Candidates must identify the need to calculate a **weighted** average from the data in the table. They then calculate the average:

1 (person) x 1 + 2 (people) x 2 + 8 (people) x 3 + 7 (people) x 4 + 2 (people) x 5 = 67; 67 ÷ 20 = 3.35

Candidates may be familiar with calculating an average (mean) by adding numbers and then dividing by a total number. This item extends the difficulty by requiring a weighted average to be calculated.

Section 2: Calculator not-available questions

Numeracy Sample Question 10

Under Thirty

This pie chart shows the age distribution of teachers in one Australian state.

Age Distribution of Teachers
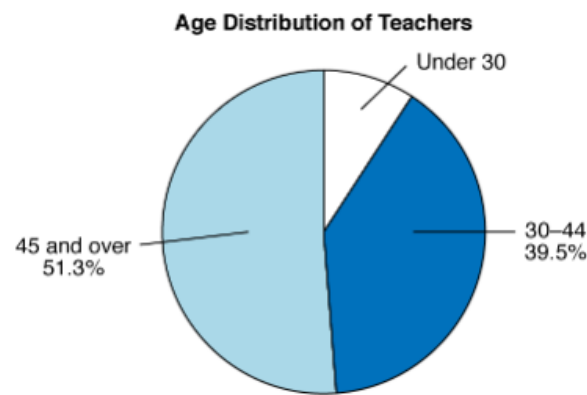
What is the percentage of teachers under 30?

[   ] %

Answer: 9.2

ASSESSMENT FRAMEWORK VARIABLES

Content	Statistics and probability
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Not available
Band	1: Below the test standard

Commentary

This statistics item requires candidates to calculate a value from a pie graph without access to a calculator. They identify percentage values for two of the three categories given. Knowing that the percentages in a pie graph sum to 100, candidates subtract the two given values (each to one decimal place) from 100.

$100 - 51.3 - 39.5 = 9.2\%$

Numeracy Sample Question 11

Pocket Money

In a survey, 14 500 students were asked about pocket money.

Three in ten of the students responded that they get pocket money without having to do any chores.

How many of the students gave this response?

Answer: 4350

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Not available
Band	3: Clearly above the test standard

Commentary

This number item requires the *use* of proportional reasoning to solve a numerical problem. For every ten students of the 14 500, three gave the response. There are 1450 tens in 14 500, multiply $3 \times 1450 = 4350$. The key elements are to recognise the number of tens in the total number and to multiply, without access to a calculator.

Language at Home

A recent census revealed that the number of people speaking an Australian Indigenous language at home increased from 60 550 in 2011 to 63 754 in 2016.

Which of the following is closest to the percentage increase from 2011 to 2016?

- ○ 5%
- ○ 20%
- ○ 30%
- ○ 50%

Answer: A – 5%

ASSESSMENT FRAMEWORK VARIABLES

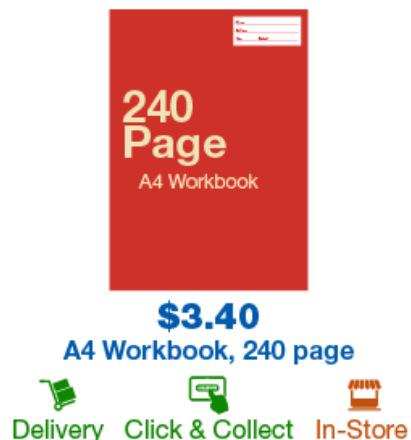|	
Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Personal and community
Availability of Calculator	Not available
Band	2: At and above the test standard

Commentary

This number item requires candidates to *use* their mathematical knowledge to represent an increase in a large numerical value as a percentage. Firstly, the difference between the two numbers is calculated (63 754 – 60 550 = 3204). From the options given, which of the percentages is closest to 3204 (the increase between the two years) out of 60 550? The challenges of this item are candidates must perform an appropriate subtraction and then determine a percentage without access to a calculator.

Numeracy Sample Question 13

Student Workbooks

A teacher decides to purchase a set of these workbooks.

240 Page
A4 Workbook

$3.40
A4 Workbook, 240 page

Delivery   Click & Collect   In-Store

What is the price of 30 workbooks?

$ [   ]

Answer: 102

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Schools and teaching
Availability of Calculator	Not available
Band	2: At and above the test standard

Commentary

This number item requires candidates to *use* their multiplication skills to determine a total cost for a purchase without access to a calculator.

Flow Rate

A hose fills a 10-litre bucket in 20 seconds.

At what rate is the water flowing?

- ○ 0.5 litres per minute
- ○ 2 litres per minute
- ○ 30 litres per minute
- ○ 50 litres per minute

Answer: C – 30 litres per minute

ASSESSMENT FRAMEWORK VARIABLES

Content	Number and algebra
Process	Using and applying mathematical knowledge and problem solving processes
Context	Personal and community
Availability of Calculator	Not available
Band	2: At and above the test standard

Commentary

This number item requires candidates to *use* their understanding of rates to identify a rate from a given volume and time, including a conversion of minutes to seconds. Ten litres in 20 seconds is the same as 30 litres in one minute (3×20 seconds $= 1$ minute).

Numeracy Sample Question 15

Race Time

During a 5-kilometre race, Olivia's average pace is 6.3 minutes per kilometre.

What was Olivia's time for the race?

○ 30 minutes and 9 seconds

○ 30 minutes and 15 seconds

○ 31 minutes and 5 seconds

○ 31 minutes and 30 seconds

Answer: D – 31 minutes and 30 seconds

ASSESSMENT FRAMEWORK VARIABLES

Content	Measurement and geometry
Process	Using and applying mathematical knowledge and problem solving processes
Context	Personal and community
Availability of Calculator	Not available
Band	3: Clearly above the test standard

Commentary

This measurement item requires candidates, without a calculator, to use a given rate and distance to calculate the time taken to complete a race, including a conversion of a fraction of a minute to seconds. $5 \times 6.3 = 31.5$ minutes = 31 minutes 30 seconds.